

Review of the values for Blue-billed Duck of an existing wetland at 609–621 Burwood Highway, Knoxfield and proposed new wetlands at the site

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22 March 2021

Introduction

Biosis Pty Ltd was commissioned by Allens Lawyers on behalf of Development Victoria to provide a review of information contained in various reports pertaining to the values of an existing wetland at 609–621 Burwood Highway, Knoxfield and proposed new wetlands at the site to the Blue-billed Duck *Oxyura australis*. The review has been prepared by Ian Smales.

The fundamental matters covered by this review relate to the proposal by Development Victoria to remove the existing wetland and to create a wetland complex to its north, within the northern extremity of the subject land that will function for the purposes of water management for re-development of the greater site. The newly created wetlands are proposed to be designed and built to provide habitat of value to a range of indigenous flora and fauna including the Blue-billed Duck.

Qualifications & expertise to prepare this report

I hold the degree of Master of Science from the University of Melbourne. My MSc project encompassed my research into the demography of the critically endangered bird, the Helmeted Honeyeater.

I have over forty years of professional experience in wildlife research and natural resource management with the public and private sectors, including with the former Fisheries and Wildlife Division and the Conservation and Research group of Zoos Victoria. I have been a senior zoologist with Biosis since 2003 and Principal Zoologist since 2012. I have broad field expertise investigating the ecology, distribution and habitat requirements of Australian vertebrate fauna and have been a long-standing member of recovery teams for two endangered bird species. I was appointed by DELWP to two scientific advisory panels for the Victorian Brolga population and in late 2020 I was appointed by the Victorian Minister for the Environment to the Scientific Advisory Committee for the Flora and Fauna Guarantee Act.

Since 2003 I have designed and managed biodiversity impact assessments for multiple major infrastructure projects and strategic geographic assessments.

My experience includes a number of large projects for waterbirds, including a long-term study of the responses of waterbirds to management of water in the Hattah-Kulkyne Ramsar Wetlands.

My understanding of the Blue-billed Duck is based on my first-hand knowledge and experience with the species at many wetland locations. It is also informed by the scientific literature about the ecology and biology of the species. References cited are listed at the end of the report.

My CV is appended to this report.

Scope of this review

This review pertains to the values for Blue-billed Duck of an existing wetland at 609–621 Burwood Highway, Knoxfield and proposed new wetlands at the site.

The review also addresses measures set out in Ecocentric Environmental Consulting (2021) aimed at avoidance and/or mitigation of deleterious effects on the Blue-billed Duck.

My understanding of the existing and proposed wetlands at the Knoxfield site rely on descriptions in reports and plans for the site that have been provided to me. They include the following:

- Boon, P.I. 2020. Review of proposal to drain Lake Knox & replace it with a constructed stormwater lake/wetland complex: ecological considerations. Dodo Environmental report for First Friends of Dandenong Creek.
- Ecocentric Environmental Consulting 2021. Ecological Assessment: Wetland Development Area 609-619 & 621 Burwood Highway, Knoxfield. Report for Development Victoria [revised March 2021].
- Engeny Water Management 2020. 621 Burwood Highway, Knoxfield: Preliminary Stormwater Management Strategy. Report for Development Victoria.
- Lorimer, G. 2017. Preliminary Ecological Assessment of the Floodplain at 609-621 Burwood Highway, Knoxfield. Biosphere Pty Ltd report to Knox City Council.
- MDG Landscape Architects 2020. KNOXFIELD - landscape masterplan + concepts J:\1878 Knoxfield\5. Design\Drawings\InDesign\1878B Knoxfield Landscape Masterplan [D].indd. Issue A: preliminary 04.09.2020. Issue B: community consultation 06.09.2020. Issue C: council application 04.12.2020. Issue D: council application 16.12.2020. Issue [E] 22.12.2020
- Parolsslen Grant & Associates Pty Ltd Consulting Engineers & surveyors 2020. Knoxfield Cnr Burwood Hwy & Scoresby Rod Knox Council. Sed Basin & Wetland Layout Plan & Sections.

I visited the site to inspect it and the existing wetland at first-hand on 15th March 2021. I observed birds at the existing wetland for 70 minutes during my visit.

