

Eagleby Wetlands Fauna Survey and Comments on Proposed Freeway

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Introduction

Preamble and personal disclosure

The author of this report acknowledges a personal interest in the integrity of the wetlands, as she has been conducting birdwatching tours there for some years. The reasons for so doing are however indicative of the value of the wetlands, not only to my own business but others within the tourism industry, their guests, other visiting birdwatchers and nature lovers, and the local residents. I not only run my own tours but am chair of Wildlife Tourism Australia and have engaged in much tourism literature research over the years and published various articles, chapters and books on the topic, lectured on same and have been an invited speaker on sustainable wildlife tourism in Malaysia, Indonesia and Japan. I am also a research ecologist with a PhD in zoology and have conducted many environmental impact assessments over the years in addition to ecological research in suburban, rural and wilderness areas, long preceding my tour business, and have lectured on fauna surveys as well as basic ecology at several several universities. My interests and experience in the region are thus considerably wider than simply my own business.

The time and resources available for the actual survey described herein were regrettably short. Two nights and three days are what we consider the absolute minimum to gain an initial impression of the presence of small vertebrate species, and very inadequate for such a large area, but this time it was the only option. Thus the survey must be seen as an initial exploratory study only, and we cannot assume that species that remained undetected were not present, which can be a precarious conclusion even with a more exhaustive survey. A considerable amount of other information, especially from bird groups and also from my own previous visits and conversations with locals, was already available, and some will be discussed herein.

Photos in this report are mostly by Ronda Green, Darren Green and local resident Robert Livingstone plus a couple of other local residents.

Background

The Eagleby Wetlands and neighbouring natural or semi-natural areas are well-known for their biodiversity and recreational value. They include a remarkable variety of habitats for a region at the edge of suburbia: rivers (Logan and Albert), lakes and lagoons, swamps, mangroves, tea-tree wetlands, open sclerophyll forest dominated by sheoaks, riparian areas of tall mature eucalypts with hollows, small patches of rainforest species, and open areas of tall grasses. It is not surprising it is home to many species of birds throughout the year plus others that visit seasonally or opportunistically, and thus popular with both hobbyist birdwatchers and ecotour operators (I myself am one of the latter, and have been visiting with tourists for over a decade). It also supports various reptiles, frogs, mammals, butterflies and other wildlife.

In addition to the more natural areas there are large expanses of suburbia, cattle pasture and sugarcane plantations plus a water treatment plant. Many have settled here to enjoy the peaceful natural surrounds, either in private homes or retirement villages. I have remarked myself when bringing international tourists and others into the area that if I was ever to be forced to live in the suburbs again (instead of my current rural lifestyle) this district would be amongst those at the top of my list of possibilities. I have also praised it as an encouraging example of a naturalist organisation (the former Bird Observers Club of Australia) and a local council (it was then under jurisdiction of the Gold Coast City Council) working together to assist nature conservation, education and recreation. Every time we visit the boardwalk or the lagoon on Eagleby Road near Palm Lakes Resort we see people walking their dogs, strolling, jogging, birdwatching, taking photos (usually of birds) or just sitting and enjoying the peaceful surroundings, but not the big, noisy crowds we often encounter at some other destinations.

Recognition as birding hotspot

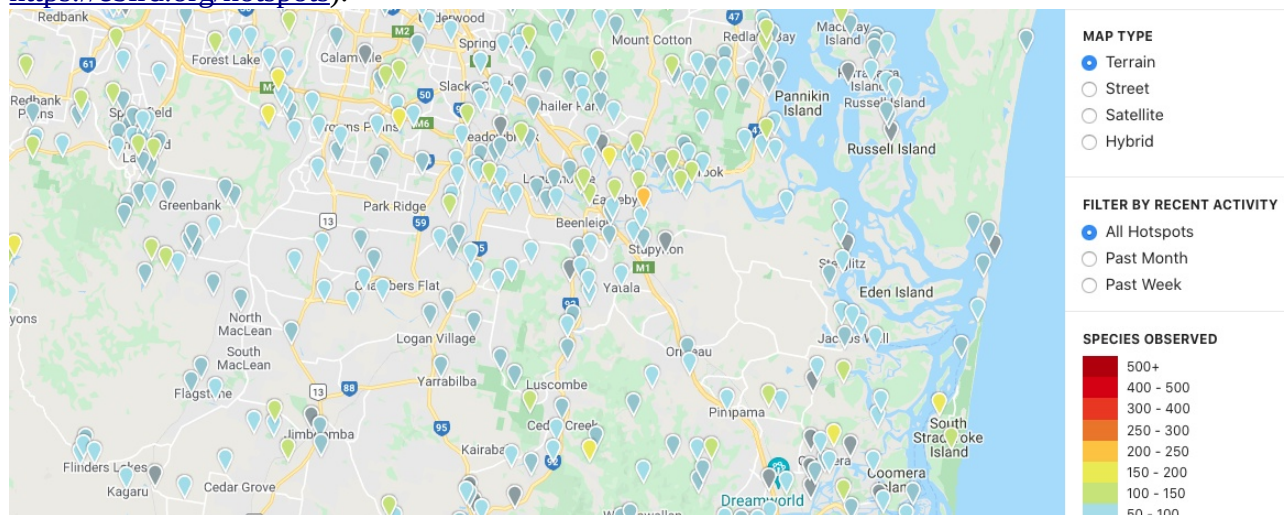
Eagleby Wetlands has long been recognised by eBird users, Birdlife Australia, Birdlife Queensland and others as a birding hotspot (e.g. news.com.au 2009). The orange pointer in Figure 1 for instance is Eagleby Wetlands.

