Koala Beach Glossy Black-cockatoo habitat

Monitoring Report

October 2021

Glossy Black-cockatoo female feeding in Forest Oak at Koala Beach

Photograph by Irene Timmins

Prepared for

Tweed Shire Council

by

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EXECUTIVE SUMMARY

The 2021 Koala Beach Glossy Black-cockatoo monitoring was the tenth such event undertaken since 1996.

Tweed Coast locations were surveyed in April, artificial hollows were inspected, and the Koala Beach reserved habitat was surveyed in April, May and October 2021.

In the April/May survey low usage of the reserved Koala Beach habitat was evident, with 400 chewed cones found under two Forest Oaks. At two locations south of Pottsville 465 chewed cones were found under six Black She-oaks. October surveys of the Koala Beach reserved habitat revealed more widespread use with 840 chewed cones under 26 trees. Three trees outside the reserved habitat also had feed sign (175 chewed cones). Three trees were previously unused and were tagged, bringing the total number of tagged feed trees recorded at Koala Beach to 190.

No evidence of Glossy Black-cockatoos was found at known feeding locations at Cudgen Headland (Horsetail She-oak) or Hastings Point, (Black She-oak) or in the Pottsville Environment Park (Black She-oak) in the first round of surveys.

A pair of Glossy Black-cockatoos were observed in the reserved habitat in October 2021. Birds were also recorded and photographed at Koala Beach by Irene Timmins.

Monitoring provides evidence of the ongoing use of habitat at Koala Beach by the local Glossy Black-cockatoo population. The condition of Forest Oak stands in the reserved habitat and reservoir stands was broadly similar to that observed in previous monitoring, but prevailing wet conditions have resulted in a heavier groundlayer growth than observed previously.

The widespread emergence of mesic rainforest species like Macaranga and Pencil Cedars in the reserved habitat Forest Oak stands indicates a successional trend towards rainforest.

eBird sightings on the Tweed Coast provide insights into patterns of habitat use and demography of Glossy Black-cockatoos in the Tweed Coast area.

GLOSSARY

Cladode: foliage of she-oaks (*Casuarina* and *Allocasuarina* species) also termed 'needles' are rod-shaped branchlets with tiny reduced leaves arranged around the branchlet.

Cone crop: The number of cones present on each Forest Oak at the time of survey.

Feed sign: chewed cones and parts of cones, usually on the ground beneath a feed tree.

Feed tree: she-oak or Forest Oak with feed sign beneath it.

Preferred feed tree: feed tree with history of repeated or large-scale use by Glossy Black-cockatoos.

ACKNOWLEDGEMENTS

Thanks to: Irene Timmins for photographs and sighting records; Marama Hopkins, Tanya Fountain for supplying Glossy Black-cockatoo records.

The eBird database provides important information on patterns of occurrence of Glossy Black-cockatoos on the Tweed Coast, including at Koala Beach. Thanks are due to: the observers who contributed their sighting data to the eBird database, and: to the Cornell Ornithology Lab.

The Glossy Black Conservancy website provides important ecological information on the species.

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1.0 INTRODUCTION

1.1 THE PLAN OF MANAGEMENT

A Plan of Management for reserved Glossy Black-cockatoo habitat at the Koala Beach Estate prescribes monitoring of the reserved habitat and of use of the habitat by Glossy Black-cockatoos *Calyptorhynchus lathami*. The species is listed as Vulnerable under the NSW *Biodiversity Conservation Act* 2016.

Specific requirements for monitoring in the plan are:

Project: Carry out monitoring of Glossy Black-cockatoo habitat at Koala Beach; provide an annual report of monitoring results; and recommend revisions to the Plan of Management if deemed necessary.

Monitoring is to be undertaken in accordance with the current adopted Glossy Black-cockatoo Plan of Management.

1. Monitor use of the Glossy Black-cockatoo habitat area and adjacent Forest Oak Allocasuarina torulosa habitat every second year.
Monitoring should take place when preliminary surveys or sightings indicate use of the reserved habitat.

1(a) Search for Glossy Black-cockatoos in the Glossy Black-cockatoo habitat area and adjacent Forest Oak habitat. Mid-morning traverses of the Forest Oak stands listening for sounds of feeding and calling birds, use binoculars to count birds and identify pairs and immatures.

1(b) Search for, quantify and record the location of feed sign (chewed Allocasuarina cones) in the Glossy Black-cockatoo habitat area and adjacent Forest Oak habitat. The area for searches is indicated in Figure 2 in the Plan of Management.

2. Assess the condition of the Glossy Black-cockatoo habitat area and adjacent Forest Oak habitat and provide information including but not restricted to: general tree health and any

tree death; recruitment of Forest Oak Allocasuarina torulosa; and disturbance e.g. tree removal, branch lopping, dumping of garden wastes, fire, and weed development. Report on condition of plantings, if any.

3. Provide a report of monitoring results and recommend revisions to the Glossy Black-cockatoo Plan of Management if deemed necessary.

3(a) The report should be provided as a Word document

3(b) Copies of the report should be provided to:

- *Koala Beach Wildlife and Habitat Management Committee;*
- *Biodiversity and Conservation, Department of Planning Industry and Environment.*

4. Collate and review any sighting records collected by residents and forwarded to the Koala Beach Wildlife and Habitat Management Committee (a standard survey form will be distributed to residents by the committee to report fauna sightings).

