6.1 e Cassowary Survey Nov. 2010 P. Buosi

NRA Environmental Consultants
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Our Ref: EBIRD Cass Survey Nov10_L01/PB:jw

17 February 2011

Ella Bay Services Pty Ltd
PO Box 5766
West End QLD 4101

Attention: Rod Lamb

Dear Rod

RE: Cassowary Survey at the proposed Ella Bay Integrated Resort Development - November 2010

Introduction

NRA Environmental Consultants (NRA) was commissioned by Ella Bay Services (EBS) to conduct field surveys to collect information on the abundance, distribution, sex ratio and age class structure of Southern Cassowaries (*Casuarius casuarius johnsonii*, hereafter referred to as Cassowary) living on or immediately adjacent to the proposed Ella Bay Integrated Resort Development (EBIRD) site and access roads (referred to as 'the study area' in this report). The information will further increase Satori's understanding of the Cassowary population around the proposed development area and inform management decisions regarding the species.

The following four Cassowary surveys have already been conducted in the study area as part of the Environmental Impact Assessment (EIA) process.

- November 2006 survey by Moore (2006).
- February 2009 survey by Moore (2009).
- November 2009 survey by NRA (2010a).
- April 2010 survey by NRA (2010b).

The following reports on the results of the fifth Cassowary survey conducted between 8 and 11 November 2010. The survey was timed to coincide with the general period when new generations of Cassowary chicks begin to appear (NRA 2009). The advantage of surveying during this period is that family groups are easier to locate than single birds, information on chicks can help distinguish adult Cassowaries and information on breeding and recruitment can be obtained. The survey timing is consistent with advice provided by Moore (2009) and replicates the timing of his original survey of the area in November 2006 (Moore 2006).

Methods

The methodology involved the collection and analysis of data obtained via searches for Cassowary sign (primarily scats, footprints and feathers) from dedicated surveillance cameras and incidental sightings recorded by EBS staff. The survey periods and details of survey techniques are described below.

- **Field survey**. A field survey was undertaken between 8 and 11 November 2010 by Peter Buosi (NRA), with assistance from EBS staff Adrian Hogg, Daniel Figueiredo, Brian Hogg, Paul Harris and Steve Garrad. The survey involved daily searches for Cassowaries and their signs (primarily scats, footprints and feathers) along designated transects. Survey transects are shown on **Figures 1a** and **1b** and described in **Table 1**. Accessibility within the study area and available human resources have differed during each survey event to date (Moore 2006, 2009; NRA 2010a, b; current study) and consequently the field survey transects have also differed. The main differences are described in **Table 1**. Data on Cassowaries and their sign were recorded according to the categories described in **Table 2**.
- **Surveillance cameras**. Surveillance cameras were also used to collect Cassowary data. Camera locations are shown on **Figures 1a** and **1b**, with the period of deployment (survey effort) shown in **Table 3**. In summary, survey cameras were deployed between 7 October and 2 December 2010. Many camera locations differ slightly to those used during previous surveys. The optimal location for cameras is being refined based on site-specific experience. Camera survey effort was greater during the current survey compared with previous surveys.
- **Incidental sightings by EBS staff**. EBS staff record opportunistic sightings of Cassowaries. Sighting data collected between 7 October and 2 December 2010 were reviewed during the preparation of this report.

The population analysis described in this report is based on the above data sources and therefore reflects the Cassowary population using the study area between 7 October and 2 December 2010. The method used to identify individual Cassowaries is provided in the results section of this report. Data collected during previous surveys (*eg* Cassowary profiles and images) assisted in the identification of Cassowaries recorded during the current survey period. Mapping for this study was prepared by EBS staff.

Table 1: Description of survey transects used during the November 2010 Cassowary survey at Ella Bay

Transect Number	Transect Length (km)	Description	Notable Variation From Previous NRA Surveys (NRA 2010a, b)
1	0.6	Beach and foredune commencing at north-east corner of clearing and terminating at the boundary of the EBIRD site.	This transect has previously terminated at a headland 2.5 km further to the north.
2	2.3	Forest edge along northern boundary of clearing.	This transect is relatively unchanged in terms of location. Many sections of this transect are under water during wetter months (*eg* NRA 2010b), which reduces the quality and detectability of Cassowary sign.
3	3.7	Forest edge along western boundary of clearing.	This transect extended approximately 0.5 km further east along the east-west creek than in previous years. As per the April 2010 survey, and unlike the November 2009 survey, significant effort was spent surveying just inside the forest edge.
4	2.8	Forest edge along southern boundary of clearing.	The 0.4 km section referred to as transect 4b in NRA (2010b) was not surveyed during the current study.

