6.1 b Cassowary Survey Feb. 2009 L. Moore

WET SEASON CASSOWARY SURVEY

Ella Bay Integrated Resort and Ella Bay Access Road, Innisfail, North Queensland

Report prepared
for
Satori Pty Ltd

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Cassowaries

The birds located in this survey indicated a movement away from the flooded lowlands and supports the hypothesis that the local cassowary population makes seasonal use of the coastal lowlands east of Ella Bay National Park. There were no additional cassowaries identified in this wet season cassowary survey and it is considered that those birds sighted in the November 2006 survey represent the majority of the cassowary population making use of this area. The results of both surveys indicate that the Ella Bay property and Flying Fish Point areas comprise the eastern edge of cassowary home ranges that are centred on the Seymour Range and Ella Bay National Park.

Three birds previously sighted in the Ella Bay – Flying Fish Point study area in November 2006 were not recorded in February 2009. One of these missing birds was an adult female known to have been killed by dogs in early 2007, shortly after the 2006 survey. The second cassowary, an easily identifiable adult male sighted on the Ella Bay property in 2006, was located within the Ella Bay National Park in this survey, approximately 2.3 kilometres west of the property. The third bird was an adult cassowary sighted using the drier areas of the Ella Bay Swamps in 2006; these swamps were heavily flooded during this survey and not exploitable by cassowaries.

Food resources

Fruiting abundance was low on the slopes and flatter areas during the field survey, with only a few widely dispersed fruiting trees. Fallen fruit were generally swept away from the parent trees by significant overland water flow, probably making it difficult for cassowaries to locate. Cassowaries were generally foraging on higher and less flooded forest, but two family parties were observed to make visits down to the lowlands. Evidence of this movement was the presence of pond apple *Annona glabra* in a number of droppings found along the ridges to the south and west of the Ella Bay property. Conversely, droppings located on the lower areas contained Johnson River Almond *Elaeocarpus bancroftii,* a species that was only fruiting on the ridges during the survey.

Optimum surveying times for cassowaries

This survey demonstrated that the tropical wet season is not an appropriate time to survey cassowaries due to heavy rain washing away cassowary sign (footprints and droppings), flooding, and OHS related issues. The following times of the year are recommended when considering future cassowary surveys:

April – June: Courting and nesting period.

Adult birds are moving around seeking mates and are more easily located. The relationships between birds (breeding partners) can also be obtained at this time of the year.

September – December: Hatching of new chicks and weaning of older chicks.

The first chicks appear in September and family parties are easier to locate than single birds. The ability of an area to support breeding birds can be determined in this period and potential recruitment can be assessed.

Conducting successive surveys (April-June and September-December) has the greatest potential to obtain critical cassowary field data, and allows proponents of developments to conduct the two surveys within an acceptable timeframe.

1. INTRODUCTION

This report has been prepared for Satori Pty Ltd for the purpose of providing wet season information on the population of southern cassowary *Casuarius casuarius johnsonii* occurring on and around the proposed Ella Bay Integrated Resort (EBIR) and its access road. This is the second cassowary survey conducted at the site. The first survey was undertaken 6-14 November 2006 (late-dry season), approximately eight months after Cyclone Larry (20 March 2006). A total of six adult cassowaries and one nine-month old chick were identified in that survey and it was considered this number probably represented the adult cassowary population using the area pre-cyclone. This second field survey was conducted in the wet season (2–10 February 2009). The field methodology used is detailed in the report of the 2006 survey (Moore 2006b).

1.1 STUDY AREA

The study area is located approximately 110 kilometres south of Cairns and approximately nine kilometres to the northeast of Innisfail within the Wet Tropics Bioregion (Figure 1). The total area surveyed comprises:

- Ella Bay property and Little Cove;
- Ella Bay access road and Flying Fish Point;
- Parts of Ella Bay National Park.

Detailed descriptions of the study area, including climate, vegetation, and conservation status, are provided in Moore (2006b).

2. METHODOLOGY

The field methodology used in this survey was a combination of detailed mapping of cassowary sign and the direct observation of located cassowaries. The primary objective was to accurately locate, measure and map all cassowary sign e.g., footprints, bird sightings, droppings and vocalisations. Although sightings of individual birds are the most certain evidence of occurrence, footprints and droppings

are the most common signs of a cassowary's presence. A detailed description of the field methodology is given in Moore (2006b).

