



6.1 a Review of EIS and SEIS Cassowary Reports P Buosi



Our Ref: Ella Bay Cassowary EIS review_L02.doc/PB:pb

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**RE: Ella Bay Integrated Resort Development Proposal – Review of Information and Issues
Pertaining to the Southern Cassowary**

NRA Environmental Consultants (NRA) was commissioned by Satori Resorts Ella Bay Pty Ltd (Satori) to review survey and assessment work conducted on Southern Cassowary (*Casuarius casuarius johnsonii* hereafter referred to as Cassowary) for the proposed Ella Bay Integrated Resort Development. The purpose of this review is to assess the reliability of specialised survey work, impact assessment and reporting undertaken for the species. The review focuses on Cassowary studies conducted by Moore (2006, 2007, 2009).

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Context

Satori proposes to construct a fully master planned, integrated tourism and residential lifestyle community at Ella Bay, Johnstone Shire, Queensland. Development of the site is proposed to proceed in stages over a ten to fifteen year period. Our understanding of the proposed action is based on information contained in Satori 2008 SEIS. Although aspects of the development are still being refined, the action may include the following elements.

- Four 5-star resort precincts comprising 860 units and villas.
- A village precinct comprising mixed retail, professional services, offices, and restaurants and dining.
- 540 residences with ocean or rainforest views located around an 18-hole golf course.
- A proposed sustainable development research institute.
- An educational precinct comprising a school, sports centre and church.
- A Welcome Centre.
- A 'signature' championship 18-hole golf course.
- Public infrastructure and amenities.

The proposed development will require upgrading existing access routes and possibly the construction of new alignments. Road designs have not been finalised.

Satori has submitted the proposed action for approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) via submission of an EIS and SEIS. Comments on the Satori 2007 EIS and Satori 2008 SEIS by the Department of Environment, Water Heritage and the Arts, state agencies and the public have been received and Satori is preparing a response to address the identified issues.

Documentation Review

Scope

The purpose of this study is to review the general suitability and reliability of the survey approach and effort devoted to the Cassowary studies by Moore (2006, 2007, 2009) and the subsequent interpretation of survey results including threat identification. The review identifies data deficiencies and ways to address them. As many aspects of the proposed action are still being refined the proposed management measures and significance of residual impacts are not considered in this review.

Overview

In general, the EIS and supporting documents are challenging to interpret on account of the large scale of the proposed action, the sensitivity and complexity of the issues involved, and length of the approvals process. There have been changes and/or refinements to many details of the proposed action (including impact avoidance and mitigation measures). This evolution is not uncommon or unhealthy during an impact assessment process; however, the clarity of information has been clouded. These observations are not provided for the purpose of criticism but rather to highlight the potential for confusion when dealing with regulators. There appears to be a need to consolidate details of the proposed action and impact avoidance and mitigation measures with respect to the Cassowary into a single revised document.



Survey Approach and Effort

The following section reviews the survey effort and approach described in Moore (2006, 2009).

- The approach employed for the Cassowary survey (Moore 2006, 2009) was in our experience suitable for the site and type of proposed development. The development of Cassowary profiles is particularly useful given the Cassowary population is quite small and further monitoring will be required if the development is approved.
- Wet and dry season surveys were conducted and the effort devoted to each survey event is in our estimation sufficient for the project area, considering the consultant's high level of Cassowary field survey experience. In our experience, the survey effort is above that which often occurs for impact assessment studies involving the Cassowary.
- It is worth highlighting that in our opinion the site is a difficult area to conduct Cassowary surveys. There are very few access tracks and the surrounding rainforests are very dense which increases the difficulty of survey transects and decreases the likelihood of encountering sign. The results demonstrate that considerable effort in difficult circumstances was devoted to the field survey.
- The timing of the Cassowary survey with respect to extreme climatic events has resulted in an unusual data set. The dry season survey (November 2006) occurred approximately eight months after Cyclone Larry which impacted heavily on forests in the Innisfail region. The wet season survey (February 2009) occurred during heavy rain and flooding associated with Cyclone Ellie. These conditions greatly influence Cassowary abundance, movement patterns, behaviour and detectability. While Satori personnel have continued to collect data on Cassowaries this has not occurred in a systematic manner. This situation has influenced our understanding of the resident Cassowary population, including how it uses the site and immediate surrounds during ambient conditions. The implications of this are discussed in the following section.