Transect Number	Transect Length (km)	Transect Description	Notable Variation From Previous NRA Surveys (NRA 2010a, b)
5a to 5d	4.6	Random meanders along and within beach and foredune communities commencing at north-east corner of clearing and terminating at south-east corner of clearing.	The survey effort devoted to this was higher than in previous years. Transect 5d has not been previously surveyed. Water levels allowed reasonable access through this area unlike April 2010 (NRA 2010b) when high water levels made most of the area inaccessible.
6a	1.8	Upstream section of east-west creek. Effort concentrated along northern forest edge.	The stream channel was surveyed in November 2009 but not in April 2010 or this study for safety reasons (presence of Estuarine Crocodiles).
6b	0.7	Downstream section of east-west creek. Effort focused on forest edge along northern and southern side of creek. The presence of crocodiles prevented a survey along creek channel.	No change in survey approach.
7	1.1	Random meander along channel, forest and forest edge (eastern and western) of north-south creek.	Transect 7b surveyed in April 2010 (NRA 2010b) was not surveyed during this study.
8	1.4	Track up hill at Little Cove.	No change in survey approach.
9	1.1	Network of tracks around Little Cove.	No change in survey approach.
10a and 10b	2.8	Ella Bay Road between house/shed (on EBIRD site) and Heath Point car park.	No change in survey approach to transect 10a. This is the first time that transect 10b has been surveyed on foot. Cassowary activity around the waterfall (end of transect 10a and start of transect 10b) prompted this change.
11	0.6	Little Cove beach and foredune .	No change in survey approach.
12	1	Random meander along Flying Fish Point Beach and foredune near the fish farm.	No change in survey approach.
13	1.5	Ella Bay Road between Heath Point (adjacent to car park) and intersection with Ruby Street.	No change in survey approach.
14	0.7	Random meander through Flying Fish Point Reserve.	The forest through this area is difficult to traverse (tangle of *Calamus* spp. and *Pandanus* spp.) and for this reason the transect varies slightly from year to year. Unlike previous years the eastern and southern forest edge (transect 14a) was not surveyed (this was an oversight).
15	1.4	Vicinity of proposed road alignment over Seymour Range between Flying Fish Point Road and Ella Bay Road.	The forest through this area is difficult to traverse (tangle of *Calamus* spp. and *Pandanus* spp.) and for this reason the transect varies slightly from year to year.
Total	**28.1**		

Table 2: Description of attributes used to record data on Cassowaries and their sign during surveys at Ella Bay in November 2010

Cassowary Sign	Primary Attribute	Secondary Attribute	Tertiary Attribute
Scats	Age of scat. • Very fresh: dropping is raised from ground surface and has complete structure; very wet and sometimes steaming; negligible sign of oxidisation; fruit still fleshy. • Fresh: dropping is raised and has complete structure; thin outer layer is dry but dropping is otherwise wet; signs that outer layer is oxidising; fruit still fleshy. • Recent: dropping is raised and has complete structure; dry outer layer but wet in centre and base; outer layer is oxidised; fruit partly fleshy. • Old: dropping is slightly raised but has weak structure; completely dry; fruit in advanced state of decay. • Very old: dropping is flat and lacking structure; very dry and deteriorated; no sign of fleshy fruit; some seeds might be germinating.	Size of scat. • Small: <12 cm diameter (possible evidence of a juvenile or subadult Cassowary). • Large: >12 cm diameter (evidence of an adult Cassowary).	Contents of scat.
Footprint	Social structure. • Independent bird: no chick prints accompany adult print. • Family group: chick prints accompany adult print, including number of chicks discernable from footprints.	Footprint quality: footprints can be measured from tip of middle toe to back of heel. High quality: tip of toenail and back of heel are clearly defined; scale imprints are often visible; print is on relatively flat surface and not speared into or smudged on substrate. Low quality: tip of toenail and edge of heel not clearly defined, obscured by vegetation, smudged or speared into substrate.	Length of each measured print (in millimetres) and direction of travel.
Sighting	Social structure. • Family group: adult male and number of chicks. • Independent adult: feathers totally black; blue and red on face and neck; well developed casque. • Independent subadult: feathers totally brown or contain proportion of brown; face and neck may or may not be blue and red; casque small.	Sex. • Male: tail droops below body line; smaller than fully grown female; with or without chicks. • Female: tail small and does not droop below body line; larger than male when fully grown; without chicks.	Description of casque (bends, notches, colours), wattles (length and colour) and/or other distinguishing face or body markings.