FIGURE 1

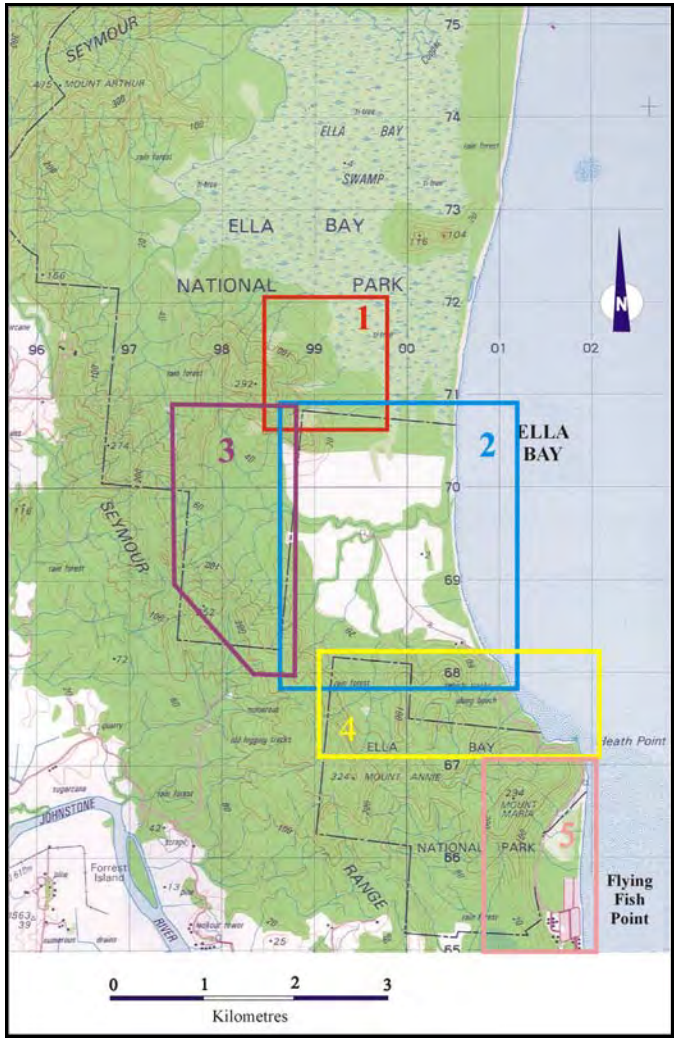
Location of Ella Bay Study Area

FIGURE 2

Cassowary study area

FIGURE 3

Search areas



Heavy rainfall during the survey washed away cassowary footprints making them unavailable for this study. Although less informative than footprints, droppings are nonetheless a useful tool in surveying cassowaries. However, while droppings can indicate how a bird uses an area, they cannot be used to either identify a bird or calculate the number of birds present in an area (Westcott 1999, Moore 2003, 2007a). Furthermore, the physical condition of the dropping can be affected by prevailing weather conditions such as rain or high temperatures and this needs to be considered when aging cassowary droppings. Through a season and from year to year a cassowary will concentrate its activity in those areas of its range that yield adequate food, and fresher droppings are generally concentrated in such areas. The distribution of old and very old droppings is often spread wider and indicates the past use of the habitat. It is possible, therefore, to make general observations of habitat usage based on the distribution and age of droppings.

Age categories for droppings were developed by the author over previous field surveys carried out between 1988-2006 (Crome and Moore 1988b, 1990, 1993, Moore and Crome 1992; Moore 1995, 1996a-j, 1998a-d, 1999a-j, 2000, 2003, 2007a-b). The age of a dropping was classified as follows:

Very Fresh Dropping wet and sometimes "steaming". Deposited within the last 12 hours;

Fresh Dropping has a thin dry outer layer but is still very wet underneath. Deposited within the last 36 hours;

Recent Dropping dry but wet at centre and base. Deposited within the last four days;

Old Dropping still maintains its shape but completely dry throughout. Deposited more than four days previously;

Very Old Dropping consists of exposed seeds with detritus partially or completely broken down. Depending upon rainfall patterns, such droppings could be 1-3 months old.

3. RESULTS

Approximately 8.0 km^2 were surveyed on foot over the nine days of the Ella Bay cassowary survey. Total search effort resulted in the location of 46 cassowary sign comprising six sightings of three birds and 40 droppings. Due to heavy rain (average of 100 mm per day), footprints were quickly washed away. Photographing sighted birds was not possible due to the heavy rainfall and extremely poor light conditions in the forest.

The field data obtained during the survey are shown on Figure 4 and the extrapolated area of activity for individual birds is presented in Figure 5. Three cassowaries were sighted: an adult male with two chicks, an unaccompanied adult cassowary, and a large subadult cassowary approximately 12 months old. Although not sighted in this survey, observations by staff of the Flying Fish Point fish farm indicated that an adult male with two chicks regularly visited that property at approximately two-weekly intervals.

3.1 LOCATED CASSOWARIES

Male with two chicks (Ella Bay Integrated Resort and Little Cove)

Although a family party of an adult male and two chicks were foraging over Little Cove and adjacent Ella Bay property during the survey, the majority of their activity was located on the ridges of the Ella Bay National Park, to the south and west of the property (Figures 4 and 5). This family party was sighted on three occasions, one of which was in the forest adjoining the main house on the Ella Bay property.