1.2 OBJECTIVE OF THE GLOSSY BLACK-COCKATOO PLAN OF MANAGEMENT

The principal objective of the management plan is:

- to preserve habitat value for Glossy Black-cockatoos by maintaining the reserved Forest Oak *Allocasuarina torulosa* stands, roost trees and potential or actual nest trees at Koala Beach.

Monitoring and collation of local sightings incidentally provide a measure of the local abundance and habitat use of Glossy Black-cockatoos.

1.3 STRUCTURE OF THE 2021 REPORT

An earlier report was produced after the first round of monitoring: document titled "2021 GBC Monitoring report", dated 30th June 2021. The present report updates that June document with results of October 2021 monitoring. Technical details dealing with the geology and vegetation of the reserved habitat, design of artificial hollows *inter alia* are provided at Appendix A

2.0 METHODS

2.1 MONITORING PROCEDURES

Monitoring procedures undertaken during field work for the current report included:

- Checking occupation of artificial hollows;
- Searches of the reserved habitat and vicinity;
- Quantification of feed sign;
- Identification of trees used;
- Recording the occurrence of weeds in the reserved habitat, and
- Surveys of sites on the Tweed coast where Glossy Black-cockatoos have previously been recorded feeding on Black She-oak and Horsetail She-oak.

2.2 CHECKING OCCUPATION OF ARTIFICIAL HOLLOWS

Artificial hollows were checked using a pole camera (Brightstar, Victoria) with extendable poles.

2.3 SEARCHES OF THE RESERVED HABITAT AND VICINITY

This search area has been determined by the concentration of Forest Oaks in the reserved habitat area, and history of feed tree use detected since first identified in 1994. Occasional reconnaissance beyond this area has resulted in the discovery of additional individual feed trees. Searches involved looking for and quantifying feed sign beneath trees, as well as looking for and listening for Glossy Black-cockatoos.

2.4 QUANTIFICATION OF FEED SIGN

Feed sign is counted (when < 20 chewed cones were present) or estimated when more numerous, in order to provide an index of Glossy Black-cockatoo foraging effort.

2.5 IDENTIFICATION & TAGGING OF INDIVIDUAL TREES USED

Feed trees encountered on Koala Beach have been identified by the application of a numbered stainless steel tag attached to stainless steel wire and fixed permanently into the trunk surface at breast height. Trees outside Koala Beach have not been tagged.

Tagging began in 1994, with 190 feed trees tagged over the course of monitoring, however occasional tags have been lost, and in one case the wire remained embedded, but the tag has been manually removed.

2.6 RECORDING WEEDS IN THE RESERVED HABITAT

Weeds were noted as encountered during searches for birds and feed sign.

2.7 SEARCHES OUTSIDE KOALA BEACH

Areas with She-oaks were searched outside Koala Beach in April and May 2021. These included two locations south of Pottsville, the Hastings Point Community Dunecare area, Bogangar, Pottsville Environment Park (Cudgera Creek) and Cudgen Headland (identified in previous reports as Sutherland Point).
Areas known to be used by Glossy Black-cockatoos for foraging and previously searched near Bogangar had been burnt in 2017, and were revisited in 2021 to observe regeneration of Black She-oak.

2.8 COLLATION OF RECORDS FROM LOCAL OBSERVERS

Records of Glossy Black-cockatoos were sought from local residents and observers. Sources of sightings include the EBird data base, which included 29 records from the Tweed Coast in 2020-2021, and the Glossy Black Conservancy database (51 records for 2021). These records are analysed and discussed later in this report.

3.0 RESULTS—2021 GLOSSY BLACK-COCKATOO MONITORING

In April and May 2021 ~400 chewed cones were found under two trees at Koala Beach, however very dense and tall groundlayer vegetation in the reserved habitat stands may have resulted in smaller numbers of chewed cones not being detected.

No chewed cones were found at Kingscliff, Bogangar, or Hastings Point. Feed sign (~465 chewed cones) was found under six Black She-oaks at two sites south of Pottsville.

Monitoring in October 2021 recorded 840 chewed cones under 28 trees at Koala Beach, with three feed trees located outside the reserved habitat. Comparison with previous monitoring indicated that the 2019 results are both the lowest feed sign and feed tree counts in monitoring at Koala Beach so far, and 2021 results are the second lowest feed sign counts, and third lowest feed tree counts.

A pair of Glossy Black-cockatoos were observed feeding in the reserved habitat in October 2021.

