

Floristic impacts of re-alignment of beach ridge track, Cowley Beach

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BACKGROUND

A long-standing 4WD track along the back of the fore-dunes and sand spit between Cowley Beach and the mouth of Liverpool Creek (Fig. 1) was extensively damaged by Cyclone Larry on 20 March, 2006. Storm surges removed several metres of beach sand and many established trees, while high winds felled many trees across the track. Quad bike riders and 4WD drivers have subsequently made their own tracks, following the original track at the southern end, but running along the ridge crest for much of its length, damaging sand-stabilising vegetation and potentially disturbing turtle nest sites. Cassowary Coast Regional Council is assessing the feasibility of re-routing this track to the landward side of the fore-dune where the sand is better stabilised and potential ecological damage is minimised.

SITE ASSESSMENT

A site assessment by CSIRO ecologists Daniel Metcalfe and Andrew Ford was undertaken in August 2010, in the company of Mr Damon Sydes (Cassowary Coast Regional Council). We assessed community structure and condition in relation to the mapped vegetation communities under the Queensland Department of Environment and Resource Management's *Regional Ecosystem* framework (RE), searched for significant plant species listed under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Nature Conservation Act 1992 (Qld)* (NCA), and for bioregionally important occurrences of other plant species, assessed weed abundance and distribution, and assessed the ecological values of the site and the damage being caused by on-going motor vehicle access.

COMMUNITY STRUCTURE

Regional Ecosystem mapping identifies only two communities along the beach ridge affected; these are 7.2.3e and 7.2.7a (Fig 2; for more information see http://www.derm.qld.gov.au/wildlife-ecosystems/biodiversity/regional_ecosystems/). The *Vegetation Management Act (1999)* class (November 2009) of RE 7.2.3e is Of Concern, and the Biodiversity Status is Of Concern; the *Vegetation Management Act (1999)* class (November 2009) of RE 7.2.7a is Of Concern, and the Biodiversity Status is Endangered.

Branch-break, tip-ups and death of many standing trees attributable to Cyclone Larry means that the current vegetation is highly disturbed, but remaining vegetation and regenerating seedlings and saplings suggest that the current mapping of RE 7.2.7a may require some modification. Such modifications would not be unique to the Cowley Beach area, but rather required at the bioregional scale. RE 7.2.7a is described as a

“Complex of open to closed shrublands, grasslands and low to medium woodlands and forests. Includes pure stands of *Casuarina equisetifolia*, and open to closed woodlands dominated by *Acacia crassicarpa*, *Syzygium forte* subsp. *forte*, and *Calophyllum inophyllum* *Pandanus* sp. Beach strand and foredune.”

The presence of *Casuarina* draws many similarly structured coastal habitats into a single classification as a non-closed forest community. Alternatively, recognition of this RE (7.2.7) as a type of littoral rainforest (coastal vine-thicket) as exemplified by its understorey components would enable these fragile and easily disturbed communities to be appropriately protected through the EPBC Act, which recognises *Littoral rainforest and coastal vine thickets of eastern Australia* as a critically endangered community.

The solution to the above problem could be easily addressed; in other bioregions individual polygons often contain a mosaic of different RE's, and their relative abundance is indicated as a proportion of the polygon. For example, a polygon in the Gulf Plains may be designated as 2.10.2/2.10.5/2.10.4, where the relative proportion representation for that polygon is 60:30:10. Areas within the greater Cowley Beach area which have littoral rainforest are mapped as 7.2.2. Accordingly, in the Wet Tropics, RE 7.2.7a could be recognised as having a littoral rainforest component by, say, referring it to 7.2.7a/7.2.2. In which case the proportion that is attributed to littoral rainforest would have EPBC protection. Such a change to the mapping would be relatively easy to make and could be scrutinised by DERM for applicability once they are approached and a submission is made.

SIGNIFICANT PLANT SPECIES LISTED UNDER THE EPBC ACT OR THE NCA

No species listed under the EPBC Act or NCA were observed during the site assessment.

OTHER SIGNIFICANT PLANT SPECIES

Several plant species recorded were notable within a bioregional context, including a population of *Aidia cowleyi* (Fig. 3), and several *Lomandra banksii* (tropical mat-rush), both species being near their known southern limit.

A number of species, especially in the former littoral rainforest area, are significant cassowary food plants, including *Aidia cowleyi*, *Syzygium forte* (white apple), *Pandanus* sp. (screw pine), *Alyxia spicata* (chain fruit), *Dianella* spp. (flax lilies) and *Terminalia arenicola* (brown damson). These support the existing designation of the central section of the area as 'essential cassowary habitat'.

There was a rich and diverse weed flora at the site, but of particular concern was a mature individual and a large number of seedlings of *Annona glabra* (pond apple, Fig. 4), a weed of national significance, and *Praxelis clematidea* (praxelis), a National Environmental Alert List species. Other species, such as *Sphagneticola trilobata* (Singapore daisy) are extensive and abundant, and causing significant damage to the floristic integrity of the area.

ECOLOGICAL VALUES ASSOCIATED WITH THE SITE

Plants play a critical role in dune stabilisation, both in capture of drifting sand at the fore-dune edge, and binding of sand to provide a firm substrate for successional development further back from the sea. Species such as *Triumfetta repens* (beach triumfetta), *Ipomoea pes-caprae* (coast morning glory) and *Canavalia rosea* (coastal jack bean, Fig. 5) creep along the ground at the front of the dunes, helping to suppress wind action on loose sand and prevent dune blow outs, but these are being extensively and repeatedly damaged both where the current

track runs along the top of the fore dune, and also where numerous access points onto the beach proper are made (Fig. 6). Continued damage to these frontal dune plants are likely to destabilise dune crests and result in increased erosion by wind and high water. These areas are also those favoured by nesting turtles.