Large subadult (~12 months old)

A large brown-black subadult, possibly 12 months old, was sighted using a well-defined pig track along a ridge in the National Park to the west of the Ella Bay property. The track continued west leading further into the park (Figures 4 and 5)

Male with two chicks (Flying Fish Point access road)

This family group was not sighted during the survey but had been observed two weeks before the survey by the staff of the fish farm adjacent to the Flying Fish Point Reserve. The male had three chicks originally but one chick was killed on the road two months previously. In this report, the field observations gathered along the ridge between Flying Fish Point and Mount Maria have been cautiously subscribed to this family group. The majority of droppings were old and located along the top of the ridge, indicating that the family party was not using the area during the survey (Figures 4 and 5).

Adult cassowary (swamps west of Flying Fish Point)

A single adult cassowary (unknown sex) was sighted standing just off the Flying Fish to Innisfail Road on the edge of swamp-forest vegetation during a heavy rain event at 1650 hours on 8 February, 2009. When followed, the bird moved through the swamp and entered highly disturbed forest to the north (Figures 4 and 5)

Other field sign

Two droppings were found on the southeast edge of the Ella Bay Swamps. It was not possible to determine whether they indicate the presence of another cassowary in that area.

FIGURE 4

Cassowary field data: 2–10 February 2009

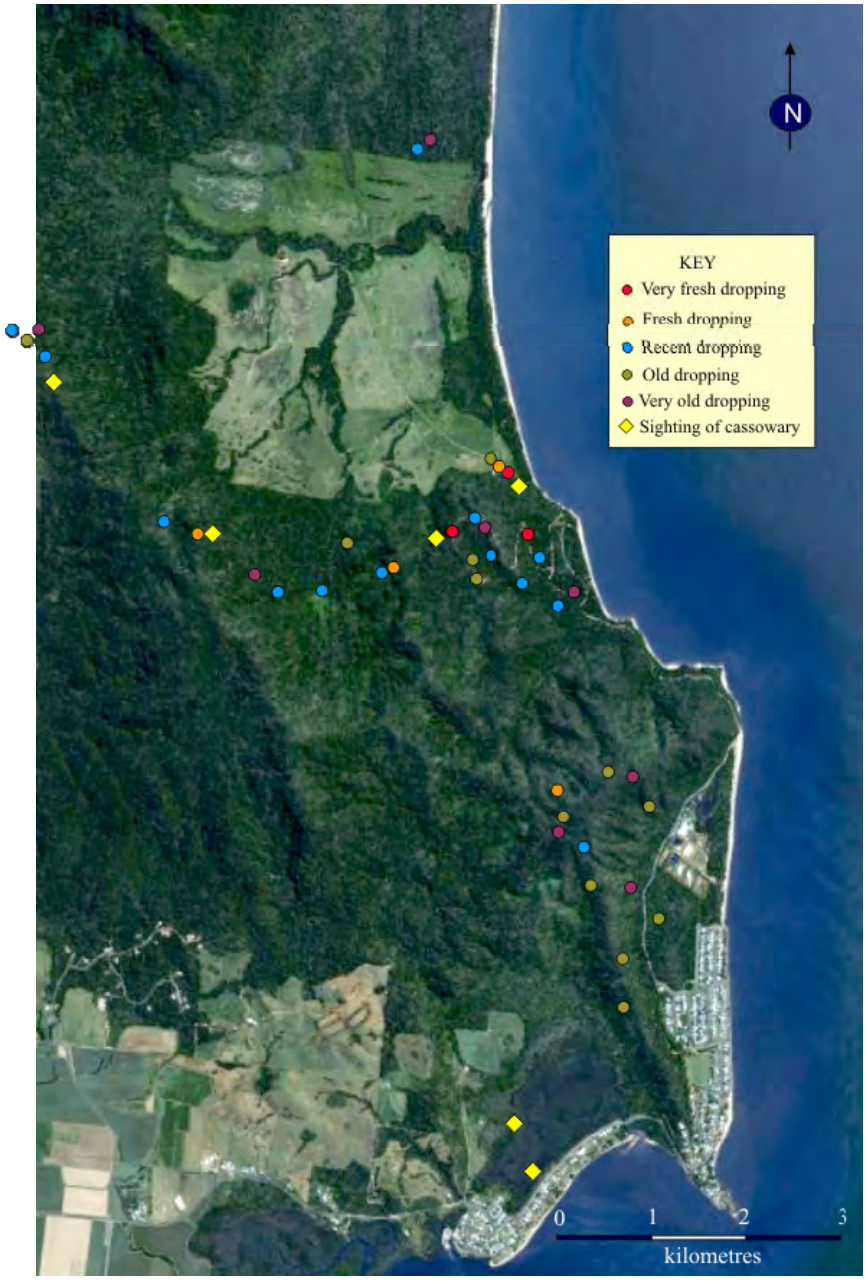
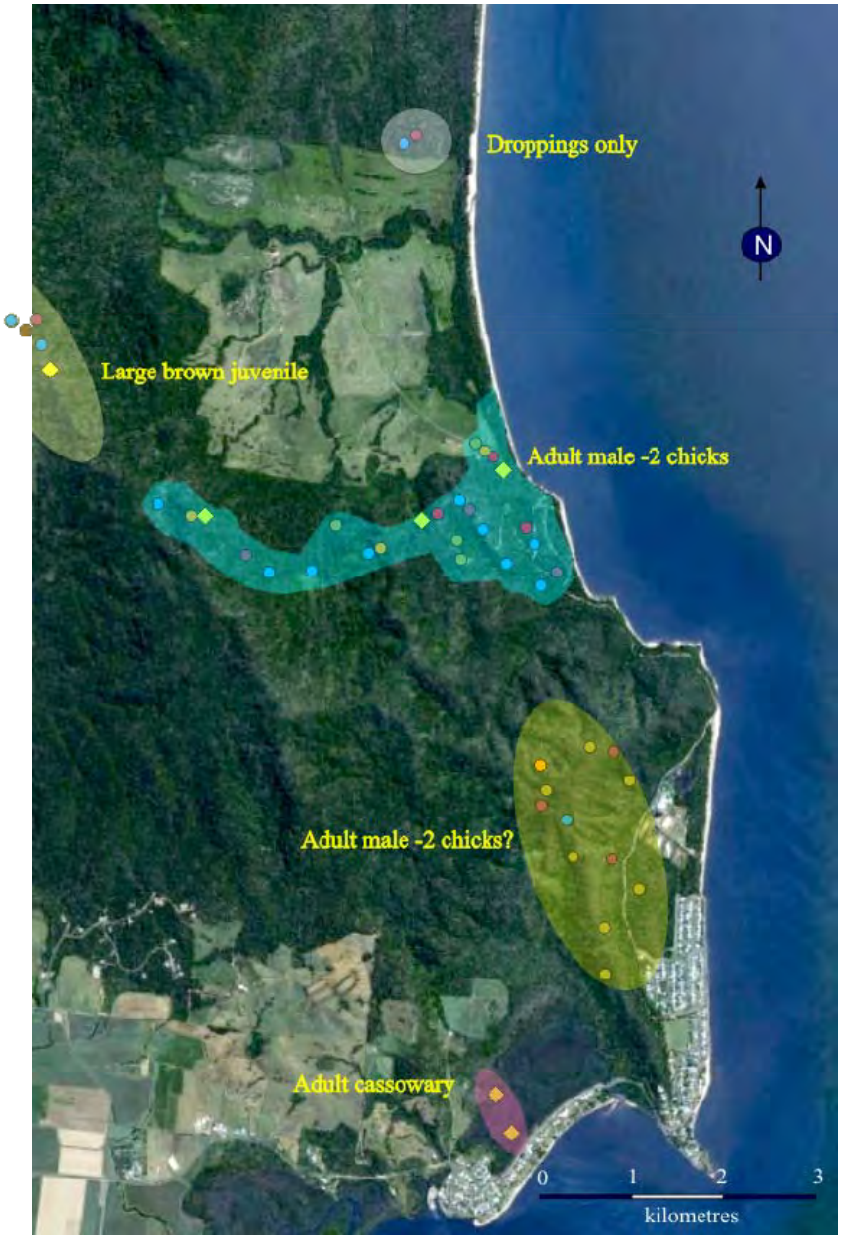