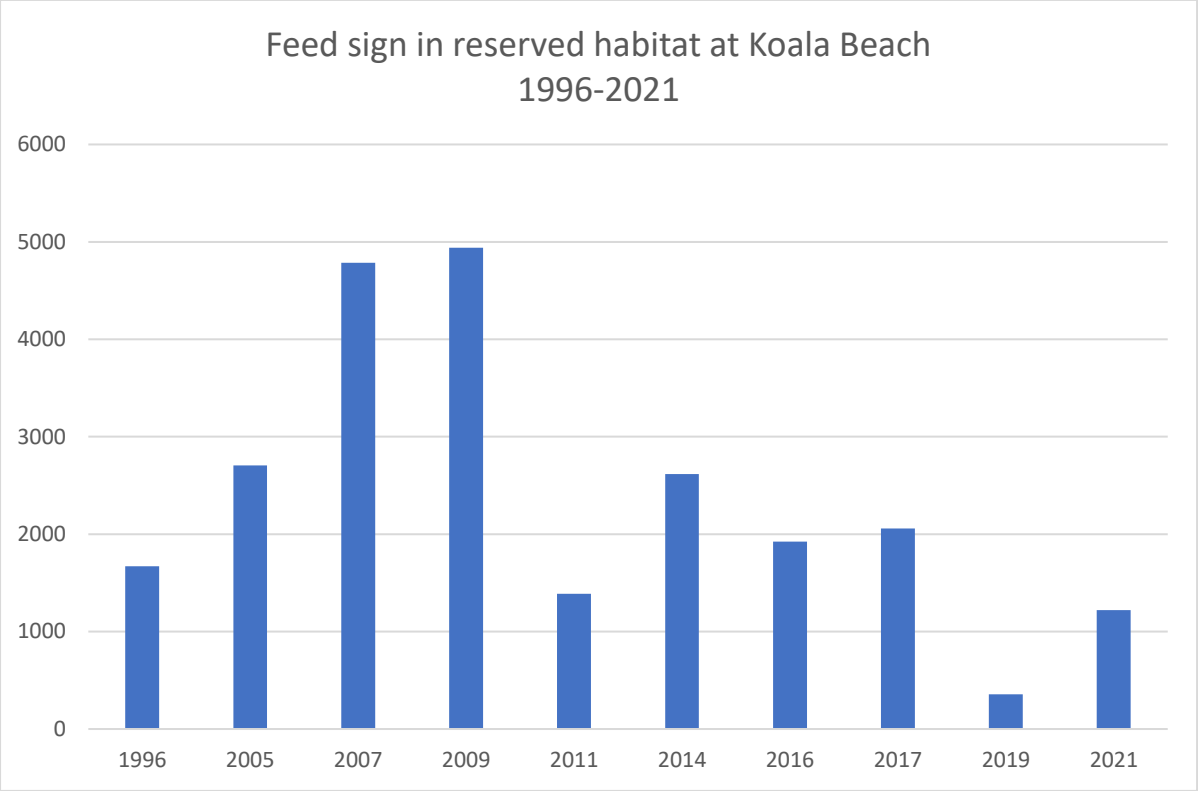

Figure 1: Feed Sign/chewed cones recorded in reserved Koala Beach habitat in monitoring from 1996 to 2021.

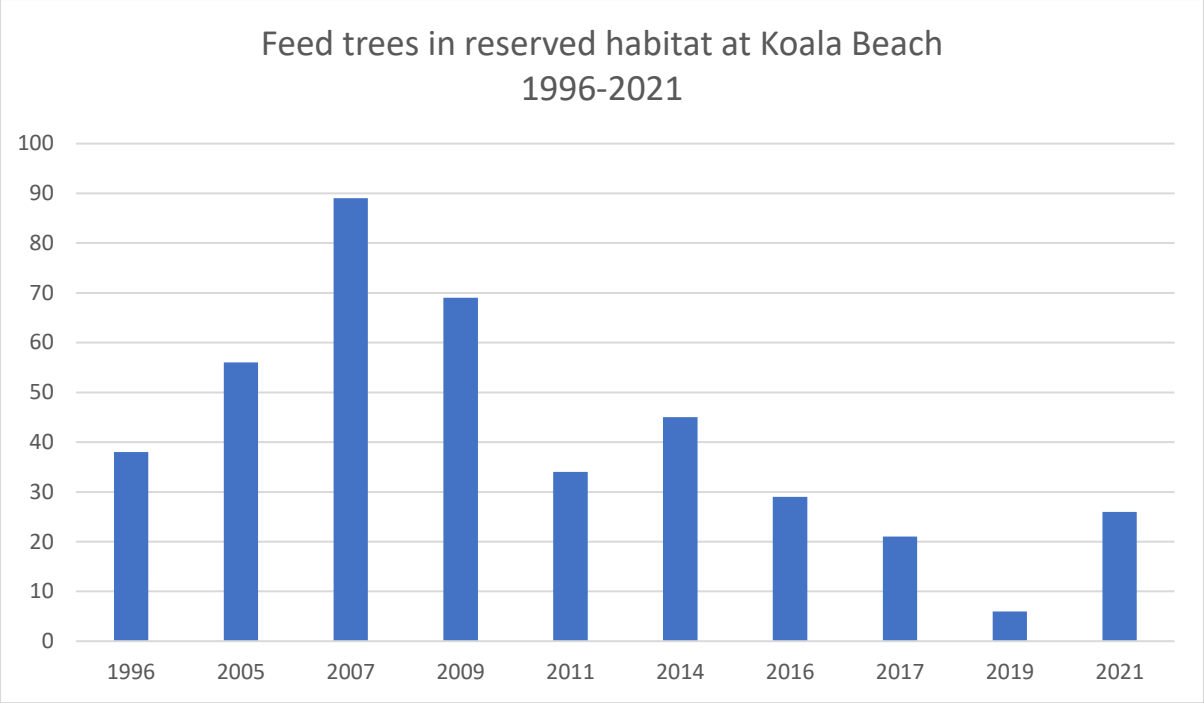

Figure 2: Number of Feed Trees used in reserved Koala Beach habitat in monitoring from 1996 to 2021

3.1 INSPECTION OF ARTIFICIAL HOLLOWS

A single clutch of probable Maned Duck *Chenonetta jubata* eggs was found in one hollow, and eggshell scatters in 3 hollows likely indicate recent use of hollows by this species. Another hollow was occupied by a Brush-tailed Possum. Competition for hollows between species may have affected successful use of the artificial hollows by Glossy Black-cockatoos. The possum is a likely predator of eggs and or nestling birds.