Conservation status and population of Blue-billed Duck

The Blue-billed Duck is not listed as threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. The species is currently listed as threatened under the *Flora and Fauna Guarantee Act 1988* and as 'endangered' on the *Advisory List of Threatened Vertebrate Fauna in Victoria* (DELWP 2013). Under the *Flora and Fauna Guarantee Amendment Act 2019* DELWP is implementing the intergovernmental Common Assessment Method (CAM) to apply listings of conservation status that align with the IUCN Red List criteria for all relevant species. Under the CAM the Blue-billed Duck has been determined to meet criteria for listing under the less threatened level of 'vulnerable'. The conservation status under the CAM for all threatened taxa listed under the *Flora and Fauna Guarantee Amendment Act 2019* is expected to be ratified in early 2021.

The most recent Action Plan for Australian Birds (Garnett *et al.* 2010) evaluated the Blue-billed Duck as 'near threatened'.

In 2000, the entire Australian population was estimated at 12,000 breeding birds (Environment Australia 2000). An indication of the minimum size of the south-eastern Australian population is that during counts at coastal Victorian drought refuges in the period from 2000–2006 there was one occasion in which 13,000 were recorded at the Western Treatment Plant, Werribee (ARI database on behalf of Melbourne Water Corporation). The Action Plan for Australian Birds (Garnett *et al.* 2010) provided an estimate of “near 10 000 mature individuals”.

Biology of Blue-billed Duck

The Blue-billed Duck is endemic to Australia where it has a wide distribution across the temperate portions of the south-east of the continent and of Western Australia.

The following summary of the ecology and habitat preferences of the species is substantially drawn from SWIFFT - State Wide Integrated Flora and Fauna Teams (undated), Marchant & Higgins (1990) and Frith (1967).

The highest concentrations of Blue-billed Ducks in eastern Australia occur in southern Victoria, where the majority tend to occur on artificial wetlands, for example the main site for the species in Victoria are the wetlands of the Melbourne Western Treatment Plant at Werribee.

Large-scale and regional movements of Blue-billed Ducks in south-eastern Australia are indicated by widely fluctuating numbers encountered at given wetlands over time. Analysis of 73 counts between the years 2000 - 2012 at the Western Treatment Plant wetlands found an average of 4078 Blue-billed Ducks. In 2013 in excess of 10,000 Blue-billed ducks were recorded in that area (Loyn *et al.* 2014). The occurrence and extent of the birds' movements are likely to be influenced by seasonal conditions such as drought, rainfall, lake levels and water salinity.

The Blue-billed Duck inhabits fresh to saline, deep permanent open wetlands including deep, densely vegetated lakes. During the breeding season (concentrated on the period from November - March) there is a tendency to disperse to deep freshwater wetlands that have abundant aquatic and emergent vegetation although many birds remain on large wetlands (Hewish 1988). The birds feed by day far from the shore, particularly if dense cover is available in the central parts of a wetland. They feed on the bottom of wetlands eating seeds, buds, stems, leaves, fruit and small aquatic insects such as the larvae of midges, caddisflies and dragonflies.

Wetlands are suitable for breeding by the species only if they contain dense marginal vegetation and large expanses of open water. Nests are mostly solitary and constructed in spring on low, trampled swamp vegetation such as rushes and sedges. Blue-billed Ducks have previously been documented to breed at 17 wetland sites in Victoria (SWIFFT 2021).

Within suitable habitat, breeding frequently occurs over nine months of the year and young may be present for 11 months. Clutch size is reported to be between 3 and 12 with clutches of 5-6 being the most common (Marchant & Higgins 1990). The species is polygamous and while a dominant male may defend the breeding area occupied by a number of females, long-term pair-bonds do not occur and pairing occurs only for copulation (Marchant & Higgins 1990).

Values of the existing and proposed Knoxfield wetlands for Blue-billed Duck

The existing wetland at the Knoxfield site is a dam that was built to supply water for the agricultural and horticultural requirements of the former government research facility at the site. It is understood to have been built 50 – 65 years ago and it is not a natural or 'original' wetland. In common with many such waterbodies, it has provided habitat for waterbirds incidental to its original design purposes for water supply.

During a total of 22 waterbird surveys between 2015 and 2021 documented by Ecocentric (2021), the number of Blue-billed Ducks recorded at the existing wetland varied between one and seven. In all cases until March 2021 the birds were all adults. The species does make local and long-distance movements between sites in response to prevailing environmental conditions and the variable numbers recorded at the site demonstrates that the birds using it are also moving between it and other wetlands.