FIGURE 5

Areas of cassowary activity based on field data: 2–10 February 2009



3.2 COMPARISON OF DRY AND WET SEASON CASSOWARY SURVEYS

Table 1 presents the results of the wet season survey (February 2009) and compares them with those from the dry season survey conducted in November 2006.

Table 1

Dry season –Wet season survey results

	November 2006	**February 2009**
Single adult	4	2*
Adult female	1	0
Family party	1	2
Subadult	0	1
Total birds	**6**	**5**

* one of these birds was adult male '*Hightower*' recorded using the Ella Bay property in November 2006 but located 2.3 kilometres west of the property in February 2009.

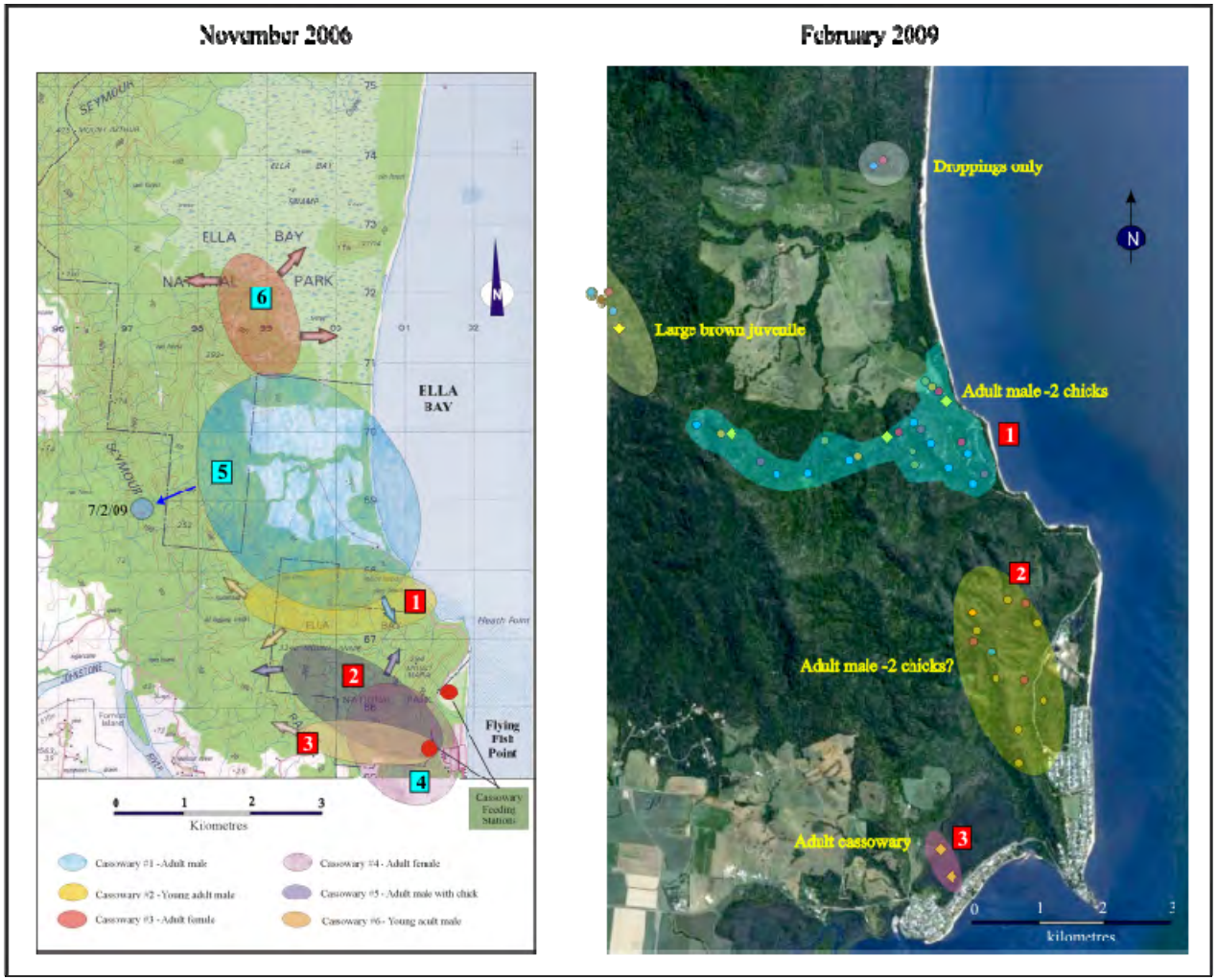
3.2.1 Unsighted birds from November 2006 survey

Figure 6 presents a comparison of the November 2006 survey and the February 2009 cassowary surveys; birds seen in 2006 but unsighted in 2009 are also identified in this figure.

Adult female cassowary **[4]** was mauled to death by dogs in early 2007, shortly after the 2006 survey and is no longer extant. Cassowary **[5]** is an adult male with a distinctively tall casque (*aka* 'Hightower' or 'Top Hat') whose centre of activity was the Ella Bay property in 2006. During the survey there were reliable reports that this male had moved west into the Ella Bay National Park where it was regularly sighted at properties in the area of Taluba Road (Steve Huxham *pers comm.*). Accordingly, this area was searched from 0730 – 1330 on 7 February 2009.