Fidelity of Glossy Black-cockatoos to existing nest tree hollows (GB Conservancy), and likely low recruitment rates in this population may retard the rate at which they take up use of artificial hollows. The Glossy Black Conservancy website states that female Glossy Black-cockatoos produce a single egg only every second year, which also may influence the rate at which they take up use of artificial hollows.

Continued annual monitoring of the artificial hollows is recommended. As the breeding season is given as between late January and early June (GB Conservancy), monitoring should take place between these dates.

3.2 OCCURRENCE OF WEEDS IN THE RESERVED HABITAT

Weeds recorded in the reserved Glossy Black-cockatoo habitat include the following plants: Ground Asparagus, Winter Senna, Lantana, Woody Passionfruit, Molasses Grass and Giant Devil's Fig. Weed occurrence in the reserved Glossy Black-cockatoo habitat was sparse and scattered.

3.3 CONDITIONS AT THE TIME OF MONITORING IN 2021

The rainfall data for the 18 months from January 2020 to June 2021 (3587 mm) indicate that more than twice the mean annual rainfall (1713mm) had been recorded at the nearest weather station (Kingscliff) during this period.

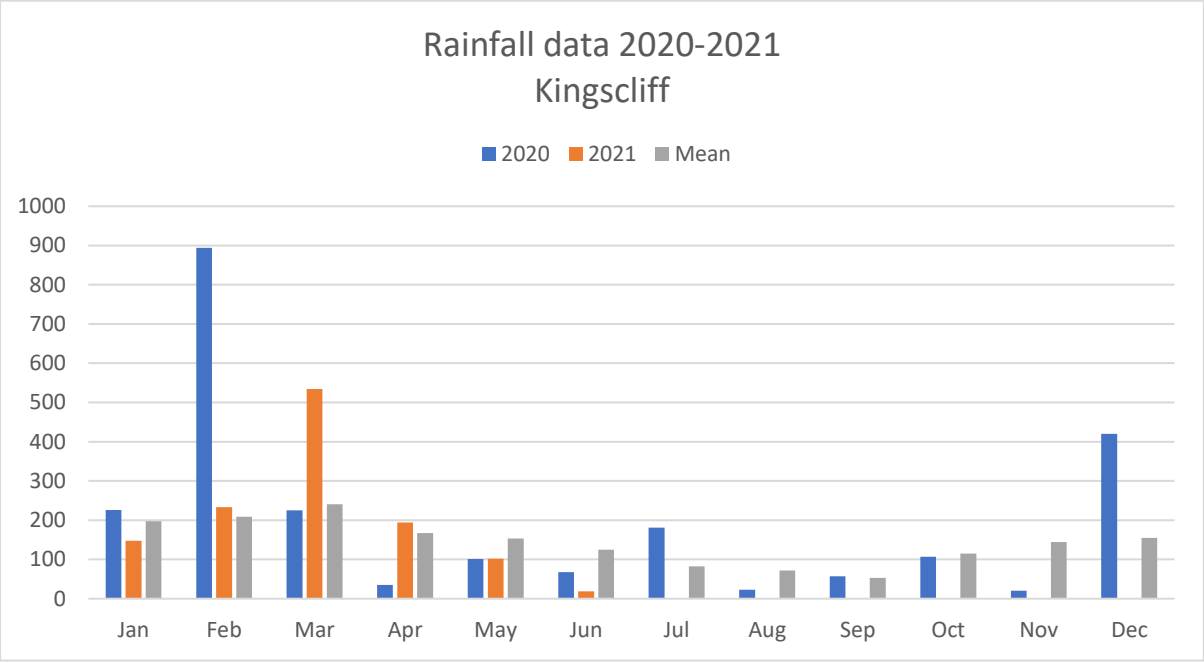

Figure 3: Rainfall (mm) 2020 and up to June 2021 and overall historical mean.

3.4 CONDITION OF THE RESERVED HABITAT

Reserved habitat at Koala Beach was noted to have more and taller groundlayer and understorey vegetation than in previous surveys. Tall native grasses were present in all parts of the reserved habitat, and a cohort of young Macaranga saplings *Macaranga tanarius* was also widespread. The presence of Geebungs *Persoonia sp.*, multiple Celerywood *Polyscias elegans* saplings and Pink Euodia *Melicope elleryana* is evidence of a community transition or succession, in the absence of fire, to a more mesic, rainforest community.

Dumping of garden clippings in the reserved habitat near the terminus of Melia Close may exacerbate fire hazard, and encourage further dumping.

3.5 RECORDS/SIGHTINGS KOALA BEACH ESTATE 2021 MONITORING

Birds were observed by Irene Timmins on several occasions feeding in a Forest Oak at Koala Beach, and flying over (I. Timmins, pers. comm.). A pair of birds was observed by the author in the reserved habitat in October 2021.

The 29 sighting records for 2020-2021 registered on the eBird database up to June 2021 are discussed below.