My own company, Araucaria Ecotours has made frequent use of Eagleby Wetlands. Although some lagoons that were once full of birds are now instead choked with weeds, the area continues to be rewarding, and on our own tours we usually visit the boardwalk, the river walk beyond that, the lagoon on Eagleby Road near Palm Lakes Resort, the river at Wharf Street, and the lagoons and swamps of Schmidt Road. Occasionally I have been asked by international birders to take them to other wetland areas they have read about on eBird or elsewhere but have been disappointed in the variety of birds we viewed, and when I have suggested we leave early, even if traveling 100km or more west or north of Brisbane, so we can include a visit to Eagleby, they have not been disappointed. I have often wished I could spend longer exploring Eagleby with our tourists, and would have done so had there been a restaurant with appealing atmosphere (not in the middle of a shopping centre) and preferably a view of water and trees suitable for an international clientele.

Birdwatching tourism has been shown to significantly assist local economies (e.g. Buckley and Jones 2001, Lee *et al* 2009, Sekercloglu 2002, Siossian 2019, Tisdell and Wilson 2004). Water

treatment plants are also well-known to add to the diversity and numbers of birds visiting or residing at a site (e.g. Stevenson 2018) and such treatment plants are well-known by birdwatchers traveling to Darwin, Geelong and other parts of Australia.

Figure 1. Map of birding locations showing Eagleby Wetlands as having a high bird count (from <https://ebird.org/hotspots>).



Plans for Freeway and request for fauna survey

For years it seemed something so well appreciated by so many would never change. However, a major freeway is now planned as part of Stage 2 of the Coomera Connector, an undertaking by the Queensland department of Transport and Main Roads

(<https://www.tmr.qld.gov.au/projects/coomera-connector>), with sections of it running quite close to a major lagoon near a quiet retirement village (the lagoon with its tranquility and birdlife being one of the reasons at least some of the residents choose to settle there for their later years), the Eagleby Wetlands lagoons that BOCA and the Gold Coast City Council established some years ago as important areas for bird conservation and public recreation (complete with boardwalk, bird hides and habitat restoration), and other currently peaceful and bird-rich sites.

TMR (<https://www.tmr.qld.gov.au/projects/coomera-connector>) states that “All property owners directly impacted by the gazettal of the corridor were advised during the planning stage. Our team continues to liaise with property owners when dealing with land sales and development applications.” We are aware there have also been recent public meetings. We are uncertain as to how effective consultation there has been with those whose properties are not directly affected but whose lifestyles or other interests could be affected, especially as we are aware that a number of residents feel their concerns have not been fully taken into account, or the possibility that viable alternatives could exist.

A regional perspective must be considered in such cases, for the sake of local residents, attraction of tourists, and natural ecosystems. Although there are other well-known birding sites in the region, this is one of the best between Brisbane and the Gold Coast, much of it very accessible, making it a special place for both birds and birdwatchers (and more general nature-lovers) both domestic and international. Also, although there are indeed other wetlands, during prolonged drought periods

many of Australia's more nomadic bird species head coastwards, and there may not always be enough resources (water plants, aquatic invertebrates, fish etc.) to serve all their needs.

The bushland sections are also likely to be increasingly important to birds and other wildlife as other vegetation in the region is cleared for housing or other developments. Some north-south or altitudinal migrants may depend on the area in particular seasons, and may increasingly do so with future land-clearing.

Re-routing the freeway would be counter-productive if it was moved to other sensitive habitats such as the Carbrook Wetlands. There would appear to be alternatives that avoid this, but these are beyond the scope of this report.

The aims of the current study were to:

- conduct and report on a (necessarily very short) survey for small mammals and other vertebrates
- survey the literature and online information relevant to biodiversity and tourism potential for Eagleby
- offer advice based on the above, and from the author's long experience in both wildlife ecology and ecotourism

Methods

Fauna Survey

Volunteers from the Eagleby Community and Wetlands Group assisted with the survey, which was conducted from 9-11 February 2021 under the author's permit for collecting native animals. The author's son Darren, who has been assisting with fauna surveys for the past three decades, also assisted throughout the survey.

A total of 40 Elliot traps and two wire cage traps were set for small mammals, all with a mixture of rolled oats, honey and peanut butter, and every second one also with a piece of sardine (to attract small carnivorous marsupials and bandicoots). Dry grass or soft bark was added to each trap for the comfort of any animals caught, and also placed on and around each trap as insulation from the weather and concealment from passers-by. The traps were set a minimum of 5 metres apart in lines divided between two private properties - one near the northern end of Schmidt Road and one near the western end of Eagleby Road - and also Stoten Park, a public park. All were close to water - either swamp, lagoon or river - and close to sections of the proposed freeway. Traps were placed near or under sheltering vegetation, and where possible within anything that looked like it could be a natural runway for small mammals. All traps were tagged with flagging tape on branches a metre or more off the ground so none would be overlooked the following morning, and all were checked soon after dawn the morning after being set.

Three pitfall traps were also sunk at each of the two private properties, with steep-sided plastic buckets sunk into the ground, unbaited but with dry grass and polystyrene added, the polystyrene being buoyant and so offering a floating raft to any small creatures if we had unexpectedly heavy rain during the night. Several metres of drift net were erected, with soil packed against each side, to lead frogs and small lizards towards the pitfalls, which they then bisected.