Monitoring of Blue-billed Ducks during 12 targeted surveys during the core breeding season (Ecocentric 2021) detected no breeding attempts nor any chicks. However, on 9th March 2021 a single duckling was observed with a pair of adult Blue-billed Ducks at the wetland. The fact that it had not fledged and was thus too young to have flown to the site, indicates that breeding had occurred there. An adult male and female Blue-billed Duck were present for the duration of my observations on 15th March. Throughout that time they were toward the centre of the waterbody and were feeding by duck-diving. No juvenile was seen with them during my observations, but it is possible that the duckling was hidden amongst vegetation at the time.

Blue-billed Ducks use dense emergent aquatic vegetation, particularly Cumbungi and reed beds as nest-sites. Ecocentric (2021) records the presence of a small patch of Narrow-leaf Cumbungi *Typha* spp. in the shallows of the south-western section of the dam. I examined this patch which is a narrow band of less than three metres in width confined to the south-western bank. I consider it is the most likely microhabitat in which Blue-billed Ducks might nest.

There are a number of factors that suggest successful breeding by Blue-billed Ducks would be rare at the existing wetland. No successful breeding had been detected during targeted monitoring of the species there until March 2021. In that instance a single duckling was observed on 9th March and it was not observed during my observations on 15th March. This suggests that in that instance, either a normal-sized clutch had not been laid, or more likely that the majority of the clutch or brood had not survived until the single duckling was observed. It is plausible that the small area of nesting microhabitat is insufficient to provide for successful breeding and/or the survival of eggs and chicks.

Boon (2020) considers that the existing wetland is important to the Blue-billed Duck and that it should not be removed. He considers that its value for the species outweighs the potential values of the proposed new wetlands and suggests that newly created wetlands are not likely to be occupied by the species.

He also argues against the concepts of ecological offsetting and that the primary purpose of creating new wetlands is for stormwater management and that this detracts from objectives related to their potential values for wildlife.

Plans for the creation and establishment of new wetlands at the site are detailed in Engeny Water Management (2020) and associated design drawings. Ecocentric (2021) also discusses these plans. The intention is to create a series of wetlands that will serve stormwater management functions and will be purposely designed and managed to provide habitat for a suite of flora and fauna. The designs include components specifically aimed at providing habitat for Blue-billed Ducks. Those include water quality, water depth, substrate and revegetation to include areas suitable for breeding by the species. The design

and management proposed also allows for exclusion of people and dogs from substantial portions of the new wetlands with the aim of minimising disturbance of wildlife.

Review comments about the existing wetland

- Conservation of threatened species functions at the population level. Individuals have a limited lifespan and, in the case of Blue-billed Ducks, they also have high capacity to move widely across a huge area of south-eastern Australia as seasonal and regional conditions alter. For these reasons, conservation is aimed at the long-term persistence and viability of the population of the species as a whole.
- Documentary evidence indicates that a single breeding attempt only has been detected at the existing Knoxfield wetland during targeted surveys for the project assessment and that the wetland does not currently provide sufficient habitat suitable for Blue-billed Ducks to routinely breed successfully.
- In view of the very small number of Blue-billed Ducks using the existing wetland, the considerable emphasis placed on this wetland for this particular species does not reflect the concepts of ecological functionality or demography of inherently mobile taxa like the Blue-billed Duck. Individual Blue-billed Ducks may reside for long periods at a particular location but, in light of the fact that they have high capacity for movement within their entire geographic range, no single wetland that supports between two and seven individuals is critical to the conservation or viability of the population.
- While artificial wetlands vary widely in their values for the Blue-billed Duck, it is well documented that the species uses many such wetlands. The existing wetland is by no means unique in this respect either across the geographic range of the species or within the local area. Lorimer (2017) says that he has, “*observed small numbers (usually two or four) regularly at nearby Lakewood Nature Reserve and periodically at Waterford Valley Golf Course and the Reservoir Crescent dam in Rowville. Blue-billed Ducks are also recorded in recent years at Caribbean Lake and the lake at Heany Park*”. Most, if not all of those are artificial or substantially modified wetlands. Fauna databases, including the Victorian Biodiversity Atlas and the Atlas of Living Australia, show multiple records of the species at similar wetland sites across south-eastern Melbourne.