3.6 THREATENED SPECIES RECORDS

Pink Nodding Orchids *Geodorum densiflorum* may have benefitted from the wet conditions in 2020 & 2021 as around 50 individuals were located in the reserved habitat in the first round of monitoring; several with large seed pods, and one in flower. Only one plant as observed in the October round of monitoring. Previously the species occurred sporadically and in smaller numbers in the reserved Glossy Black-cockatoo habitat. See Appendix B.

This is a significant population of an endangered species with fewer than 20 small populations known in NSW (Threatened Species Profiles). The species is also recorded as flowering in December and January, thus flowering in April 2021 may reflect unusual climatic conditions, or species variation.

An endangered Bush Stone-curlew was recorded south of Pottsville.

A pair of Glossy Black-cockatoos were observed feeding in the reserved habitat in October 2021.

4.0 THE eBIRD DATABASE—SIGHTING LOCATIONS

Records of Glossy Black-cockatoos on the eBird website from the Tweed Coast dated 2020 (18 sightings) and up to October 2021 were examined (12 sightings). Sightings were predominantly (55%) from Koala Beach.

Sightings are clearly not random, reflecting the activity of motivated individuals. However, the absence of records from intervening areas where potential feed trees (Horsetail She-oak, Black She-oak) are abundant, is important, reflecting the consistent selectivity of Glossy Black-cockatoo habitat use and feeding preferences.

Summarising the location of 29 sightings for 2020-2021, the importance of Koala Beach and the Kingscliff area is evident as provided below;

LOCATION	SIGHTINGS
Koala Beach & vicinity	17
Kingscliff & Casuarina	8
Bogangar	2
Pottsville	3
TOTAL	29

4.1 SIGHTING ATTRIBUTES: NUMBER OF BIRDS

In 2020 with 18 sightings, the number of birds recorded varied from 1-8 with a mean of 3.2 birds per sighting.

In 2021 with 12 sightings (to October), the number of birds recorded varied from 1-8 with a mean of 2.8 birds per sighting. The overall mean number of birds per sighting for both years combined is 3.1.

4.2 FEED TREE SPECIES

Records were often of birds heard but not seen, or of birds flying overhead. Monitoring results from 2021 indicate use of Forest Oak and Black She-oak. Other sightings were of birds associated with Horsetail She-oak.

4.3 RECORDS FROM THE GLOSSY BLACK CONSERVANCY

Fifty-one (51) records from January to May 2021 for Tweed Shire LGA from the Glossy Black Conservancy were examined. Thirty-four of these were from the Tweed Coast between Kingscliff and Pottsville. The mean number of birds per sighting was 2.9, range 1-7.

5.0 DISCUSSION—GLOSSY BLACK-COCKATOO USE OF THE KOALA BEACH RESERVED HABITAT

Monitoring confirms the continued use of the reserved Koala Beach habitat by Glossy Black-cockatoos, although at a lower level than in some previous years, likely reflective of patterns of resource abundance, and/or sample timing, but also of the local population demographics. In the first round of monitoring, cone crops in the reserved habitat and cone sizes were very much smaller than that of a much used tree nearby, see photos at Appendix B.

In the first round of monitoring cone crops observed in the reserved habitat were light with smaller than median cone size score, but moderate in a small sample (52 trees), with a mean crop score of 1.6 (max. possible 3) and cone sizes were small, with a median score of 1.4 (max. possible 3). A notably productive younger Forest Oak with large crops of large cones in the reserved habitat has not so far been observed being utilised, providing further evidence of the selectivity of use of feed trees by Glossy Black-cockatoos. A well-used tree outside

the reserved habitat had an exceptional cone crop score of 3 and cone size of 3+. See photos at Appendix B.

In the second monitoring event in October most Forest Oaks had few or no cones. Foraging at the site had removed the last of the 2021 crop of cones from most trees, and unusually, there was little evidence of a following crop.

5.1 FEED TREE RESOURCES OUTSIDE KOALA BEACH

Light cone crops were observed in the Cudgen Headland Horsetail She-oaks in early 2021 monitoring. Black She-oak cone crops in the Hastings Point Landcare site, Tweed Bicentennial Environmental Park and south of Pottsville were moderate to heavy, but of these, only the trees south of Pottsville had been utilised by Glossy Black-cockatoos at the time of sampling.

At Bogangar trees were noted to have moderate cone crops and to be regenerating following fire in 2017. Dumping of garden clippings and weed development were evident at this site (Mother of Millions, Bitou Bush, Lantana).

As in the 2019 sample, Black She-oaks in the Hastings Point Landcare site exhibited high levels of mortality or senescence: with ~50% of trees on the sampled walking trail noted as being dead in the April sample. The other Black She-oak sites (south of Pottsville & Tweed Bicentennial Environmental Park) showed minimal mortality of this species.

Feed trees observed south of Pottsville were located in Asset Protection Zones.

Black Sheoak habitat on the banks of Cudgera Creek, behind the school had been affected by vehicle tracks being pushed into this vegetation.

5.2 NUMBER OF BIRDS SIGHTED

Sightings were provided from the Glossy Black Conservancy database, from eBird, and from individual records. The mean number of birds sighted in the Glossy Black Conservancy database of 2.9 in combined 2020-2021 data is slightly greater than that recorded in the previous eBird 2019 sample (2.7). Glossy Black-cockatoos are reported to have a clutch size of one, therefore if sightings of 3 birds represent a pair with young then the 2021 data includes 2 sightings of 3 birds, and in 2020 no sightings of 3 birds were recorded.