We conducted the survey in late summer, in the hope of encountering some of the frog species that were getting towards the end of the season in which they are likely to call. We had planned on a second survey in May or winter, which would have been a better time to seek small carnivorous marsupials (family Dasyuridae), as it is the time when young adults are actively exploring new home ranges and later seeking mates, but this was cancelled. We are advised that motion-sensing cameras have been set in the hope of detecting these.

Figure 2. Properties where traps were set. The two areas of private land are the westernmost and easternmost sites, the public park being the more southerly site near the Drainage Reserve.



Figure 3. Setting the traps



We conducted nocturnal searches with spotlights on each of the two nights and attempted recordings of frog calls with smart phones, but other noises made the recordings unsatisfactory, so we could only reliably identify what we could confidently recognise in the field. The first night we concentrated on Schmidt Road and Stoten Park, and the second night explored the property near the end of Eagleby Road and a further property on Eagleby Road between the two private properties mentioned above.

During daylight hours while setting or checking traps we also opportunistically recorded birds, butterflies and any other creatures that happened to come through the area.

A Song Metre was set on each property to record bat calls, and also motion-sensing cameras attached to trees, facing the ground on which bait similar to that in the Elliot traps had been scattered.

Local residents were asked to report any sightings of wildlife beyond the actual survey.

Literature and online surveys

I requested 2 lists from Wildlife Online of all species reported from a circular area with the centre at Latitude: -27.7024 and Longitude: 153.2130 and a radius of 5 km, which essentially covers the entire suburb of Eagleby. One list included all reported sightings of species, the second only those which had been confirmed, and detected since 1980.

I also checked the online eBird lists and lists produced by the former BOCA (Bird observers Club of Australia) and Birds Queensland, and googled for further information.

Literature on effects of roads on wildlife and the value of birdwatching to local economies were also reviewed, although due to time constraints not as comprehensively as they would have been for academic publication.

Results

Fauna survey and additional information

The trapping was quite disappointing, but it was only for two nights, and not in the best season for small carnivorous marsupials (at this time of year the only adults still alive are females: a better time for trapping would have been late autumn and winter, when young adults are more active, seeking new territories and later seeking mates).

Mammals

Placentals

The only mammal caught in a trap was a feral house mouse (*Mus musculus*), in a location that was grassier and less wooded than most of the others.

No native rodents were found in this very brief survey.

Bats recorded by the Song Meter and analysed by ecologist Greg Ford were:

- Northern Free-tailed Bat *Ozimops lumsdenae*
- Eastern Coastal Free-tailed Bat *Micronomus norfolkensis*
- White-striped Free-tailed Bat *Austronomus australis*
- Little Bent-winged Bat *Miniopterus australis*

One microbat and one fruitbat were seen on the nocturnal walks, but too briefly to be identified. All three local flying fox species (black, grey-headed and little red) have been recorded as confirmed since 1980 on Wildnet (Queensland government)

Foxes were recorded after the survey by motion-sensing cameras mounted by local resident Robert Livingstone (one of these is pictured to right, sniffing for food, its brushy tail clearly visible). I have sighted one previously in the canefields of Eagleby Rd., as have several local residents.

Hares have also been detected, as have domestic cats (either feral or straying from yards)



Marsupials

Grey kangaroos and red-necked wallabies have been observed and photographed by local residents (e.g. recent capture by motion-sensing camera set by Robert Livingstone, reproduced to right), and at least one swamp wallaby was sighted recently near Schmidt Road by Claire Tailor.

We know of no koalas currently within Eagleby but there have been recent sightings not far away, in Alexander Clark Park, Loganholme.

Monotremes

None were detected during the survey, but there have been recent sightings, confirmed by photographs, of echidnas in the region, reported by Claire Tailor.



Birds

Because of the extensive observations already made on birds in the area, we did not concentrate on birds in this survey, although we did record some incidental observations. Our list for the two afternoons of trap-setting and two mornings of trap-checking thus included (without really trying):

- white-throated gerygone
- grey fantail
- golden-headed cisticola
- Australian magpie
- grey butcherbird
- Torresian crow
- eastern whipbird
- noisy miner
- silvereye
- crested pigeon
- bar-shouldered dove
- scaly-breasted lorikeet
- galah
- laughing kookaburra
- forest kingfisher

- white ibis

Reptiles and frogs

One skink – a *Lampropholis amicula* (friendly sunskink or secretive skink, pictured below) – was caught in a pitfall trap, on the property adjoining the western end of Eagleby Road. No other reptiles were detected during searches, although others have been sighted opportunistically at other times by the author and local residents (including bearded dragon, eastern water dragon, carpet python, tiger snake and an *Emydura* turtle).



Only one species of frog was caught in the pitfall traps, but others were heard at night

- Striped marshfrog *Limnodynastes peronii* – (pictured) 5 caught in the western-most property on the second morning, spread across all three of the traps.
- Eastern sedge frog *Litoria fallax* – heard during nocturnal search
- Striped rocket frog *Litoria nasuta* – heard during nocturnal search
- Broad-palmed rocket frog *Litoria latopalmata* – heard during nocturnal search



- Southern laughing (or Tyler's) tree-frog *Litoria tyleri* – heard during nocturnal search

We know from observations by residents that the green treefrog *Litoria caerulea* also inhabits the region. Further nights of trapping, and sound-recording devices set up on warm wet evenings would very likely have detected more species. All the frog species we found had already been recorded Wildnet as confirmed species since 1980, plus a further 14 species.