Table 3: Deployment period for surveillance cameras used during surveys at Ella Bay in November 2010[1]

	Pre-Survey Period			Survey Period			Post-Survey Period		
Camera No.	Deployed	Retrieved	Days	Deployed	Retrieved	Days	Deployed	Retrieved	Days
S3	7/10/2010	4/11/2010	28	4/11/2010	12/11/2010	8	12/11/2010	2/12/2010	20
S4	7/10/2010	4/11/2010	28	4/11/2010	12/11/2010	8	12/11/2010	2/12/2010	20
S5	-	-	0	4/11/2010	12/11/2010	8	12/11/2010	2/12/2010	20
S6	7/10/2010	4/11/2010	28	-	-	0	-	-	0
S6a	-	-	0	9/11/2010	12/11/2010	3	12/11/2010	2/12/2010	20
S8	-	-	0	-	-	0	-	-	0
R1	14/10/2010	28/10/2010	14	28/10/2010	12/11/2010	15	12/11/2010	2/12/2010	20
R2	-	-	0	8/11/2010	12/11/2010	4	-	-	0
R3	7/10/2010	4/11/2010	28	4/11/2010	12/11/2010	8	12/11/2010	2/12/2010	20
R4	7/10/2010	4/11/2010	28	4/11/2010	12/11/2010	8	-	-	0
R4a	-	-	0	-	-	0	12/11/2010	19/11/2010	7
R5	14/10/2010	8/11/2010	25	-	-	0	-	-	0
R5a	-	-	0	9/11/2010	12/11/2010	3	12/11/2010	2/12/2010	20
R6	14/10/2010	4/11/2010	21	4/11/2010	12/11/2010	8	12/11/2010	2/12/2010	20
R7	14/10/2010	28/10/2010	14	28/10/2010	10/11/2010	13	-	-	0
R7a	-	-	0	10/11/2010	12/11/2010	2	12/11/2010	2/12/2010	20
R8	14/10/2010	28/10/2010	14	28/10/2010	12/11/2010	15	12/11/2010	2/12/2010	20
R9	20/9/2010	28/10/2010	38	28/10/2010	12/11/2010	15	12/11/2010	2/12/2010	20
R10	14/10/2010	28/10/2010	14	-	-	0	-	-	0
R10a	-	-	0	28/10/2010	12/11/2010	15	12/11/2010	2/12/2010	20
RL	-	-	0	8/11/2010	12/11/2010	4	12/11/2010	2/12/2010	20
NRA R1	-	-	0	9/11/2010	19/11/2010	10	-	-	0
NRA R2	-	-	0	10/11/2010	19/11/2010	9	-	-	0
NRA P1	-	-	0	9/11/2010	19/11/2010	10	-	-	0
NRA P2	-	-	0	9/11/2010	19/11/2010	10	-	-	0
NRA P3	-	-	0	10/11/2010	19/11/2010	9	-	-	0
NRA P4	-	-	0	9/11/2010	19/11/2010	10	-	-	0
TOTAL			**280**			**195**			**267**