FIGURE 6

Comparison of November 2006 and February 2009 cassowary surveys

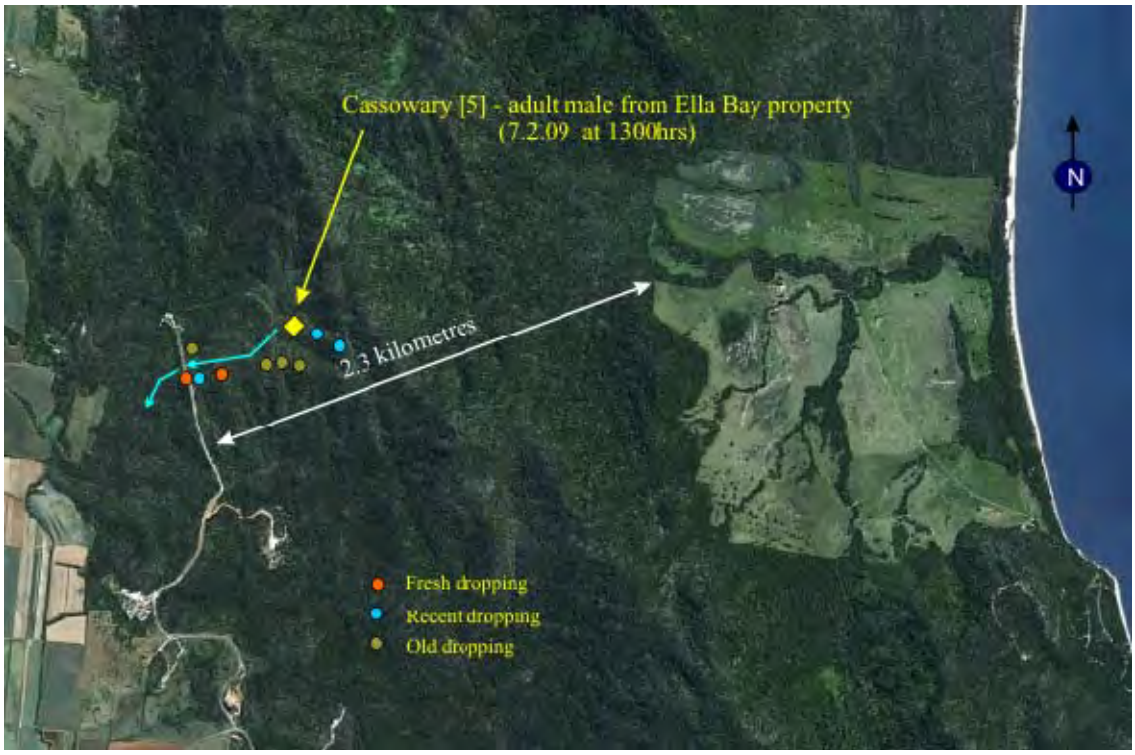


This figure presents the results from the two surveys, November 2006 (late dry season) and February 2009 (wet season). The RED numbered squares represent a likely match for individual birds over the two surveys. The LIGHT BLUE numbered squares indicate that an individual cassowary identified in the 2006 survey was not recorded in the survey area during the 2009 survey.

A fresh dropping was found on the road and the male cassowary was subsequently located foraging along a ridgeline two kilometres west of the Ella Bay property and approximately 800 metres east of Taluba Road (Figure 7). The movement of this bird away from the flooded lowlands is similar to that of the other cassowaries observed in this survey, and supports the hypothesis that the local cassowary population makes seasonal use of the coastal lowlands east of Ella Bay National Park.

FIGURE 7

7 February 2009: Location of adult male cassowary [5] – '*Hightower*'



Unsighted cassowary **[6]** may be responsible for the droppings found along the edge of the Ella Bay Swamps but this was not confirmed in the 2009 survey.

4. DISCUSSION OF WET SEASON SURVEY RESULTS

There were no additional cassowaries identified in this wet season cassowary survey and it is considered that those birds sighted in the November 2006 survey represent the majority of the cassowary population making use of this area. The results of both surveys indicate that the Ella Bay property and Flying Fish point areas comprise the edge of cassowary home ranges that are predominantly located further within the Seymour Range.

Three birds previously sighted in the Ella Bay – Flying Fish Point study area in November 2006 were not recorded in February 2009. One of these missing birds was an adult female known to have been killed by dogs in early 2007, shortly after the 2006 survey (Plate 1).

Plate 1. Deceased adult female from Flying Fish Point

The second unsighted bird, the easily identified adult male cassowary sighted on the Ella Bay property in 2006, was located in this survey approximately 2.3km west of the Ella Bay property and within the Ella Bay National Park (Plate 2).

Plate 2. Adult male cassowary '*Hightower*' from the Ella Bay property.

The third bird, an adult cassowary, was sighted in 2006 using the drier areas of the Ella Bay Swamps. These swamps were heavily flooded during the 2009 survey and unusable to cassowaries.

Other than a few widely dispersed trees, fruiting was rarely noted on the lower slopes and flatter areas during the 2009 survey. Fallen fruits were generally swept away from the parent trees by significant overland water flow, making it difficult for cassowaries to locate. Cassowaries were predominantly foraging in higher and less flooded forest, but the two family parties were observed to make visits down to the lowlands. Evidence of this movement was provided by the presence of pond apple *Annona glabra* in a number of droppings found along the ridges to the south and west of the Ella Bay property. Conversely, droppings located on the lower areas contained Johnson River Almond *Elaeocarpus bancroftii*, a species that was only seen fruiting on the ridges during the survey.

Food items recorded in droppings included:

- *Elaeocarpus bancroftii*
- *Calamus australis/moti*
- *Omphalae queenslandica*
- *Faradaya splendida*
- *Acmena graveolens*