The only other amphibians detected, regrettably, were two feral cane toads *Rhinella* (formerly *Bufo*) *marina* captured in Elliot traps and a few others of that species seen near water bodies..

Other species

Butterflies observed during the survey included the introduced monarch butterfly and the following native species:

- Blue triangle *Grapheum sarpedon*
- Orchard butterfly *Papilio aegaeus*
- Blue Tiger *Tirumala kimniace*
- Common crow *Euploea core*
- Evening brown *Melanitis leda*

Literature survey – birds

eBird lists Eagleby Wetlands as a birding hotspot with 205 species recorded. Other lists record many more species. Since there is abundant information on numbers of birds in this region, in this report (see discussion) I am concentrating not so much on actual numbers but on the actual composition of these lists, i.e. some of the important taxa (for both conservation and tourism), reliability or rarity of sightings, and seasonal and other variations (e.g. see Appendix I). I am ignoring a few doubtful records (e.g. I suspect the red-capped robin that has been recorded was actually a mistletoebird, the western wattlebird was a little wattlebird and the Adelaide rosella was either an aviary escape or a hybrid of eastern rosella and pale-headed rosella) and feral or domestic birds such as spotted doves or muscovy ducks, as the latter are relevant to neither biodiversity conservation nor serious birdwatching. This still leaves us with a very impressive list, especially for a site on the outskirts of a city

Literature survey - other

Bats recorded in Eagleby by Wildnet (confirmed sightings since 1980) included little bent-wing bat *Miniopterus australis*, white-striped freetail bat *Austronomus australis*, east coast freetail bat *Mormopterus ridei*, eastern free-tailed bat *Mormopterus norfolkensis*, Gould's wattled bat *Chalinolobus gouldii*, hoary wattled bat *Chalinolobus nigrogriseus*, Gould's long-eared bat *Nyctophilus gouldi*, and little broad-nosed bat *Scotorepens greyii*

No native rodents were detected in our survey but fawn-footed melomys *Melomys cervinipes* (a forest species) and swamp rat *Rattus lutreolus* (which needs a combination of swampy, grassy and wooded areas) have been recorded by Wildnet (confirmed sightings since 1980)

Marsupials recorded by Wildnet (confirmed sightings since 1980) include the three macropod species referred to in Results (*Macropus giganteus* *Notamacropus rufogriseus* and *Wallabia bicolor*), plus yellow-footed antechinus *Antechinus flavipes flavipes*, northern brown bandicoot *Isodon macrourus*, sugar glider *Petaurus breviceps sensu lato*, squirrel glider *Petaurus norfolcensis*, common brushtail possum *Trichosurus vulpecula* and koala *Phascolarctos cinereus*.

Reptiles recorded by Wildnet (confirmed sightings since 1980) include several snakes (*Morelia spilota*, *Cacophis harriettae*, *Demansia psammophis*, *Pseudechis porphyriacus*, *Anilius nigrescens*) and lizards (*Anomalopus verreauxii*, *Calyptotis scutirostrum*, *Cryptoblepharus pulcher pulcher*, *Ctenotus spaldingi*, *Lampropholis delicata*, *Lygisaurus foliorum* and *Varanus varius*).

Discussion

Biodiversity Conservation

Birds

There is a remarkable diversity of bird species within a small area, and ranging across many foraging guilds: raptors, surface feeding and diving ducks, deep divers such as little black cormorants, grazers such as magpie geese and swamp hens, species that wade but have very different feeding styles such as avocets, spoonbills, storks, ibis and dotterells, and forest birds including carnivores, scavengers, frugivores, nectarivores, granivores, and aerial-catching, leaf-gleaning, bark-probing and ground-foraging insectivores. Birds also range across a diversity of habitat preferences (reedy swamps, shorelines, deep water, grassy areas, open forest with grassy understorey, forest with shrubby understorey, forests with rainforest flora etc.), indicating there is likely to be a high biodiversity amongst invertebrate groups as well and at least the potential for a high diversity of fish (eight species have been recorded and confirmed by WildNet since 1980) and other vertebrates (mammals, reptiles and frogs), especially if the introduced predators (mainly cats, foxes and dogs and possibly feral rats) could be controlled. There have been at least occasional sightings of rare (e.g. freckled duck) and endangered (Australian bittern, regent honeyeater, curlew sandpiper, Australian painted snipe) species.

Eagleby Wetlands could be especially important to nomadic birds during a drought. The freckled duck, the rarest species of waterfowl endemic to Australia, only visits coastal wetlands such as these if there is an extended drought inland. In such cases survival of individuals, and thus populations of such rare species also, can depend on the quality of wetlands they visit for their plant and invertebrate food. The lagoons of the wetlands have been allowed to dry out for long periods. Annette Foy of Create-a-Tour in 2018 sent me the message: “Last time I stopped at Eagleby Wetlands I was really disappointed to see how much of the water had been overgrown with grasses and reeds.” This has indeed been frustrating, as for instance there was once an expanse of water in front of the hides where we could watch pink-eared ducks, avocets, swamp harriers and other birds above an attractive expanse of water, which I’ve only been able to describe to our international guests in recent years as we now watch instead for fairy-wrens and finches amongst the tall weeds (see also Appendix II).