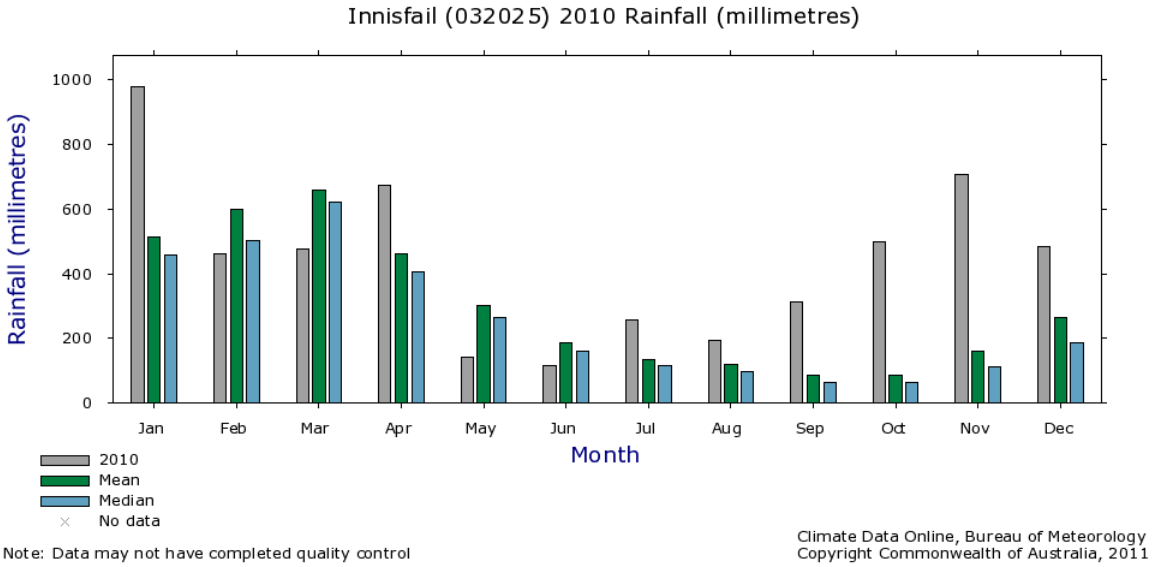
1 - Camera locations are shown on Figures 1a and 1b.

Results

Weather Conditions

Showers occurred during, and in the weeks proceeding, the field survey period. No cyclone occurred in 2010 and no extreme weather event (flooding, extended dry or gale force winds) occurred during or immediately prior to the survey. Conditions were quite good for surveying Cassowaries. Above average rainfall occurred in the weeks following the field survey period when surveillance cameras were still deployed.

Rainfall for the 2010 calendar year is shown on **Graph 1**. Weather data is based on the Innisfail weather station and obtained from the Bureau of Meteorology web site (http://www.bom.gov.au).



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Graph 1: Rainfall data (2010 and long term) from the Innisfail weather station

Cassowary Survey Results

Overview

During the field survey 10 Cassowary sightings were made and 163 scats (61 were recent or fresh) and 42 sets of footprints (including eight high quality prints) were recorded. Surveillance cameras captured photographs of Cassowaries at 10 general locations between 7 October and 2 December 2010. The locations of Cassowary sign recorded during the field survey (8 to 11 November 2010) and on surveillance cameras (7 October to 2 December 2010) are shown on **Figures 2a** and **2b**.

Estimates of population abundance, sex, age and social class

Within the study period (7 October to 2 December 2010), it was estimated that at least nine adult Cassowaries (6 males, 2 females and 1 of unknown sex), five subadult Cassowaries and four chicks (**Table 4**) were using the study area. Two other adult Cassowaries (both probably male) and one subadult may have also occurred in the study area. The identities of these birds are summarised below.

EBIRD Site

- **Unidentifiable adult Male**. A single photo was recorded on surveillance camera R9 in the north-east of the EBIRD site. There is insufficient data to attribute this bird to any of the previously identified Cassowaries (NRA 2010a, b). Adult Male A was recorded in the same area during previous surveys (NRA 2010a, b) and hasn't been recorded elsewhere during the current survey. It's possible that the unidentified adult male described here is Male A. Subadult 4 was photographed on the same surveillance camera and the footprint record shows that this bird was using similar areas to that of the adult Cassowary. Male A had two large brown chicks in April 2010 (NRA 2010b) and subadult 4 could be one of these chicks.
- **Subadult 4**. Approximately 75% of plumage is brown and 25% is black (shoulders/base of neck). Recorded on surveillance camera R9 in the north-east of the EBIRD site. Poor quality footprint approximately 160 mm probably belongs to this bird. This bird could be one of the chicks recorded with Male A in April 2010 (NRA 2010b).
- **Subadult 1.** Approximately 20% of plumage is brown and 80% is black creating a mottled appearance. Recorded on surveillance camera R1 in the north-west of the EBIRD site. High quality 180 mm footprint probably belongs to this bird.