In summary, the existing wetland is routinely providing habitat for two Blue-billed Ducks and at times has been documented to be used by up to seven individuals. It is one of multiple sites used by the species in the south-eastern suburbs of Melbourne and that is within a context of the species’ distribution across south-eastern Australia and the south-west of Western Australia. As such, the existing wetland cannot be considered to contribute in any significant way to the viability of the population.

Review comments about the proposed new wetlands

- Criticism by Boon (2020) of the concept that newly created wetlands will not offset for loss of the existing wetland is of no relevance to Blue-billed Duck. Offsetting has a policy and legislated role for native vegetation in Victoria and for species and communities listed as threatened under the EPBC Act where a significant impact (as defined for the purposes of the Act) may occur. The Blue-billed Duck is not subject to any offsetting policy.
- It is argued by Boon (2020) that artificially created wetlands rarely replicate ecosystem functions of natural wetlands and in many cases that may be true. However, for Blue-billed Ducks there is

ample evidence that artificial wetlands not only support the species but, as noted above, the literature indicates that the species is actually now heavily reliant on man-made waterbodies. There are many artificial impoundments and even large farm dams that have not been designed specifically for Blue-billed Ducks but that provide habitat for them and that support successful breeding of the species.

- There are good examples of major wetland creation and restoration projects that are, by design, providing functional ecosystems and habitat for numerous species including Blue-billed Duck and other wetland birds. The key is that the specific habitat requirements of the species involved must be carefully incorporated into the wetland design and creation. Recent examples of wetland habitats designed and built to create habitat for waterbirds include The Waterways at Braeside and 200 ha at the Victorian Desalination project near Wonthaggi.
- It is the case that any created wetland will take time to fully establish and reach maturity. To the best of my knowledge, various well-designed wetland creation projects have succeeded and begun to support vertebrate wetland fauna, including waterbirds, within less than three years. The natural mobility of Blue-billed Ducks and multiple other wetland bird species, gives them high capacity to colonise new wetlands once they offer suitable conditions. The fact that Blue-billed Ducks are using wetlands across suburban Melbourne is ample evidence for their capacity to locate and use such habitats. There is no reason to believe the proposed wetlands will not be colonised as soon as they reach a condition that is suitable for relevant species.

The comments of Boon (2020) regarding timing of removal of the existing waterbody and establishment of the new wetlands may have been written prior to publication of the Engeny Water Management (2020) report which says:

“It is proposed that the construction of the habitat wetland occurs before the existing dam onsite is decommissioned. An establishment period would also be allowed so that the vegetation within the deeper waters of the habitat wetland are confirmed to be growing well and are healthy. This will allow the water birds that are currently using the site to transition from the existing dam to the new habitat wetland and will ensure that they will not be left without habitat during the construction process. It is expected that the construction and establishment period for the habitat wetland will take approximately 12 months”.

- In my view, it is not possible to be entirely certain that the new wetlands will be suitable for Blue-billed Ducks within the projected timeframe of 12 months and there may be a hiatus for the species at the site between removal of the existing wetland and the point at which the new wetlands attain a suitable condition for the species. I do not consider this is a concern because Blue-billed Ducks are highly mobile and the variable number of birds using the existing wetland demonstrates that they have capacity to move to other wetlands and there is no reason to consider that they will not do so if necessary in this case. The small number of individuals involved demonstrates that wetlands at this site are not a critical resource on which the Blue-billed Duck population is reliant. The design of new wetlands for the site is appropriate for the species and regardless of the potential that Blue-billed Ducks may not be present for a period, I fully expect they will utilise the new wetlands there once they attain an appropriate condition.
- Arguments about the primary stated purpose of the new wetlands are not relevant. Wetlands of various types are routinely built to serve the multiple purposes of stormwater management and treatment and for their biodiversity values. For a local example, Ecocentric (2021) notes that there are numerous records of Blue-billed Duck at the Lakewood Nature Reserve. Knox City Council’s ‘Lakewood Nature Reserve’ brochure notes that the lake there was “constructed in 1985 for

drainage and flood mitigation of the surrounding estate". It is also the case that the existing Knoxfield wetland was built to function as an agricultural dam.