The actual loss of native habitat in terms of number of hectares to be cleared for construction of the freeway would appear to be low. However, impacts may go beyond the cleared area. Birds rely on sound for communicating with one another, detecting the approach of predators and finding prey (e.g. listening for rustles in leaves or even below the soil). There is mounting evidence that traffic sounds can reduce a bird’s ability to perform these functions, and can cause a decline in bird numbers near freeways, or even when recorded freeway noise is played nearby, before actual construction begins (Dooling and Popper, 2007, 2016, Gill 2021, Reijnen, R. and R. Foppen 1994)

Other species

The results of trapping were very low. No native mammals were trapped, and only one reptile and one frog species. The only other vertebrates trapped were the introduced house mouse and cane toad. With such a brief survey, although we can fairly confidently say native vertebrates were not abundant at the trapping sites, it is impossible to say none were there or even that their overall abundance was very low across the entire region. In disturbed areas with resident feral and domestic predators (cats, dogs and foxes), we would need much longer surveys and at a greater number of sites within the area, to have a good probability of detecting small mammals. Detecting the rarest of them can be especially time-consuming. Trapping with students I was lecturing to at Southern Cross University some years ago in Bundjalung National Park, we had 200 Elliot traps set for 3 nights, and caught many native rodents and a few marsupials, but only one planigale and one phascogale. Capturing those two animals confirmed they were there, but that was one capture each out of a possible 600 (200 traps over three nights). Similarly, with the same group and similar number of traps and trapping nights, in the Border Ranges National Park we caught many native rodents and marsupials but just one *Antechinus swainsonii*, which had not previously been encountered there, and excited Steve van Dyck, mammal curator of the Queensland Museum, as it suggested that species was so close to the Queensland border it might also be found in Lamington National Park. An ecological survey of Wivernhoe Park through Griffith University and SciPlan continued for several months, with traps being set several nights a week, and during that entire period just one dunnart, *Sminthopsis murina*, was captured in a deep pitfall trap and one narrow-banded sand-swimmer (a lizard not previously encountered so far east), again providing proof that these species were present but it took considerable time and effort to actually achieve this. There are many other examples of a species turning up just once in an extended trapping session. As the saying goes (author uncertain) "absence of evidence is not evidence of absence": failure to detect a species after exhaustive surveys may strongly imply absence, but not failure to do so with a two-night trapping session.

Different species will often be absent or less easily detected in different seasons or by different methods. Small carnivorous mammals of the Dasyuridae family are best detected in late autumn and winter when young adults are actively dispersing. After a frenzied mating season in early spring all males die, and the females are soon burdened with progressively growing youngsters, and thus less active for the next few months. Although it is certainly still possible to trap them in other seasons, it reduces the probability of any individual encountering a trap. Even within this family, while antechinus often enter Elliot traps quite readily, dunnarts are less inclined to do so, and zoologists often have better luck with pitfall traps, but because of the dunnart's jumping ability these need to be not only steep-sided but at least 60cm deep. Frogs tend to be more active on warm wet nights, some only emerging or calling during substantial rainfall, especially after a period of drought, but there are also a few species that call during winter. Reptiles are more active in warmer months, some becoming active earlier than others in spring. Some can readily be found by active searching in daylight but others are more cryptic, spending most of their time in dense undergrowth, nocturnal in habit or even (such as the blind snake that has been recorded at Eagleby on WildNet) living underground. Migratory or nomadic birds will obviously not be detected in seasons when they are absent from the region (e.g. koels and dollarbirds that travel north for the winter) and some will only be present in suitable conditions (such as when the tea-trees are flowering, mistletoe is fruiting or rainfall has replenished the lagoons after a drought, with sufficient time for invertebrates or water-plants to flourish and thus provide food). Some birds may be present year-round but heard mainly during breeding season and difficult to detect at other times.

For a fully comprehensive survey to adequately investigate what species use the area, we would suggest trapping, direct observation, sound recording and motion-sensing cameras, in at least four seasons and at different times of day and night, the trapping and observation extending for at least a week each time, and the recording devices for several weeks. This would preferably occur over a

two-year period, as rainfall and other conditions can vary markedly between years, affecting wildlife presence and behaviour. A greater number of traps and cameras would speed up the amount of information collected. [Please note: I am not asking to be employed for this, just recommending it be done by someone]. There are probably no birds currently present that have never been recorded, because it is such a well-known birding site (although shy nocturnal waterbirds living amongst reeds could escape attention) but there could still be rare reptiles, small mammals or frogs that are less easily detected and have not been rigorously searched for. It would also be useful to study the behaviour of the birds more than has been done so far: for instance, what triggers the arrival of migratory or nomadic birds to this particular site, what do they feed on while here, how many other resources in the wider region are available to them at such times, whether some are more shy than others of walkers or vehicles, whether they nest in the area or just move through, etc.

There has been a 12-month study conducted at least in part by one of my colleagues (Darryl Jones) on the more southerly Stage 1 of the Coomera Connector. It is to be hoped that a similar study will be conducted for the more northerly area which will be impacted by Stage 2.

The effects of noise on species other than birds and marine vertebrates has been less well studied, but Bunkley *et al* (2017) demonstrated that certain arthropods are sufficiently affected by human-induced sounds their populations can significantly decline, because many “rely upon airborne sounds and substrate-borne vibrations in their life histories”. They point out that “[g]iven the diverse and important ecological functions provided by arthropods, changes in abundances could have ecological implications.” The effects of freeway noise in Australia is largely unknown but its potential should not be ignored, and we would like to see further research on this in the future. It could well be a useful and interesting project for an Honours student.