- **Male B(?) + 1 chick**. On the 29 November 2010 a male with one chick was photographed by EBS staff at the cattle yards just upstream of main creek crossing over the east-west creek. On 30 November 2010 an unidentifiable adult male with one chick was recorded on surveillance camera R6 near the main creek crossing. The birds were on the northern bank and travelling west. The 29 November 2010 image is a little blurry and the 30 November 2010 photos are very blurred. While image quality precludes positive identification the close proximity of the photo points suggests that the photos are probably of the same family group. Based on the blurred 29 November 2010 image the adult is probably Male B because no wattles are visible (diagnostic of Male B and should be visible on photos despite imperfect image quality) and the left side of the casque also has features diagnostic of Male B. Adult Male B was recorded further west (upstream) during previous surveys (NRA 2010a, b) and hasn't been recorded elsewhere during the current survey.
- **Male G + 1 chick.** Good quality photos of an adult male with one small chick were recorded on surveillance camera P2 in the south-west of the EBIRD site. Comparison of these photos with the historical photo record for the site (cassowary profile database) suggests that this adult is different to any of the previously recorded Cassowaries (NRA 2010a, b). The adult bird has been assigned the name 'Male G'.
- **Male E (+/- 1 chick)**. Male E was recorded on surveillance camera R3 along a creek in Little Cove. Identified as Male E using photos from this study and previous studies (NRA 2010a, b). The left side of the casque is the main identifying feature. A very small chick appears with Male E on photos taken 27 October 2010 but is absent from photos on 2 and 9 November 2010 suggesting the chick had not survived.
- **Subadult 2**. Subadult with brown plumage but beginning to darken. No colours on face. Recorded on surveillance camera R3 along a creek in Little Cove. Male E had a large chick in April 2010 (NRA 2010b) and Subadult 2 could be this chick.
- **Subadult 3**. Subadult with mostly (90%) black plumage. Red and blue colours developing on face and neck. Recorded on surveillance camera R3 along a creek in Little Cove.
- **Female A**. Female A was recorded on surveillance camera R3 along a creek in Little Cove. Identified as Female A using photos from this study and previous studies (NRA 2010a, b). The casque was the main identifying feature. Female A was photographed drinking and bathing in the creek.

Access Road

- **Female B(?)**. Adult Female B was recorded on surveillance cameras at three different locations – waterfall near Heath Point (camera R2) and two locations within Flying Fish Point Reserve (cameras P3 and R2). Photo quality is sufficient to tentatively identify this bird as Female B (based on casque features). This is the first time that Female B has been recorded near Heath Point.
- **Unidentifiable adult Male + 1 chick**. An unidentifiable adult male with one chick was recorded on surveillance camera P3 in Flying Fish Point Reserve. The chick was very small and had the striped plumage typical for its young age. While this adult bird is probably not Male F based on casque features (left side) the image is inconclusive. Given the young age of the chick this adult bird was unlikely to have ranged very far during the study period.
- **Unidentifiable adult Male + 1 chick**. An unidentifiable adult male with one chick was recorded on surveillance camera RL near the waterfall north of Heath Point. The image quality is quite poor and it's not possible to ascertain if this adult bird has been previously identified (NRA 2010a, b). The chick was very small and had the striped plumage typical for its age. Given the young age of the chick this adult bird was unlikely to have ranged very far during the study period. On this basis it is unlikely to be the same adult and chick photographed 1.2 km south in Flying Fish Point Reserve (described in the above dot point).

- **Subadult 5**. Recorded on surveillance camera RL at the waterfall near Heath Point. While photo quality is imperfect the birds plumage appears to be mostly (90%) black plumage with red and blue markings beginning to develop on the face and neck. The red and blue markings are less developed than that of Subadult 3 recorded 1.4 km north-west (creek in Little Cove). The 150 to 160 mm poor quality prints recorded approximately 1 km south in Flying Fish Point Reserve possibly belong to this bird but there is insufficient data to be certain.
- **Unidentifiable adult.** Footprints (180 to 190 mm) recorded on Seymour Range are likely to belong to a different Cassowary to those described above. The prints are too small to be Female B and the two males with small chicks (described above) are unlikely to have ventured that far.