In summary, the proposed wetlands, if built and managed as proposed, can be expected to be occupied over time by a variety of indigenous flora and fauna. The plans for the new wetland complex include provisions that will offer habitat appropriate for Blue-billed Ducks and potentially for the species to breed there. While there can be no guarantee that Blue-billed Ducks will use the new wetlands, there is ample evidence of them having utilised similar artificial wetlands and I see no reason to expect that the proposed new wetlands will not be used by the species. As noted above, the propensity for the species to move between suitable wetlands means that they may not occupy the new wetlands permanently.

Proposed mitigation/avoidance measures

Ecocentric (2021) section 5.1.2 provides a number of recommendations aimed at minimising and/or mitigating potential impacts on Blue-billed Duck and other biodiversity values related to the existing wetland and creation of new wetlands.

It suggests that breeding by Blue-billed Ducks may be occurring despite a paucity of suitable nesting habitat within the existing dam. It also notes that the breeding season for Blue-billed Ducks may be more variable than the period from September to November. As noted above, the literature indicates that the species may have a more extended annual breeding period than this.

The report recommends mitigation for potential effects on Blue-billed Ducks and other fauna, as follows:

MONITORING MEASURE 1

The Site Manager and/or appointed Environmental Officer is to conduct regular monthly (at minimum) monitoring of Blue-billed Duck activity on the dam for the duration of the Stage 1 – 7 construction program (except at any time that observation is occurring under monitoring measure 2 as detailed below).

The Site Manager and/or appointed Environmental Officer is to be inducted by the project ecologist and trained to identify Blue-billed Duck, and to identify what constitutes pairing and/or signs of disturbance/distress by this species. These monitoring works are to be implemented as a component of the CEMP for the duration of the project.

The project ecologist is to be notified immediately if any Blue-billed Duck pairing activity is observed, and in the event that Blue-billed Duck or any other fauna is displaying signs of disturbance / distress that may be attributable to construction activity. Upon notification, the project ecologist must attend the site as soon as practicable. If the project ecologist confirms that Blue-billed Duck pairing activity is evident, monitoring measure 3 will apply (see below). If the project ecologist confirms that Blue-billed Ducks or any other fauna are displaying signs of disturbance / distress that might be attributable to construction activity, then major construction works within a 50m buffer of the dam are to be halted whilst appropriate mitigation measures are developed by the project ecologist in consultation with Development Victoria.

MONITORING MEASURE 2

In addition to monitoring measure 1 above the project ecologist is to conduct fortnightly (at minimum) monitoring for Blue-billed Duck pairing behaviour commencing no later than the beginning of October annually. Fortnightly monitoring is to continue until it can be confirmed that

pairing and/or incubation and/or nesting behavior has ceased, and/or until any Blue-billed Ducklings are fledged (no longer under the care of a female) and/or absent from the site.

MONITORING MEASURE 3

If Blue-billed Duck pairing behavior is observed, all major construction works within a 50m buffer of the dam are to be ceased for a minimum period of 6 weeks in order to accommodate an incubation period of 24-26 days (see Section 2.3.3 for details). Light work activity - works not involving the use of heavy machinery such as revegetation of the open water wetland and Swampy Woodland habitat areas, water filling and maintenance of erosion control geotextiles within wetland habitat areas, slashing/mowing of open space areas, and minor utility works of this nature - are permitted unless such works are observed to be affecting Blue-billed Duck behavior on the dam.

The intent of differentiating major construction works, involving the use of heavy machinery, from non-major works, being works conducted by hand or with light vehicles, is to ensure that revegetation of the open water wetlands can occur during the optimal growth period for aquatic flora; being spring and into summer (Wong et al 1999; CSIRO 2006).

The Blue-billed Duck monitoring program outlined above is to be conducted by a suitably qualified and experienced ecologist as part of the CEMP. The Blue-billed Duck monitoring period is to commence no later than the beginning of October, and is to be conducted annually until management of the wetlands site is completed and ceded to Council. All major construction works within 50m of the wetland development area are to cease immediately when/if Blue-billed Duck are engaged in pairing activity, and a works halt is to remain until it can be conclusively demonstrated that the breeding season of this species is finalized and/or ducklings, if present, are fledged. The works halt measures are to be implemented as part of the CEMP.