Tourism potential

Logan City's former environment committee chairman Aiden McLindon has been quoted as saying "I think the Eagleby Wetlands is an absolute environmental goldmine ... I would like to see more land acquired around there, not only for protecting wildlife but for people to enjoy" (news.com.au. 2009)

Sekercloglu (2002) points out that birdwatchers form the largest group of ecotourists, and are typically well-educated, wealthy and committed, and thus birdwatching tourism has a high potential to improve the financial well-being of local communities. Withrow (2019) reports that “It is estimated that over \$800 billion is spent a year in outdoor recreation in the United States, with birdwatching having an economic benefit of \$41 billion dollars. Roughly \$17.3 billion is spent annually in wildlife-watching trip-related expenses in the U.S., with more than 20 million Americans taking birding-specific trips.”

Callaghan *et al* (2018, 2020) point to the economic value of vagrant birds, which occasionally appear in a country from other regions, and bring high-paying birders traveling across the country just to get a glimpse and add them to their life-lists. It is unlikely that many vagrants will arrive at Eagleby, but with good publicity through birding circles and social media, rare species such as freckled ducks (the rarest of all Australia's waterfowl species) arriving in time of drought could well bring in birders from other parts of Australia if not from overseas for a special chance to see them.

In Appendix I, I have divided many of the birds that have been recorded by eBird into wetland birds, forest and grassland birds and diurnal raptors, and the frequency and seasonality of sightings. Birds that can be reliably seen throughout the year (especially if weeds are controlled and lagoons are not permitted to completely dry out) are a valuable standby for tour operators and educators, and there is quite a variety of these, across many families such as ducks, egrets, kites, parrots, cockatoos, honeyeaters, fairy-wrens and others. Birds that appear seasonally can be used to promote return visits by birdwatchers to the area. The arrival of less predictable ones can be announced *via*

email or social media to birding groups both locally and throughout Australia: hobbyists who have never seen pink-eared ducks, yellow-billed spoonbills, swamp harriers, striped honeyeaters or other particular species may well decide to travel to see these and stay overnight in the district, spending on food, petrol, car hire and the like as well as accommodation, and so help boost the local economy.

Although some birdwatchers are happy with a sandwich at a picnic table, a choice of good restaurants or cafes in scenic areas, not in shopping centres and not chains like MacDonalDs, would greatly increase the overall satisfaction of many international tourists, especially some of the wealthier ones. A range of eating opportunities would be ideal, especially if at least some of them featured local produce and Australian specialties.

Accommodation providers could do well to promote birding opportunities in the region when advertising online to both domestic and international travellers. Local shops or an information centre could also profit by offering bird-related and other nature-related souvenirs, books, paintings, jewellery, and videos, either for individual profit or fund-raising for upkeep of the wetlands.

Governments throughout the world are increasingly aware of the potential economic and other community benefits of birdwatching tourists and recreationists. (Lee *et al* 2009, Potter 2021, Tisdell and Wilson 2004).

Not all travel agents however are aware of the popularity of birdwatching, as tourists often seek information elsewhere. In a survey I conducted with Darryl Jones some years ago, less than 4% of birdwatchers interviewed said they approached travel agents for information. This leads to a vicious circle in that travel agents don't stock birdwatching information because they see it as a minor niche market since no one ever asks them about it, and birdwatchers who do approach travel agents soon learn they don't offer good information so they seek it elsewhere. During participation at the Australian Travel Exchange in Sydney this year (ATE21) however, when I described the birdlife, variety of habitat and the easy walks at Eagleby, and the proximity to both Brisbane and the Gold Coast, to travel agents from around Australia and New Zealand, and did the same during online discussions with agents from Asia, the Americas and Europe (almost 100 of them all up), many were enthusiastic about such a rewarding birding spot so close to both a capital city and a major tourist area. Managers and promoters of tourism destinations elsewhere have become very conscious of the value of birdwatching areas (2021), and the main suggestions from an open-ended query on what would improve birdwatching in Australia in a survey by Green and Jones (2010) were conservation of habitat and local information on where to find birds.

We can't welcome international tourists at the moment because of Covid-19, but surely we will again in the future, and there is in the shorter term a good potential for interstate and local birdwatching tourism, and possibly New Zealanders. It also has potential for field trips from primary, secondary and tertiary educational institutions, and even for groups of home-schooled children and their parents (I ran a half-day session for home-schoolers there a couple of years ago).

Tourism and biodiversity conservation can go hand in hand if managed well so that potential negative effects are avoided or at least minimised (Green and Higginbottom 2000, Wildlife Tourism Australia 2018).