Some observations could not be conclusively attributed to specific Cassowaries and these are summarised as follows.

EBIRD Site

- The 200 mm high quality footprints recorded in the coastal forest between the house and east-west creek cannot be confidently attributed to an identifiable Cassowary. The female Cassowary that usually uses this area (Female A) has a much larger footprint (215 mm) and she is unlikely to tolerate other females residing in this area. The footprints are therefore more likely to belong to a male Cassowary, probably one previously recorded (NRA 2010a, b) in this area. Male E was recorded using this area in April 2010 and along with Males D and C was using nearby areas in November 2009. There is insufficient data to conclude if this is an additional Cassowary to that described in the previous section. Population estimates are provided in **Table 4** (*see* EBIRD Site column and Adult male category).

Access Road

- Footprints of varying sizes were recorded in Flying Fish Point Reserve. Although poor quality this data suggests there were at least three Cassowaries using Flying Fish Point Reserve including a smaller bird (165 mm footprint), an intermediate sized bird (180 mm footprint) and a larger bird (195 mm footprint). Female B is unlikely to have been responsible for the footprints as she is likely to have a footprint >205 mm, and probably between 210 mm and 215 mm. While small chick footprints were not recorded they may have been easily overlooked given the unsuitable substrate for clear footprints and the foliage density. Therefore, it is unclear if the footprints belong to the two adult males (with chicks) and subadult 5 already described for the general area or whether they belong to other birds. The possibility of there being an additional adult male and subadult Cassowary is indicated in **Table 4** (*see* Access Road column, Adult male and Subadult categories).

Table 4: Estimate of Cassowary population abundance, sex, age and social class using the Ella Bay survey area between 7 October and 2 December 2010[1]

Category	EBIRD Site	Access Road	Total
Adult male	4 (possibly 5)	2 (possibly 3)	6 (possibly 8)
Adult female	1	1	2
Adult Undetermined Sex	0	1	1
Subadult	4	1 (possibly 2)	5 (possibly 6)
Family groups	2[2]	2	4[2]
Chicks	2[2]	2	4[2]

1 – Some observations could not be conclusively attributed to specific Cassowaries and a possible estimate is therefore provided in parentheses.

2 – Excludes Male E who had a chick for only a short time during the study period.

Conclusion – Comparison with Previous Studies

Table 5 presents the results of the current (NRA 2010a, b,) and previous (Moore 2006, 2009) Cassowary surveys conducted for the proposed Ella Bay Integrated Resort Development. Variations between survey methods and survey conditions should be considered when viewing this information. While a detailed description of these variations is beyond the scope of this report they can be derived from the source documents referenced in the table. The following is of most relevance when reviewing this data.

- Cyclone Larry crossed the coast near Innisfail on 20 March 2006. Maximum gusts of 240 km/hr were recorded at Innisfail and a storm surge of 1.34 m was recorded at Mourilyan Harbour. This cyclone caused significant damage to the habitats on which Cassowaries depend and contributed to the deaths of many Cassowaries in the region. Cassowaries may die as a direct result of cyclones (*eg* tree falls) or in the months and years following the cyclone due to starvation and stress.
- Weather conditions during and/or prior to the November 2006, February 2009 and April 2010 surveys were not ideal for collecting Cassowary data and this circumstance may in part account for the lower population estimates shown for these studies.