Interpretation of Survey Results

The following section provides comment on reporting by Moore (2006, 2007, 2009).

Cassowary Abundance, Age Class Structure and Sex Ratio

- The Cassowary population was probably quite visible during the aftermath of Cyclone Larry and therefore the dry season survey (Moore 2006) probably provides a reliable estimate of the abundance and sex ratio of the adult population occurring on and immediately adjacent to the project area during the post-cyclone period. However, it is not clear to what extent the cyclone affected the abundance and distribution (which can affect observed abundance) of adult Cassowaries. Moore (2006) suggests that the observed abundance of adult Cassowaries approximates the pre-cyclone situation. This opinion is probably reliable given Moore's regional experience and on this basis the abundance and sex ratio information is probably sufficient for the impact assessment process. The wet season survey (Moore 2009) produced a less reliable estimate due to the influence of heavy rain and flooding on Cassowary distribution and detectability.
- The surveys have not provided a reliable indication of the number subadult Cassowaries occupying the project area and immediate surrounds. This cohort was largely absent during the dry season survey (presumably as a result of Cyclone Larry) and their behaviour and detectability during the wet season survey is likely to have been affected by flooding. The abundance of subadult Cassowaries should be considered during the impact assessment process. It is very difficult to determine the sex of subadult Cassowaries using sighting based data but this information is not essential for the impact assessment process.



- Due to the absence of reliable data on subadult Cassowaries there is poor information on the age class structure of the resident Cassowary population. It is probably a non-essential consideration for this impact assessment process but might be a useful consideration for any on-going monitoring program, *eg* an increase in subadult birds at the expense of adult birds may suggest an impact or that a threatening process is occurring.
- The relationship between birds observed during wet and dry season surveys is unclear from the reports (Moore 2006, 2009). For example, the numbers used to denote individual Cassowaries are inconsistent within reports (*eg* numbering used for Figure 5 vs Figure 6 in dry season report, Moore 2006) and between reports (*eg* Cassowary #1 in dry season report (Moore 2006) is Cassowary #5 in wet season report (Moore 2009)). These inconsistencies are unlikely to significantly detract from the impact assessment process but should be corrected if this information is re-presented during the impact assessment process.
- There are a few instances in Moore (2006, 2009) where it would have been useful to present additional data in support of individual Cassowary identifications. For example:
 - (a) How confidently were individual Cassowaries recognised in Moore (2009) given the difficult survey conditions?
 - (b) How were the footprints of male Cassowary #1 separated from male Cassowary #2 (Moore 2006)?

In our experience the size of footprints from an individual Cassowary can vary by up to 5 mm even in ideal substrates, and on this basis the footprint from ‘Adult Male Cassowary #1’ (193 mm) could not be separated from ‘Young Adult Male Cassowary #2’ (190mm) on print length alone and other data may have been used. This issue is unlikely to significantly detract from the impact assessment process but should be considered for any future survey and monitoring events.

- Using Cassowary density data from the western side of Seymour Range and Mission Beach, Moore (2006) suggests that the eastern side of Seymour (encompassing the project area) is able to support fewer Cassowaries than the western side. Supporting information (including references) on the western Seymour Range studies should have been provided to allow the reader to make their own assessments, *ie* increase transparency. This should have little bearing on the impact assessment process because it appears Moore (2006) is not trying to understate the importance of the eastern side but rather highlight the potential role that the western side might play in local population dynamics.