- *Syzigium canicortex*
- Introduced pond apple *Annonna glabra*

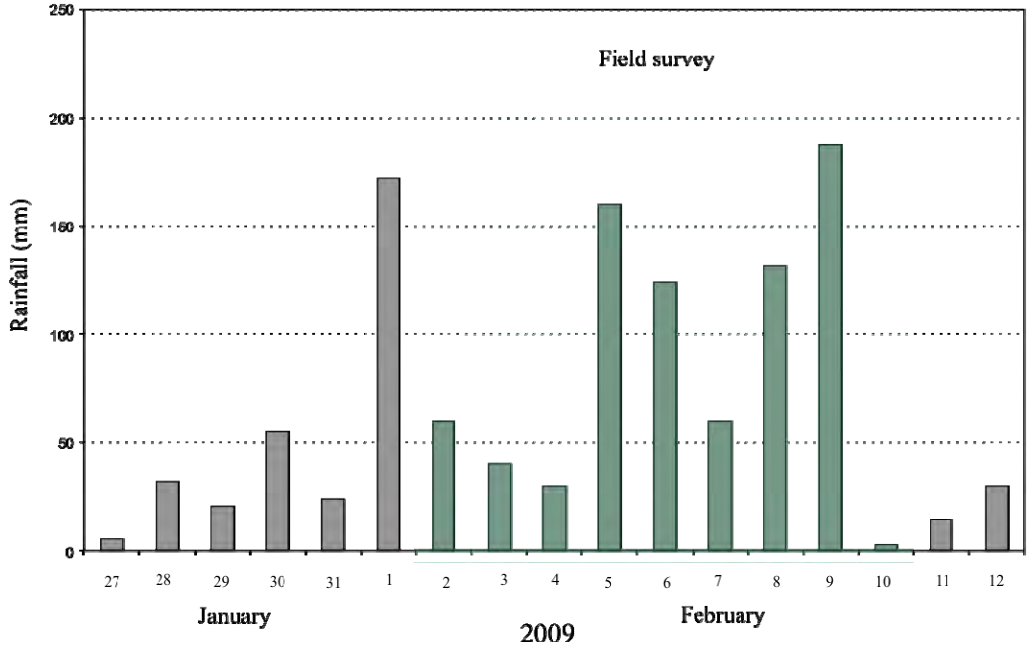
5. TROPICAL WET SEASON SURVEYING CONDITIONS

Cyclones are common from January to March in the Wet Tropics. During this field survey, heavy rain from Tropical Cyclone Ellie (Category 1) resulted in a total of 789mm of rainfall over the survey period (>31 inches), an average of four inches of rain per day. Figure 8 shows the rainfall registered at the Ella Bay property during the field survey (2-10 February, 2009).

This amount of rainfall is not unusual for the Cassowary Coast of the Wet Tropics and highlights the limitations of wet season fauna (or flora) surveys. To assist in future consideration of the need for or likely data return from undertaking wet season surveys, this report describes in detail the survey conditions, the effect of high rainfall on survey results, and recommends a sampling regime more likely to produce information to input into the approval process.