Table 5: Comparison of population estimates between the current (NRA 2010a, b,) and previous (Moore 2006, 2009) Ella Bay Cassowary surveys

Category	November 2006 (Moore 2006)		February 2009 (Moore 2009)		November 2009 (NRA 2010a)		April 2010 (NRA2010b)		November 2010 (this study)	
	EBIRD Site	Access Road	EBIRD Site	Access Road	EBIRD Site	Access Road	EBIRD Site	Access Road	EBIRD Site	Access Road
Adult male	2	2	1	1	5 (possibly 4)	1	4	0	4 (possibly 5)	2 (possibly 3)
Adult female	1	1	0	0	1 (probably 2)	1	0 (possibly 1)	0	1	1
Adult sex uncertain	0	0	0[1]	1[2]	0 (possibly 1)	0	0	1 (possibly 2)	0	1
Subadults	0	0	1	0	2	1	1	0	4	1 (possibly 2)
Family groups	0	1	1	1	5 (possibly 4)	0	3	0	2[3]	2
Chicks	0	1	2	2	11 (possibly 9)	0	5	0	2[3]	2
Total adults	6		3		8 to 10		5 to 7		9 to 11	
Total subadults	0		1		3		4		5 or 6	
Total chicks	1		4		9 to 11		2		4	

1 – Moore (2009) recorded scats along the north-eastern edge of the EBIRD clearing. While he could not definitively assign these scats to a separate bird, they were >3 km from other Cassowary sign and our experience suggests they may have been from an additional bird to that described in his report.

2 – Moore (2009) recorded this adult Cassowary in the swamps west of Flying Fish Point, approximately 3 km south-west of the proposed access road and 6 km south of the EBIRD site. This is outside the current (NRA) survey area.

3 – Excludes Male E who had a chick for a short time during the study period.

References

Moore, L.M. 2006. Cassowary Assessment of the 'Ella Bay Integrated Resort Project', North Queensland, 6–14 November 2006. Volumes I, II & III. Unpublished report prepared for John Holland Services Pty Ltd.

Moore, L.M. 2009. Wet Season Cassowary Survey, Ella Bay Integrated Resort Project and Ella Bay Access Road, Innisfail, North Queensland. Unpublished report prepared for Satori Pty Ltd.

NRA 2009. Cassowary Monitoring Program – Ella Bay Integrated Resort Development Proposal. Letter report to Satori Resorts Ella Bay Pty Ltd, prepared by NRA Environmental Consultants, 15 October 2009.

NRA 2010a. Supplementary Survey (November 2009) for the Southern Cassowary (*Casuarius casuarius johnsonii*) at the Proposed Ella Bay Integrated Resort. Report to Satori Resorts Ella bay Pty Ltd, prepared by NRA Environmental Consultants, 9 February 2010.

NRA 2010b. Supplementary Survey (April 2010) for the Southern Cassowary (*Casuarius casuarius johnsonii*) at the Proposed Ella Bay Integrated Resort. Report to Satori Resorts Ella bay Pty Ltd, prepared by NRA Environmental Consultants, 25 October 2010.

Yours sincerely

NRA Environmental Consultants

PB

Peter Buosi
Principal Ecologist

Encl: Figures

Note: Mapping undertaken by Ella Bay Services

0 0.5 1
Kilometres

PROJECT: Cassowary Survey at the Proposed Ella Bay Integrated Resort Development (November 2010)
TITLE: Ella Bay Study Area and Survey Sites
T:_AAA\340\WOR\340005_Ella Bay Study area and survey sites_a_2011_02_14.wor

JOB NO: 340005
DATE: Febuary 2011
SOURCE: Ella Bay Services, NRA, Google Earth

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Figure 1a

Recommended print size: A4

Note: Mapping undertaken by Ella Bay Services

PROJECT: Cassowary Survey at the Proposed Ella Bay Integrated Resort Development (November 2010)
TITLE: Ella Bay Study Area and Survey Sites
T:_AAA\340\WOR\340005\340005_Ella Bay Study area and survey sites_a_2011_02_14.wor