Cassowary Distribution and Important Movement Pathways

- The timing of the surveys relative to extreme climatic events probably affected the observed distribution of Cassowaries and the ability to identify regular/important movement pathways. While Cassowary movement patterns and, to lesser degree territories, are not fixed, it is sometimes possible to ascertain regular or more frequently used pathways and territories. The location of these pathways and territories during ambient conditions is unclear from available field data (and may change after major climatic events like cyclones). It is however feasible to infer possible pathways and possible home ranges based on field observations, and topographic and vegetation data as Moore (2006, 2009) has done. Further monitoring during ambient conditions may improve the reliability of current assessments. Specific attention should be devoted to habitats along the coastal fringe where Cassowaries were not recorded during the wet season survey (possibly due to flooding) and habitats near potential impact areas.
- The distribution and movement pathways of subadult Cassowaries is particularly unclear and requires consideration during the impact assessment process. For example, during ambient conditions subadults may occupy some of the more marginal areas of habitat. While these areas may not be provide high quality habitat they could be functionally important for recruitment *eg* a subadult



surviving in a marginal area of habitat may move into more favourable habitat after the death of a neighbouring resident adult. Understanding the distribution of Cassowaries in areas of marginal habitat would help identify potential management issues, *eg* a subadult Cassowary occupying marginal habitat near a proposed human use area could present a management issue.

- With respect to seasonal movement patterns, it is our opinion that there is insufficient data to support the hypothesis that Cassowaries undergo a seasonal migration between the eastern lowlands (encompassing the project area) and western foot slopes of Seymour Range. Further surveys during ambient conditions are required to confirm whether the long-distance movement undertaken by an adult male Cassowary (labelled as # 5 in February 2009 survey and #1 in November 2006 survey) is a regular movement pattern or a response to the climatic conditions during or around the time of the surveys.

Habitat Assessments

- Habitat types in and around the Ella Bay property are described in Moore 2007 and habitat quality and values adjacent to the proposed road alignments are described in Moore 2009. The approach used to describe Cassowary habitat differs between the two studies; although they both utilise essential habitat mapping (EPA 2004), field observations and professional opinion, they differ in how they rely on each of these data sources and the categories used to describe habitat types.
- The inconsistent approach decreases the clarity of information and this should be corrected if Cassowary information is to be re-presented during the impact assessment process.
- We suggest that the proponent re-assess the way in which Cassowary habitat is described on the Ella Bay site and that the reassessment should be based on the most recent vegetation mapping (3D Environmental 2009), the location of permanent water, existing (Moore 2006, 2009) and further field data collection.

Ella Bay Property Area

- It appears that Moore (2007) used EPA (2004) essential habitat mapping, field observations and professional opinion to divide the study area into eight 'Locations'. Descriptions of each 'Location' included one or more of the following:
 - known and likely presence of food resources
 - known and potential use as a movement corridor
 - habitat condition
 - a recommended essential habitat mapping category according to definitions described in EPA (2004).
- This approach does not consider the location and importance (known or potential) of permanent water for drinking and bathing. Even if water is not a limiting factor, the location of permanent water sources, especially during very dry years, is an important consideration for the impact assessment process.
- This approach may understate the role/value of strand vegetation and, to a lesser degree, mangroves. Locations 3 and 1b would have been heavily affected by Cyclone Larry and the survey data would provide an unreliable indication of potential use. This situation increases the reliance on essential habitat mapping which itself has limitations (limitations associated with mapping scale are recognised in Moore 2007). For example, RE 7.2.7 (*Casuarina equisetifolia* ± *Corymbia tessellaris* open forest ± groved vine forest shrublands of the beach strand and foredune) is not considered essential habitat (EPA 2004) but in places like Cowley Beach (20 km south of the Ella Bay) Cassowaries feed and, presumably, rely heavily on food plants such as *Pandanus*, *Scaevola taccada* and *Syzygium forte* subsp. *forte* which occur in this community (Peter Buosi, *pers. obs.*), *ie* RE 7.2.7 is essential habitat at Cowley Beach. Further field data would be required to verify the importance of strand and mangrove communities at Ella Bay.