Barry Davies of Gondwana Guides does not normally include Eagleby Wetlands, as he generally meets an international group from the airport and visits the Port and Sandy Camp then through to O'Reillys, leaving no time for Eagleby, but he recognises it as being a critical link in the chain of bird habitats between Brisbane and the Gold Coast. One of my former guests, from South Australia, sent me a news article about Eagleb, and on being informed that I was writing a report she offered the following as a quote: "I learnt of Araucaria Ecotours in 1994. A particularly memorable guided tour was in 2011 to Eagleby Wetlands. Oh, the birds, from lily trotting jacana to soaring sea-eagle. I

noted many different types of creatures: 36 birds, 11 butterflies, 5 dragonflies and 2 frogs. Please protect the Eagleby Wetlands for wildlife and ecotourism. Heather, Adelaide SA". A Sydney resident, Sarah, on the very last tour we ran this year (in July) before Covid lockdown once again forced us to cancel all tours for August and possible September, was disturbed to hear of the proposed freeway which would alter the ambience for tourists and birds alike, and sent me the following thoughts by email after returning home:

"It is very sad to think that the Eagleby Wetlands is under threat. A couple of thoughts:

- It is incredibly valuable to have important ecological reserves near built-up areas so that people can access them. That's important for those of us who just like being in nature, but also for those less familiar with such places and of course children to learn about their native environment. A lot of Aust. is simply too far for us to get to. We would all like to go to Riversleigh but I can't get there as its just too far away. That makes my local wilderness area, National Parks, wet-lands, bush, crown reserves very important. Eagleby is such a place.
- The latest AWC video has masses of data which could be useful in getting the important data across to decision makers. Things like: '...in the last 15 years Australi's threatened species list has increased b 36%'. Eagleby Wetlands can help to counter this loss. https://www.australianwildlife.org/celebrating-30-years/?utm_source=newsletter&utm_medium=email&utm_campaign=7cccd27b40_S1
- An opportunity for local tertiary education centres to continue research and training in a location which is not too far flung and expensive.
- A show-case for future environmental projects which work to re-create a ecology free of feral threats. Like Zealandia in the heart of Wellington NZ. <https://www.visitzealandia.com/About>"

Other aspects

A survey of residents living near the lagoons and bushland areas, but not restricted to those whose properties are actually on or adjacent to the route of the proposed freeway, could ascertain the importance of those areas in their decision to buy their homes there. I've been informed by a resident of Mt Warren that she and her neighbours decided to live there not because of affordable prices as was assumed by one Council official but because of the remnant bushland nearby. This factor could be relevant not only to the continued quality of life and general contentment of current residents but also to the economic aspect of potential future home-buyers.

A high reliance on private vehicle use for residents of Brisbane employed in the Gold Coast and *vice versa* has been cited, along with the predicted population growth of both centres, has been given as a reason the freeway construction is necessary. We are not experts in town planning, but are pondering the potential for an increase in public transport, which may be preferable for many commuters rather than driving that distance twice a day, especially if improved services at stations and a better variety of bus routes were offered, and also question the apparent assumption that very rapid increases in population in southeast Queensland will continue to be beneficial to the majority of residents once a certain density is exceeded.

Conclusions

We have no evidence that Eagleby is currently harbouring critically endangered fauna species (other than occasional visits by endangered birds), but there have been no comprehensive surveys other than for birds. Endangered species aside however, there has been progressive decline in terrestrial and wetland habitats in Southeast Queensland in recent decades and this is likely to continue, plus we have the threat of climate change which is already making itself felt in this area with increased frequency of floods, droughts and heatwaves. A recent survey by Healthy Land and Water (2021) indicated that although 2030 targets for scenic, recreational, agricultural, air quality and other amenities are doing quite well, the condition of woodlands and wetlands are considerably behind what is being aimed for. Songbirds have been declining worldwide and there has long been concern for both songbirds and waterfowl in Australia (Olsen *et al* 2005: also see <https://www.abc.net.au/news/science/2019-09-20/birds-collapse-us-bees-ecology-environment/11520008>). Queensland has not yet reached its target of allocating 17% of its land surface as Protected Areas (DES 2020), and much habitat clearing is continuing in both city and rural areas: in fact Queensland has quite a reputation for excessive land-clearing (ABC 2018). Thus any loss of habitat or habitat modification, including the habitat being made less suitable due to edge effects (Catterall *et al* 1991, Green and Catterall 1998), noise effects (see above) and pollution (Department of Water WA 2006) can reduce the amount of safe places for endangered species elsewhere and ultimately jeopardise even the species that are currently common. We would suggest a serious consideration of alternative routes in the interest of biodiversity conservation into the future, along with further habitat restoration and control of weeds and feral predators.

Although Australia has many wonderful birdwatching areas, Eagleby is very well-placed for day-trips from Brisbane and the Gold Coast, including tours from cruise ships. The proximity to international airports and a railway line that has services from both of these to Beenleigh, which adjoins Eagleby, enhances its value to tour operators who can pick up not only from airports, shipping ports and hotels but also from the Beenleigh Railway Station (as we ourselves have done if we have guests who are staying in both Brisbane and the Gold Coast, first collecting those staying in Brisbane, and then meeting those from the Gold Coast in Beenleigh). The region harbours a diversity of waterbirds, including large birds that even tourists who are not specialist birdwatchers are keen to see, such as the black-necked stork, magpie goose, black swan and Australian pelican, as well as intriguing species such as jacanas, spoonbills and pink-eared ducks and occasionally rare or endangered ones such as freckled ducks and painted snipe. It also provides habitat for migratory species such as Latham's snipe and the marsh sandpiper. Australia's two largest eagles (wedge-tail and white-bellied eagle) are frequently encountered, as are several bright-coloured birds (lorikeets, whistlers, fairy wrens) plus kangaroos, freshwater turtles and eastern water dragons, and there are occasional sightings of echidna. With good promotion, and encouragement of well-placed attractive restaurants, accommodation venues (which could include eco-cabins or glamping on some of the neighbouring private lands), hire of kayaks to explore the river, and shops or information centres offering relevant books, souvenirs and possibly binocular sales or hire, it is well-placed to become famous throughout Australia and overseas as a very convenient destination for seeing a range of species without the inconvenience or discomfort of long travel times. It also has considerable potential, as mentioned above, for field experience for school and university students.