Review comments on proposed mitigation/avoidance measures

- In light of the facts that Blue-billed Ducks do not appear to routinely breed at the existing wetland and have been recorded to do so just once and that they are highly mobile and are known to use various other wetlands in the region, it would seem reasonable to accept that the species may move away from the site for a period and to undertake construction works without a pause or the other measures proposed. That would expedite creation of the new wetlands and permit them to establish as new habitat as rapidly as is practicable.
- The overall population of the species will not be impacted in any significant way by this adjustment because the site in its current form supports such a small number of Blue-billed Ducks.
- All other recommendations aimed at minimising and/or mitigating potential effects on biodiversity values are appropriate and in line with accepted good practice. I do not suggest any alterations to them or the addition of further measures.

References

Boon, P.I. 2020. Review of proposal to drain Lake Knox & replace it with a constructed stormwater lake/wetland complex: ecological considerations. Dodo Environmental report for First Friends of Dandenong Creek.

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Engeny Water Management 2020. 621 Burwood Highway, Knoxfield: Preliminary Stormwater Management Strategy. Report for Development Victoria.

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[https://www.swifft.net.au/cb_pages/sp_blue-](https://www.swifft.net.au/cb_pages/sp_blue-billed_duck.php#:~:text=The%20Australian%20population%20is%20estimated,Western%20Treatment%20Works%20at%20Werribee)

[billed_duck.php#:~:text=The%20Australian%20population%20is%20estimated,Western%20Treatment%20Works%20at%20Werribee.](https://www.swifft.net.au/cb_pages/sp_blue-billed_duck.php#:~:text=The%20Australian%20population%20is%20estimated,Western%20Treatment%20Works%20at%20Werribee)

Position

Principal Zoologist

The principal zoologist is a technical expert who manages large projects. Duties include leading large project teams, field work and client liaison.

Qualifications

MSc



Professional experience

Ian has over forty years of professional experience in wildlife research and natural resource management with the public and private sectors. He has been a senior zoologist with Biosis since 2003 and Principal Zoologist since 2012. Ian has broad field expertise investigating the ecology, distribution and habitat requirements of Australian vertebrate fauna and is recognised as an authority on Australian reptiles. He has been a long-standing member of recovery teams for two endangered bird species and the scientific advisory panel for the South-west Victorian Brolga project. In 2020 Ian was appointed as a member of the Victorian Government's Scientific Advisory Committee for the Flora and Fauna Guarantee Act. He is also a member of the IUCN Species Survival Commission Reintroduction Specialist Group.

Ian has designed and managed biodiversity impact assessments for a wide variety of projects including major infrastructure developments and strategic geographic assessments. Among these have been multiple projects of State-significance level. Ian led the development and preparation of Subregional Strategies for key fauna species for the EPBC Act Strategic Assessment of the Melbourne Growth Area. He has a thorough understanding of Commonwealth and State biodiversity legislation and policy and he frequently provides expert evidence to statutory planning processes.

Ian has prepared environmental management plans for a wide range of situations including for conservation reserves and numerous development projects. Since 2003, he has had a particular involvement with the wind energy sector and has investigated effects on birds and bats at multiple proposed and operating wind farms. He is the author of a number of publications on that field in the international literature. Ian has had a lead role in the development and application of the Biosis bird collision risk model, which has been used in the assessment of many wind energy projects in Australia and the Pacific.

Ian has designed and managed large and long-term investigations of fauna in many Australian environments. These have included studies of migratory and resident shorebirds in Tasmania and Victoria; landscape utilisation by raptors and a range of other birds; investigations of reptiles and amphibians from arid zones to alpine areas, waterbird responses to environmental water regimes in the Murray-Darling Basin; and surveys for bats and terrestrial mammals. He is working with collaborators in Australia, the USA and South America on aspects of the evolution of Gondwanan freshwater turtles.