The largest sightings in the eBird database were of 8 birds at Kingscliff Spit in March 2021; of 7 birds at Koala Beach (in July 2019). A further sighting is reported of "…around 20…." birds on Cudgera Creek at Kingscliff. The latter observation expressed as "There would have been 20 of them", and is the highest number of Glossy Black-cockatoos reported on the Tweed Coast since the 1990s. This may represent the entire Tweed Coast population or sub-population.

Monitoring indicates the persistence of Glossy Black-cockatoos in the Tweed Coast area, but lower than average levels of use potentially indicate a decline in the local population. The mobility of birds means that they could be foraging elsewhere, however no data exists on the spatial ecology, or extent of distribution of the Tweed coast birds. The Glossy Black Conservancy website states daily movements of birds over 10 and 15km to feed.

5.3 ADEQUACY OF THE POM AND CURRENT MONITORING

The plan of management objective is:

to preserve habitat value for Glossy Black-cockatoos by maintaining the reserved Forest Oak *Allocasuarina torulosa* stands, roost trees and potential or actual nest trees at Koala Beach.

This has largely been fulfilled. No nest trees have been located, and some plantings have been successfully established to counter the low rate of senescence of Forest Oaks. The

tendency for the reserved habitat to develop rainforest species in the absence of fire was predicted and is largely benign, in that adverse competition with feed trees is not yet evident.

While a managed fire could potentially be considered as an appropriate tool to favour regeneration of She-oaks, the practicality of this in a residential landscape is highly questionable, and if mismanaged, could result in losses of the reserved habitat.

6.0 CONCLUSION

The variable pattern of use of the reserved habitat by Glossy Black-cockatoos at Koala Beach is consistent with previous data. Birds move around the Tweed Coast exploiting whichever She-oak crops are available and suitable for feeding. Drinking sites and social interactions are also probable influences on movement patterns. Future monitoring will be needed to determine if any trend relating to use of the reserved Koala Beach habitat is evident. The variation in cone crops and cone size between trees in the reserved habitat and a tree nearby which has a large crop of very large cones may be explained by variation in soil type and/or age of this tree.

The quantity of feed sign found suggests a low number of birds were feeding. Review of the various sightings also suggests that the current population level may have declined from previous years.

The Glossy Black Conservancy website states that birds may travel up to 15kms in a day to feed. If birds are simply foraging elsewhere, this is not indicated by the pattern of eBird records. Records for 2021 in the Conservancy database include sightings from several Tweed hinterland locations: Smith's Creek, Dungay, Tomewin, Eungella, Pumpenbil and Burringbar. With the exception of Burringbar, all of these locations are well distant (~20kms) from the Tweed Coast, and the lack of records from the intervening sub-coastal areas could be interpreted as evidence for two separate populations or sub-populations of birds.

Low levels of recruitment of Forest Oaks in the reserved habitat is a normal consequence of the ecology of the She-oaks, where dense layers of shed cladodes inhibit or prevent establishment of seedlings. In the absence of fire (which if sufficiently intense can kill adult trees) seedling development is suppressed.

While She-oak plantings have been successfully established in the reserved habitat, and some recruitment of Forest Oak and Swamp Oak has occurred in the reserved habitat and nearby, there is no evidence yet from monitoring of these trees being used for foraging.

7.0 RECOMMENDATIONS

The value of local observers reporting sightings of Glossy Black-cockatoo to the eBird website has been critical to gaining some understanding of the local demographics of the local Glossy Black-cockatoo population.

- Encourage local residents to contribute sightings, including where possible, the number, sex and life stage of birds, feed and roost tree species, watering sites and any behavioural observations.

- Continue Glossy Black-cockatoo monitoring samples at Koala Beach on a biennial basis: *i.e.* recommencing in 2023.

- Continue to monitor use of artificial hollows annually, between January and July.

- More Forest Oak plantings are recommended at Koala Beach, and She-oak plantings elsewhere on the Tweed Coast are encouraged where appropriate. Seed from the exceptionally productive Melia Close feed tree should be used to provide seedlings for plantings.

- A whole of estate survey is recommended for Koala Beach to identify areas of She-oaks outside the reserved habitat, and their condition.

- Weeds in the reserved habitat need timely attention and removal, specifically Giant Devil's Fig, Ground Asparagus, Molasses Grass and Lantana. Care needs to be taken when controlling weeds around the Pink Nodding Orchids.

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eBird. 2021. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: http://www.eBird.org. (Accessed: Date [e.g., February 2, 2017]).

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APPENDIX A: METHODOLOGIES

(i) Installation and monitoring of artificial hollows

Six artificial hollows, based on designs used successfully for Glossy Black-cockatoos on Kangaroo Island, were installed in two clusters of three each at Koala Beach on February 25th 2010. Hollows were constructed and installed by Graeme Lloyd (WildlifeServices, Terranora) after selection of potentially suitable trees on February 15th 2010. Tree selection was determined by descriptions of nest trees in literature (*e.g.* GBC 2010) as being large living or dead eucalypts with diameter at breast height > 40 cm. Tree selection was also influenced by the proximity of trees to the reserved Forest Oak habitat stands, and to a known watering site.

Monitoring occurs annually using a pole camera to investigate occupancy of the artificial hollows.