FIGURE 8

Rainfall at Ella Bay 2-10 February 2009

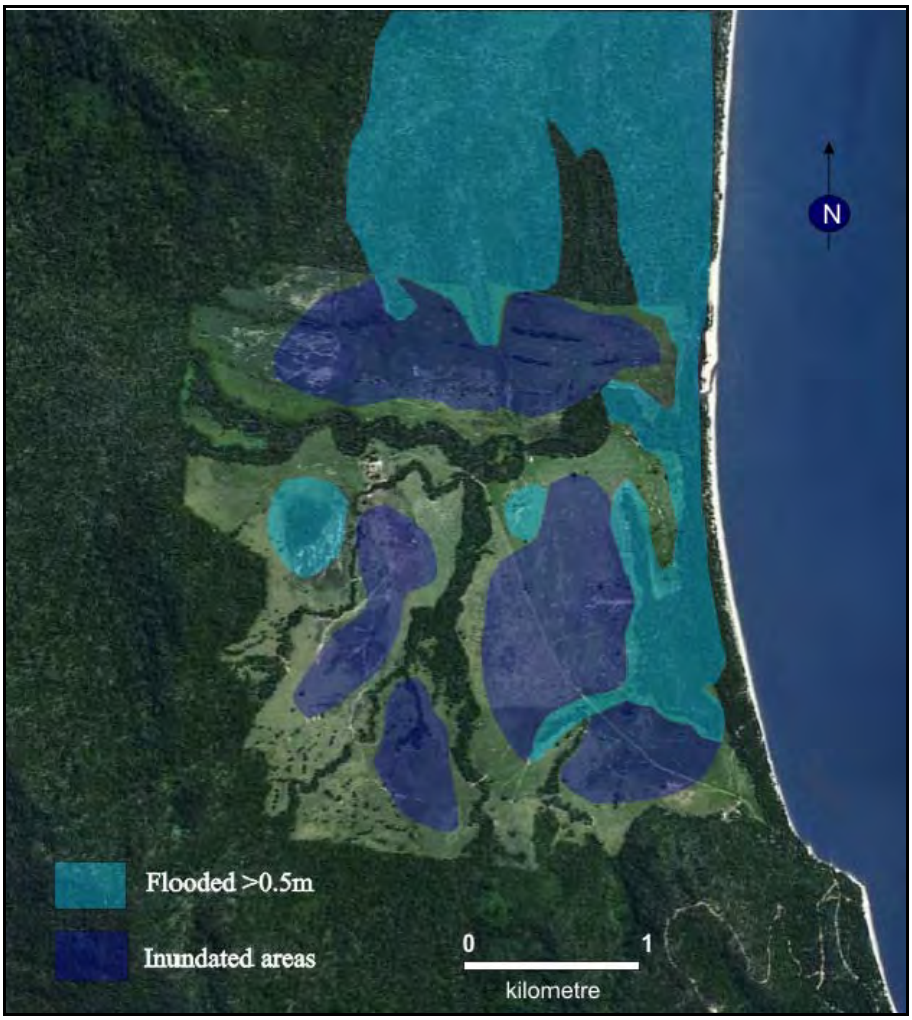


Flooding and inundation

Figure 9 shows the general state of the Ella Bay property during the February field survey. The Ella Bay Swamps north of the property were flooded to a depth of two metres with flowing water feeding into the surrounding cleared paddocks to the south. The remnant feather-palm swamps and the *Melaleuca* associations along the coastal foredunes of the property were also flooded to a depth of 0.5 - 1.5 metres, and the majority of the grassed paddocks were inundated with numerous pools and running streams. Streams were impassable immediately after heavy rain and access to the vegetated foothills and central riparian corridors was only possible using a 4WD quad-bike. Despite the use of the quad bike many areas of the forest were only accessible by walking considerable distances through inundated grasslands.

FIGURE 9

Flooded and inundated areas of Ella Bay property



Much of the forest floor on the slopes and lower foothills was severely affected by 'sheeting', the movement of large volumes of water across the landscape. As a result, cassowary droppings and footprints were quickly destroyed and only those located in more protected areas remained intact. Field information is limited in these conditions and significant extra effort was required to collect adequate data with which to extrapolate the behaviour of the local cassowaries. A comparison of field sign located in both cassowary surveys (dry season and wet season) is shown in Table 2.

Table 2

Breakdown of located cassowary sign

Survey	Sightings*	Footprint (measured)	Partial footprints	Droppings	Total Sign
Dry season (November 2006)	19	22	13	18	**72**
Wet Season (February 2009)	6	0	0	40	**46**

*includes multiple sightings of individual birds

The following photographs (Plate 3 – Plate 12) show the wet conditions prevailing throughout the study area during the survey. Appendix One contains additional photographs showing the seasonal variation between dry-season and wet-season surveys at the Ella Bay property.

Plate 3. Southern boundary of Ella Bay Swamps showing fruiting pond apple *Annona glabra* along the exposed forest edge.

Plate 4. The interior of Ella Bay Swamp showing flowing water and deep waterholes (~2 metres). The water in this photo was swarming with fish and a number of small crocodiles (<1m) were sighted.

Plate 5. Deep reedy areas in Ella Bay Swamp (~2 metres) potentially suitable for crocodile nesting.

Plate 6. Western edge of Ella Bay Swamp

Plate 7. The main access track through the Ella Bay property

Plate 8 . Deep pools occurred in cleared areas.

Plate 9. Inundation of the western side of the Ella Bay property.

Plate 10. Coastal vegetation at the front of the Ella Bay property with flowing water >1 metre in depth.

Plate 11. Flooded *Melaleuca* associations occur along the foredunes from EBIR to the mouth of 'Jungle Perch Creek' (main vegetated movement corridor – refer Figure 9)

Plate 12. 'Sheeting' effect caused by strong water flows across the forest floor.

5.1 OPTIMUM SURVEYING TIMES FOR CASSOWARIES

This survey demonstrated that the tropical wet season is not an appropriate time to survey cassowaries. The reasons for this include:

1. Heavy rain washes away cassowary sign (footprints and droppings);
2. Many areas of the forest are inaccessible due to flooding;
3. Light conditions in the forest during rain are poor and the combination of rain and poor light make photography of individual cassowaries impossible;
4. The loud sound of rain on the foliage means that birds cannot be heard moving through the vegetation;
5. There are probably a number of OHS issues associated with people working in the difficult wet conditions e.g., walking on steep slopes, injuries from falls, risk of tree and branch falls, disease (water-borne transmittable diseases), and crocodiles;
6. Due to the above, the amount of field data gained by surveying at this time is significantly reduced.

The following times of the year are recommended when considering future cassowary surveys:

April – June: Courting and nesting period.

Adult birds are moving around seeking mates and are more easily located. The relationships between birds (breeding partners) can also be ascertained at this time of the year.

October – December: Hatching of new chicks and weaning of older chicks.

The first chicks appear in September and family parties are easier to locate than single birds. The ability of an area to support breeding birds can be determined in this period and potential recruitment can be assessed.

Conducting successive surveys (April-June and October-December) has the greatest potential to obtain critical cassowary field data and allows proponents of developments to conduct the two surveys within a reasonable timeframe.

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APPENDIX ONE

SEASONAL AND POST-CYCLONE HABITAT DIFFERENCES AT ELLA BAY

2006

Cyclone damaged vegetation on slopes surrounding Ella Bay property.

2009

The same general area in 2009 showing forest recovery.

2006

Melaleuca quinquenervia forest showing dry forest floor in November 2006.

2009

Flooded Melaleuca forest in February 2009.

2006

Ella Bay Swamps showing exposed ground and small pools in 2006.

2009

Flooded condition of the Ella Bay Swamps in February 2009.