Key major & strategic project experience

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| Project Manager & Senior Zoologist | For the EPBC Act Strategic Assessment of the Melbourne Growth Area, Biosis was commissioned by DELWP Victoria to provide ecological advice for key species. Ian led the development of Subregional Strategies for Southern Brown Bandicoot and Growling Grass Frog populations across the Growth Area. |
| Project Manager & Senior Zoologist | Ian managed all aspects of assessments for terrestrial flora and fauna & marine birds & mammals for the proposed major redevelopment Port of Hastings. For this project the Victorian Government selected Biosis to provide services as part of an AECOM and GHD Joint Venture. |
| Project Manager & Senior Zoologist | DELWP Victoria undertook a review of planning mechanisms for wind energy developments in Victoria. Biosis was engaged to lead the review of effects on populations of birds and bats. Ian was a key technical specialist for the review which included evaluation of the potential for cumulative impacts of multiple wind energy projects across the State. |
| Senior Zoologist | Assessment of fauna for Melbourne Airport proposed third runway for Australia Pacific Airports. This includes consideration of impacts of the runway development on threatened and migratory species and evaluation of aircraft collision risk for birds and bats. |
| Project Manager & Senior Zoologist | Investigation of waterbird responses to environmental water management of Hattah Lakes Icon Site. Ian has designed and managed this study of eight lakes which has thus far spanned three years and various manipulations of water in the lakes within Hattah-Kulkyne National Park. The study is for the Mallee Catchment Management Authority. |

Other project experience

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| Project Manager & Senior Zoologist | Quantitative modelling of potential risk of collisions with wind turbines and overhead powerlines for a planning amendment for a completely revised design of the Stockyard Hill wind energy facility for Origin Energy. |
| Project Manager & Senior Zoologist | Bird utilization investigations for Musselroe Wind Farm, north-eastern Tasmania. This major project commenced with pre-approval studies in 2003, which included quantitative risk modelling of potential turbine collisions for all bird species, and |

completed investigations of effects of the operational wind farm in early 2017. The project is for Woolnorth Wind Farm Holdings P/L and Hydro Electric Corp. Tasmania.

Zoological peer reviewer

Ian provided a peer-review and expert witness evidence related to impacts on birds for the Victorian Environmental Effect Statement statutory hearing for Dundonnell Wind Farm in western Victoria. The wind farm was subsequently approved. This service was provided for Trustpower P/L.

Project Manager & Senior Zoologist

Colac Quarry expansion. The property of this basalt quarry provides habitat for a substantial population of the EPBC Act critically endangered lizard, the Corangamite Water Skink. Pre-approval investigations for expansion of the quarry were undertaken in 2006/06. The project was approved and Biosis prepared a management plan and is nearing completion of a 10-year monitoring program that has seen successful conservation of the population alongside expansion of the commercial operations of the quarry. The project has been undertaken for Holcim Australia.

Project Manager & Senior Zoologist

Ian managed investigations of effects on birds, including the threatened Brolga, of the operating Morton's Lane Wind Farm in western Victoria. The project assessed whether the abundance or species-composition of birds was altered by the wind farm and evaluated the effects of bird collisions with wind turbines. The project is for the wind farm owner, Goldwind P/L.

Project Manager & Senior Zoologist

Biosis undertook multi-season bird surveys for Yaloack South Wind Farm near Ballan. Targeted investigations were made for Wedge-tailed Eagles and Barking Owls. Ian provided collision risk modelling for the eagle. Ian provided expert witness evidence about these studies to the statutory planning panel which resulted in approval for the project. Biosis has prepared a Bird and Bat Management Plan for the operational wind farm,

Project Manager & Senior Zoologist

Terrestrial fauna surveys of Wallpolla Island for Mallee Catchment Management Authority. These comprehensive investigations of all vertebrate fauna were undertaken to inform Sustainable Diversion Limits for environmental water management as part of the Murray-Darling Basin Plan. The surveys resulted in new locality records for a number of significant species.

Other qualifications and training

Wildlife identification and handling

Remote Area and Senior First Aid

Advanced 4WD driving and vehicle recovery

Occupational Health and Safety General Induction for Construction Work in Victoria

'A' Class Australian Bird & Bat Banding Scheme Licence, endorsed for use of mist nets

Professional affiliations and memberships

Scientific Advisory Committee for the Flora and Fauna Guarantee Act

IUCN Species Survival Commission, Re-Introduction Specialist Group

Helmeted Honeyeater National Recovery Team (1989 - 2015)

Orange-bellied Parrot National Recovery Team (1994 - 2003)

Scientific Panel South-west Victoria Brolga Research Project (2009 - 2014)

Technical Reference Group Victoria Brolga wind Farm Guidelines (2018 - 2020)

Publications

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