(ii) Reserved Glossy Black-cockatoo habitat at Koala Beach

Reserved Glossy Black-cockatoo habitat at the Koala Beach Estate comprises 2.26 ha of the north-facing slopes of a low ridge (<50 m AHD) of metamorphic geology, which is oriented from southwest to northeast. The ground surface is rocky and sloping, with small patches of grassland. Two small gullies are present which divide the habitat into 3 identifiable stands (west, central, northeastern). Buffers to the reserved habitat extend the area reserved to a total of 6.16 ha. The reserved habitat is contiguous with a large block of forested land to the north which is zoned 7(l) Environmental Protection (Habitat), and with an area to the south-east reserved as habitat for the threatened Common Blossom Bat *Syconycteris australis*.

The dominant vegetation and principal canopy tree in the reserved habitat is Forest Oak, *Allocasuarina torulosa* and the overall stand height is low (<15m). Occasional emergent Northern Grey Ironbark *Eucalyptus siderophloia* and Pink Bloodwood *Corymbia intermedia* are present; taller Swamp Oak *Casuarina glauca* are also present, mainly in the lower slope and around gullies. A suite of dry rainforest species is developing in the mid-layer: with Celerywood *Polyscias elegans*, Tuckeroo *Cupaniopsis anacardioides*, Geebung *Persoonia sp.*, Bleeding Heart *Homalanthus populifolius*, Barbed Wire Vine *Smilax australis* and Pink Euodia *Melicope elleryana* noted to be present, and also stressed from lack of moisture.

Coast Banksia *Banksia integrifolia* occurs on the ridge top above the reserved habitat stands, but has been adversely affected by drought.

Forest Oaks are also the dominant and co-dominant canopy species in a similar stand to the near northeast, extending around the water reservoir site (reservoir stand: see Figure 1). Vegetation of the reserved Glossy Black-cockatoo habitat and the reservoir stands thus differs from habitat elsewhere on the Koala Beach Estate, where Forest Oak generally occurs as a minor component of the mid-layer vegetation beneath eucalypt open forest and woodland, where the canopy layer is dominated by taller sclerophyllous species such as Blackbutt *Eucalyptus pilularis*, Northern Grey Ironbark, Grey Gum, *E. propinqua*, White Mahogany *E. acmenoides* and Pink Bloodwood *Corymbia intermedia*.

Figure A1 below depicts the reserved habitat Western Central & Northeast stands in red and the Reservoir stand in yellow.
Figure A2 indicates the number of tagged feed trees in each area. Note three trees tagged in 2021 are not included in this figure.

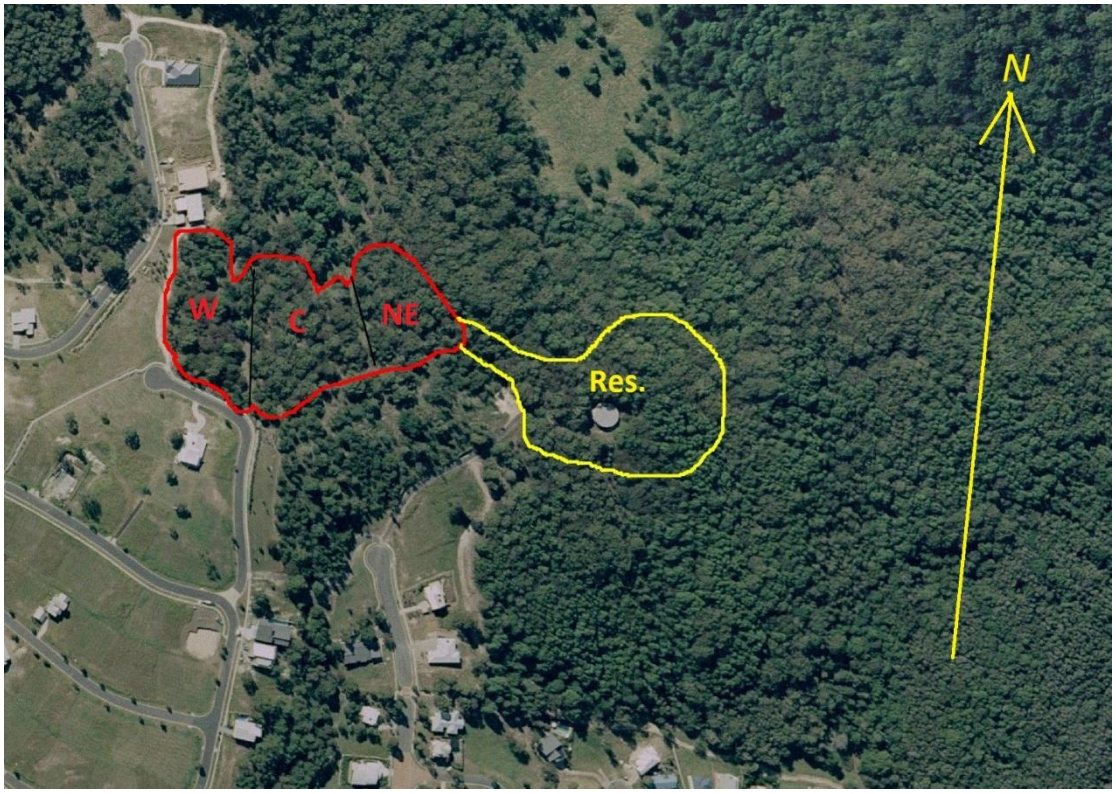

Figure A1: Reserved Koala Beach Glossy Black-cockatoo habitat and Reservoir stand. Source: GoogleEarth. Scale = ~1: 5,600