Finally, local residents value their homes not only as financial assets but for allowing their lifestyle of choice, and as suburbs and industrial areas expand and natural wetlands and bushland areas dwindle, suburban areas that satisfy the dreams of nature-lovers are becoming increasingly hard to find.

For all these reasons, we would urge further studies of fauna and flora, desires of Eagleby residents and tourism potential before making the final decision on the freeway route.

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Appendix I

Bird and seasons

Lists are adapted from eBird data for Eagleby Wetlands

Photos are by Ronda Green, while conducting tours at Eagleby

Note: I will soon be providing information on birds and other wildlife encountered on tour on the Araucaria Ecotour blog.

Waterbirds

Species very commonly seen common throughout the year

- Pacific black duck
- Australian wood (maned) duck
- Grey teal (slight dip in autumn)
- Hardhead (slight dip in autumn)
- Australasian grebe
- Dusky moorhen
- Eurasian coot
- Australasian Swamphen
- Masked lapwing
- Australian darter
- Little pied cormorant
- Little black cormorant
- Australian pelican
- Great egret
- Intermediate egret
- White ibis

Species seen throughout the year but not as commonly:

- Wandering whistling duck
- Chestnut teal
- Buff-banded rail
- Lewin's rail
- Spotless crake
- Red-kneed dotterell
- Black-fronted dotterell
- Comb-crested jacana
- Black-necked stork (pictured)
- White-necked heron
- White-faced heron
- Little egret
- Striated heron
- Straw-necked ibis (slight dip in summer)
- Royal spoonbill

Mostly seasonal:

- Magpie goose (mostly summer: pictured)
- Plumed whistling duck (mostly autumn)

Occasional:

- Freckled duck [Australia's rarest species of waterfowl]
- Australian shoveller
- Pink-eared duck
- Hoary-headed grebe



Diurnal raptors

Species very commonly seen common throughout the year

- Whistling kite (slight dip in summer)
- Brahminy kite (slight dip in summer)

Species seen throughout the year but not as commonly:

- Black-shouldered kite
- Wedge-tailed eagle
- Brown goshawk
- Collared sparrowhawk

Forest, woodland and grassland birds

Species very commonly seen throughout the year

- Crested pigeon
- Bar-shouldered dove
- White-bellied sea-eagle
- Laughing kookaburra
- Galah
- Little corella
- Pale-headed rosella
- Rainbow lorikeet
- Superb fairywren (pictured)
- Red-backed fairywren
- Lewin's honeyeater
- Yellow-faced honeyeater (slight dip in summer)
- Noisy miner
- Brown honeyeater
- Striated pardalote (slight dip in summer)
- Black-faced cuckooshrike
- Eastern whipbird
- Grey shrikethrush
- Rufous whistler
- Australian magpie
- Grey fantail
- Willy wagtail (slight dip in summer)
- Torresian crow
- Silvereye
- Red-browed finch



Species seen throughout the year but not as commonly:

- Brown quail
- Australian brush turkey
- Peaceful dove
- Fantailed cuckoo
- Brush cuckoo (slight dip in winter)
- Forest kingfisher (slight dip in summer)
- Sacred kingfisher (slight dip in winter)
- Sulphur-crested cockatoo
- Pale-headed rosealla (pictured)
- Scaly-breasted lorikeet
- Variegated fairywren
- Blue-faced honeyeater
- White-throated hooneyeater
- Striped honeyeater
- Little friarbird
- Noisy friarbird
- White-browed scrubwren



- White-throated gerygone
- Varied triller
- Leaden flycatcher
- Eastern yellow robin
- Golden-headed cisticola (pictured: probably always present but often hidden in long grass or reeds)
- Australian reed-warbler
- Tawny grassbird
- Silvereeye
- Mistletoebird
- Red-browed finch
- Double-bar finch
- Chestnut-breasted mannikin



Mostly seasonal

- Topknot pigeon (mostly winter)
- Pheasant coucal (less in winter)
- Pacific koel (not in winter)
- Channel-billed cuckoo
- Horsefield's bronze-cuckoo
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Occasional

- White-headed pigeon
- Pacific emerald dove
- Common bronzewing
- Rose-crowned fruitdove

Appendix II (downloaded from the Internet) Petition to Logan Council Mayor, 26 July 2017, through Avaaz-org

“Only four years ago, the 30 hectare Eagleby Wetlands had one of the most diverse bird populations in South East Queensland, Australia, including many northern hemisphere migratory birds that visited us regularly and more than 200 Australian species of birds.

I have lived in the area for over 30 years and the wetlands had been thriving under the care of the Gold Coast City Council who created a master plan for its future but was too late to implement it before it was transferred to Logan City Council at the time of amalgamation.

Logan City Council rejected this paid for Plan, and shortly after turned off the tap that fed clean water and topped up the Wetlands from the nearby Waste Water Treatment Plant, destroying the environment that attracted the birds.

Now that water is piped directly into the adjoining Albert River next to the Wetlands, so it must be clean.

Logan City Council, please clean up the weeds that now clog the gullies, pipes, ponds and walkways.

and Please-please, turn the tap back on, and bring back the Birds.”