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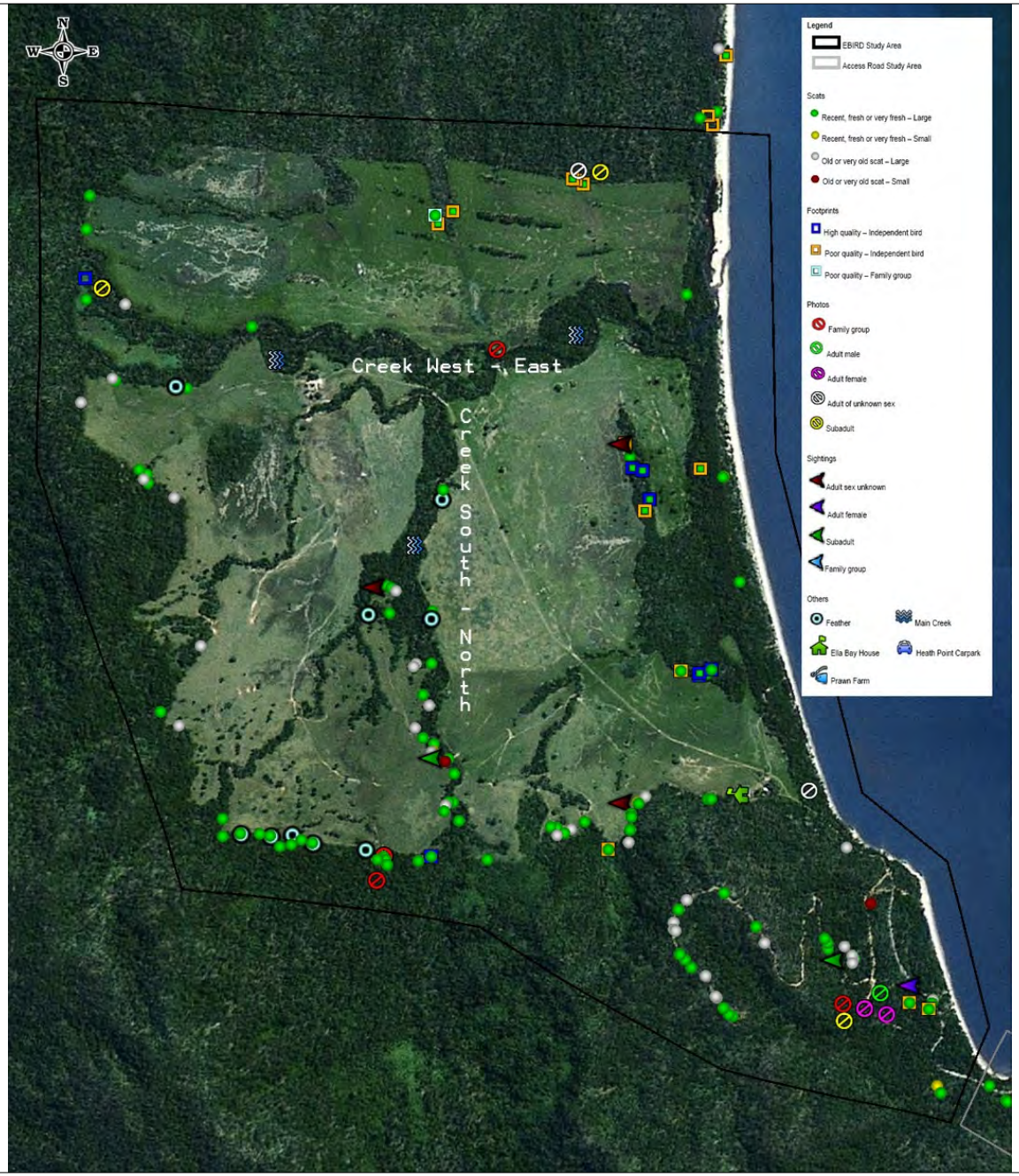
Figure 1b

Recommended print size: A4



Note: Mapping undertaken by Ella Bay Services

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Kilometres

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TITLE: Results from November 2010 Cassowary Survey at Ella Bay
T:_AAA\340\WOR\340005_Cassowary Survey Results_a_2011_02_14.wor

JOB NO: 340005
DATE: Febuary 2011
SOURCE: Ella Bay Services, NRA, Google Earth

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Figure 2a

Recommended print size: A4

Note: Mapping undertaken by Ella Bay Services

PROJECT: Cassowary Survey at the Proposed Ella Bay Integrated Resort Development (November 2010) TITLE: Results from November 2010 Cassowary Survey at Ella Bay *T:_AAA\340\WOR\340005\340005_Cassowary Survey Results_b_2011_02_14.wor*	JOB NO: 340005 DATE: Febuary 2011 SOURCE: Ella Bay Services, NRA, Google Earth	NRA Environmental Consultants NATURAL RESOURCE ASSESSMENT AND MANAGEMENT	Figure 2b

Recommended print size: A4