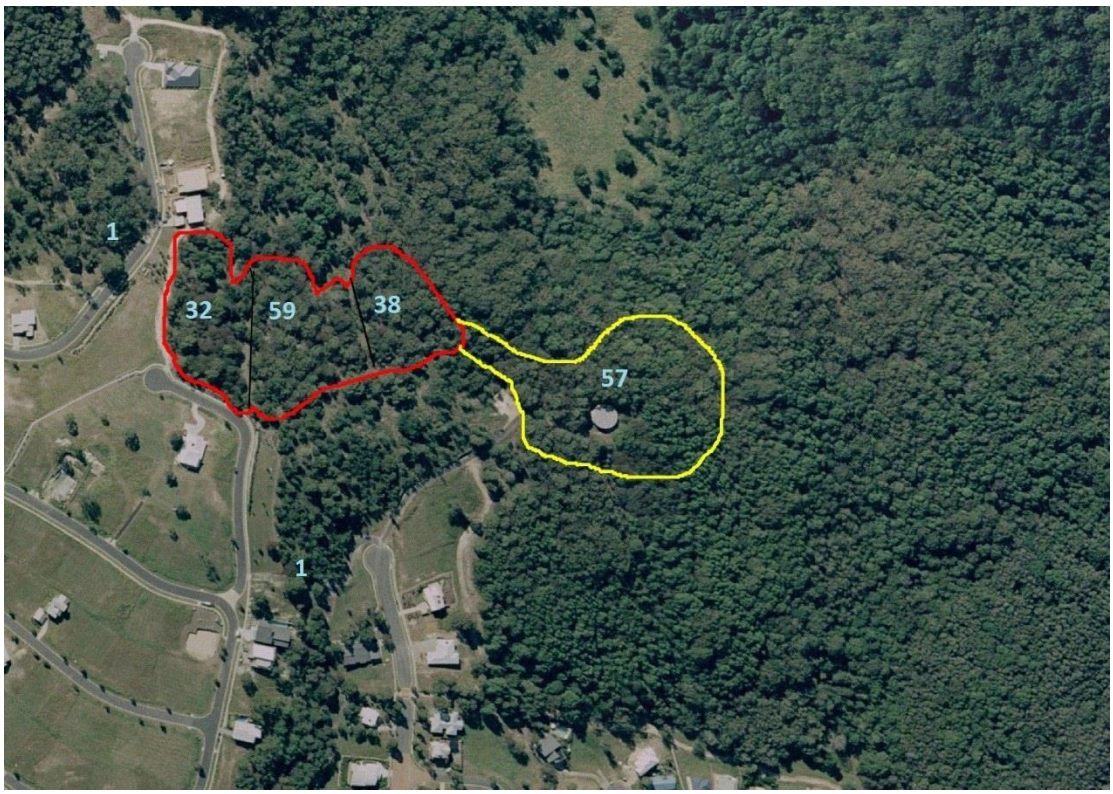

Figure A2: Distribution of feed trees at Koala Beach: 1996-2019

Table A1: Feed Sign Data: 2021 Monitoring – first round (April-May)

Date	Tree tag	Location & Feed Tree Species	Chewed cones
28/4/21	No tag	Near Peters Ct, Pottsville: Black Sheoak	350
	No tag	McKenzie Rd., Pottsville Black Sheoak	115
26/5/21	70	Koala Beach Reserved Habitat; Forest Oak	250
	No tag	Koala Beach Reserved Habitat; Forest Oak	150
TOTAL			865

Table A2: Feed Sign Data: 2021 Monitoring – second round (October)

Tree tag	Cone crop	Cone size	Chewed cones
188	2	1	150
182	1	1	5
167	0	0	5
81	1	1	30
163	1	1	10
79	1	1	20
34	1	1	10
32	1	1	10
189	0	0	20
94	0	0	20
92	0	0	20
156	1	1	60
91	1	1	50
25	0	0	120
140	0	0	30
23	3	2	20
89	0	0	20
21	1	1	20
88	1	1	20
86	0	0	30
49	1	1	40
48	1	1	70
170	1	1	5
190	1	1	80
104	0	0	10
62	1	1	50
61	1	1	50
untagged	1	1	20

Table A3: 2021 Monitoring activities

Date	Location	Activities
28/4/21	Tweed Coast: Cudgen Headland, Bogangar, Hastings Point, south of Pottsville	Search of She-oak stands
13/5/21	Koala Beach	Artificial hollow check
15/8/19	Tweed Coast: Cudgen Headland, Hastings Point, south of Pottsville	Search of She-oak stands
26/5/21	Koala Beach	Search of the reserved habitat
		Search of Cudgera Creek, Pottsville Environment Park
18/10/2021	Koala Beach	Search of the reserved habitat

APPENDIX B: PHOTOGRAPHS

(i) Lush closed groundlayer vegetation in Koala Beach reserved habitat

(ii) Feed sign under Tree #70 in Koala Beach reserved habitat

(iii) Cones in untagged Use Tree at Melia Close Koala Beach

(iv) Pink Nodding Orchid in flower in Koala Beach reserved habitat; April 2021

(v) Black Sheoak feed trees in Asset Protection Zone, Pottsville

(vi) Bush Stone-curlew Pottsville

(vii) Garden clipping dumping at Melia close