Access Road

- Moore (2007) used field survey data from Moore (2006), BAAM (2007) and presumably professional opinion to map areas as high, moderate or low quality Cassowary habitat. These habitat categories are a combination of category descriptions used in EPA (2004) and Goosem (1992). Moore (2007) also assessed the perceived risk for the Cassowary (low risk, moderate risk and high risk) of each area mapped and this, together with habitat quality, is used to identify a habitat value category (negative value, moderate value and high value).
- Moore (2007) identifies the area of coastal vegetation adjacent to the fish farm as low quality habitat but provides no rationale for this decision. Vegetation mapping (3D Environmental 2009) shows that these areas comprise RE 7.2.7 (described previously) and RE 7.2.5 (Mesophyll to notophyll vine forest of *Syzygium forte* subsp. *forte* on sands of beach origin) which contain Cassowary food plants, and RE 7.2.8 (a palustrine wetland) which may contain water (a critical resource for Cassowaries). At places like Cowley Beach (20 km south of the Ella Bay) *Syzygium forte* (a rainforest and beach swale plant), which occurs in RE 7.2.5, and *Scaevola taccada* (a non-rainforest strandline plant), which occurs in RE 7.2.7, dominate the diet of Cassowaries between January and April (Peter Buosi, *pers. obs.*). These and other Cassowary food plants potentially occurring in this area are unlikely to have been fruiting during the dry season survey and were probably inaccessible (due to flooding) to Cassowaries during the wet season survey. Therefore, the potential importance and use of these plants and the habitats in which they occur may have been underestimated. The 'Low Quality Habitat' designation could be justified if it is demonstrated that water is not a limiting resource in the local area (including periods of drought/extended dry) and Cassowaries don't regularly forage in the area. It is not clear what affect this potential understatement in habitat value has had on the impact assessment process. Given the available information we suggest that this area be regarded as important or 'High Quality Habitat' unless proven otherwise.
- It is unclear why Flying Fish Point Reserve was designated as 'Moderate Quality Habitat' (as opposed to 'High Quality Habitat') in Moore 2007 as the report states that part of the area '*may hold the only water source available to Cassowaries in this area during dry periods*' and '*probably provides both food and water resources for Cassowaries*'. Vegetation mapping (3D Environmental 2009) shows that the reserve is dominated by RE 7.3.10 (Simple to complex mesophyll to notophyll vine forest on moderate to poorly drained alluvial plains of moderate fertility), RE 7.3.25 (*Melaleuca leucadendra* ± vine forest species, open to closed forest, on alluvium fringing streams) and RE 7.3.3 (Mesophyll vine forest with *Archontophoenix alexandrae* on poorly drained alluvial plains), which are collectively known to support Cassowary food plants and hold water. It is not clear what affect this potential understatement in habitat value has had on the impact assessment process. Given the available information we suggest that this area be regarded as important or 'High Quality Habitat' unless proven otherwise.

Threat Identification and Management Considerations

- Most of the project-related threats of the proposed action were adequately identified in the specialised Cassowary studies (Moore 2006, 2007, 2009); however, there is little discussion of these threats.
- The major omission is a discussion on the water sources to be lost, gained, or impacted upon as part of the proposed development and the impact this may have on the Cassowary population.
- The influence of extreme climatic events such as cyclones, extended dry periods and flooding, although not project-related threats, has also received insufficient attention. Such events are not only important considerations for quantifying impacts but they may also identify new threats (*eg* fragmenting forests with road corridors may make them more susceptible to cyclonic wind damage) and additional management considerations. For example, it is important that during the planning and



design phase that consideration be given to managing the threats of human-Cassowary interaction in the post-cyclone environment. This might involve identifying and establishing feed stations early in the development phase, *ie* before a cyclone occurs. Extreme climatic events should be considered during the impact assessment process.

- While the Population Viability Analysis identified the vulnerability of the Cassowary population to decline, the reported sex ratio also deserves consideration and discussion. For example, the loss of the adult female (Cassowary #4) reported in the second wet season survey (Moore 2009) highlights a potential vulnerability in the local population. Only one other female Cassowary was recorded in the wet season survey (described as Cassowary #3 in text and Figure 6 but #2 on Figure 5 of Moore 2006) and this bird presumably occupies habitats to the north and north-west of the project area. While another female(s) may occur outside Moore's (2006, 2009) study area (west and south-west of the study area), this situation illustrates the vulnerability of this small and geographically restricted population. Further information on the location of female Cassowaries relative to the project area would greatly assist the impact assessment process.
- The potential impacts posed by the proposed development and those associated with the current land use are each assessed independently against a standardised list of threats in Tables 4 and 5 of Moore 2006. To assist analysis each score should have been supported by a brief justification. For example, in Table 4:
 - (a) does the development impact 'Habitat loss on site' include consideration of loss of foraging resources and water sources?
 - (b) Why was dog attack afforded a -4 weighting when this threat could feasibly impact birds outside the study area (*ie* -6 weighting)?
and in Table 5:
 - (c) Why would traffic flow and dog attacks change (score of 2) whereas negative interactions with humans and hand-feeding issues remain the same?
- The comparative assessment (Tables 4 and 5, Moore 2006) presently considers one possible scenario, *ie* that continuation of grazing will be done in a manner unsympathetic to environmental/Cassowary considerations (*ie* worst case scenario) and that future residents and management of the integrated resort development will be sympathetic to environmental/Cassowary considerations (*ie* best case scenario). To be of more value the comparative assessment should have considered more than one scenario for each land use.
- Based on the values shown in Table 4 (Moore 2006), the overall score should be -212 not -200 as shown.

Summary and Data Deficiencies

- The survey approach and effort was suitable for the impact assessment process.
- The timing of the surveys with respect to extreme climatic events has resulted in an unusual data set with varying suitability for the impact assessment process. Generally the critically important information has been provided by Moore (2006, 2007, 2009) but in some instances this information would benefit from increased clarity. The most significant omission is the lack of discussion on water availability. The impact assessment process would also benefit, but is not totally reliant upon, information on the following.
 - Abundance, distribution and movement pathways of subadult population during ambient conditions.
 - The distribution and movement pathways of adult Cassowaries during ambient conditions especially movement around the coastal fringe and near potential impact areas (particularly proposed roads).



- The presence of female Cassowaries within and near the project area.
- Revised habitat assessment using a consistent and transparent methodology for all areas. Ideally habitats should be reassessed based on more recent vegetation mapping (3D Environmental 2009), the location of permanent water, existing (Moore 2006, 2009) and further field data collection.
- Moore (2006) has identified most of the project-related threats for the impact assessment process. However a discussion of potential impacts on important water sources and threats associated with extreme climatic events is needed. We anticipate that the greatest project-related threats include the potential for vehicle strike (especially on the access road to the Ella Bay site), negative human-Cassowary interaction and maintenance of connectivity.

Recommendations

The following recommendations are made.

- Assess the need to develop a single consolidated document that describes the details of the proposed action and issues pertaining to the Cassowary.
- Continue to collect data on Cassowary use patterns. Data collection should occur in a systematic manner and involve specialist expertise. Further survey work should specifically gather information on the abundance, distribution and movement pathways of subadult and adult Cassowaries during ambient conditions, especially movements around the coastal fringe and near potential impact areas (particularly proposed roads). Surveys should also try and establish the presence of female Cassowaries within and near to the project area.
- Revised habitat assessment using a consistent and transparent methodology for all areas. Ideally habitats should be reassessed based on more recent vegetation mapping (3D Environmental 2009), the location of permanent water, existing (Moore 2006, 2009) and further field data collection.
- The Flying Fish Point Reserve and adjacent coastal vegetation should be regarded as important Cassowary habitat unless proven otherwise.
- Describe the location of water sources accessible to Cassowaries during the dry season and drought years, and identify potential impacts on these sources. Impact avoidance/mitigation measures should be developed if impacts are identified.
- Request copies of survey reports conducted on the West Seymour Range (described in Moore 2006) and determine the location of adult female Cassowaries relative to the project area.

References

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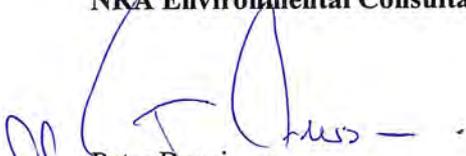
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Please contact the undersigned to discuss any matters arising from this report.

Yours sincerely
NRA Environmental Consultants



Peter Buosi
Principal Ecologist

A handwritten signature in blue ink, appearing to read 'Peter Buosi', is written over the printed name. To the left of the signature is a small, stylized blue mark that resembles a pair of wings or a logo.