Plants further back from the frontal dune bind the sand, helping to retain organic matter and developing physical structure which enables other species to regenerate and develop the recognisable dune community. While re-establishing the track from Cowley Beach boat ramp to Liverpool Creek through this area will reduce the ecological damage caused by motor vehicles, removing vegetation from what is already a narrow and highly impacted area without allowing revegetation works in old sections of track to become established may hinder the regeneration potential of these areas. Continued beach access through established vegetation, cutting of vegetation for shelter and firewood, and winching out of established trees (Fig. 7) all significantly damage the integrity of the remaining vegetation and the ecological services it provides.

REFERENCE

Henderson, R.F.J. (ed.), (2002) *Names and Distribution of Queensland Plants, Algae and Lichens*. Environmental Protection Agency: Brisbane.

FLORISTIC SPECIES LIST

The species listed below were present along the proposed route of the new road from Cowley Beach boat ramp to the mouth of Liverpool Creek, or immediately adjacent to it.

Nomenclature follows the Queensland Herbarium (HERBRECS), although assignment to family follows Henderson (2002). Exotic species are denoted by *

Family	Species
Amaryllidaceae	<i>Crinum pedunculatum</i>
Anacardiaceae	<i>Euroschinus falcata</i> var. <i>falcata</i>
Annonaceae	* <i>Annona glabra</i>
Annonaceae	<i>Polyalthia nitidissima</i>
Apocynaceae	<i>Alyxia spicata</i>
Apocynaceae	* <i>Catharanthus roseus</i>
Apocynaceae	<i>Tabernaemontana pandacaqui</i>
Arecaceae	* <i>Cocos nucifera</i>
Asteraceae	* <i>Ageratum conyzoides</i> ssp. <i>conyzoides</i>
Asteraceae	<i>Coronidium rupicola</i>
Asteraceae	* <i>Emilia sonchifolia</i> var. <i>sonchifolia</i>
Asteraceae	* <i>Praxelis clematidea</i>
Asteraceae	* <i>Sphagneticola trilobata</i>
Asteraceae	<i>Wollastonia biflora</i>
Burseraceae	<i>Canarium australianum</i>
Caesalpinaceae	<i>Caesalpinia bonduc</i>
Casuarinaceae	<i>Casuarina equisetifolia</i>
Clusiaceae	<i>Calophyllum inophyllum</i>
Combretaceae	<i>Terminalia arenicola</i>
Combretaceae	<i>Terminalia muelleri</i>
Commelinaceae	<i>Commelina diffusa</i>
Convolvulaceae	<i>Ipomoea macrantha</i>
Convolvulaceae	<i>Ipomoea pes-caprae</i> ssp. <i>brasiliensis</i>
Cucurbitaceae	<i>Diplocyclos palmatus</i>
Cyperaceae	<i>Cyperus pedunculatus</i>
Cyperaceae	<i>Cyperus</i> sp.
Euphorbiaceae	<i>Drypetes deplanchei</i>
Euphorbiaceae	<i>Excoecaria agallocha</i>
Euphorbiaceae	<i>Macaranga involucrata</i> var. <i>mallotoides</i>
Euphorbiaceae	<i>Macaranga tanarius</i>
Fabaceae	<i>Aphyllodium biarticulatum</i>
Fabaceae	<i>Canavalia rosea</i>
Fabaceae	<i>Derris trifoliata</i>
Fabaceae	* <i>Indigofera ?suffruticosa</i>
Fabaceae	* <i>Macroptilium atropurpureum</i>
Fabaceae	* <i>Macroptilium lathyroides</i>
Fabaceae	<i>Millettia pinnata</i>
Fabaceae	<i>Sophora tomentosa</i> ssp. <i>australis</i>
Fabaceae	<i>Vigna marina</i>
Fabaceae	<i>Zornia dyctiocarpa</i> var. <i>dyctiocarpa</i>
Flacourtiaceae	<i>Scolopia braunii</i>
Flagellariaceae	<i>Flagellaria indica</i>
Goodeniaceae	<i>Scaevola taccada</i>
Heliconiaceae	* <i>Heliconia</i> sp.

Lamiaceae	Clerodendrum inerme
Lamiaceae	Clerodendrum longiflorum var. glabrum
Lamiaceae	Premna serratifolia
Lamiaceae	Vitex rotundifolia
Lamiaceae	Vitex trifolia var. trifolia
Lauraceae	Cassytha filiformis
Malvaceae	Hibiscus tiliaceus
Malvaceae	Thespesia populnea
Meliaceae	Aglaia elaeagnoidea
Meliaceae	Melia azedarach
Menispermaceae	Stephania japonica
Mimosaceae	Acacia crassicarpa
Mimosaceae	Acacia flavescens
Moraceae	Ficus destruens
Moraceae	Ficus opposita
Myrsinaceae	Aegiceras corniculatum
Myrtaceae	Acmena hemilampra ssp. hemilampra
Myrtaceae	Lithomyrtus obtusa
Myrtaceae	Syzygium forte ssp. forte
Olacaceae	Ximenia americana
Oleaceae	Chionanthus ramiflora
Pandanaceae	Pandanus ?tectorius
Passifloraceae	*Passiflora edulis
Passifloraceae	*Passiflora foetida var. foetida
Passifloraceae	*Passiflora suberosa
Phormiaceae	Dianella caerulea
Pittosporaceae	Pittosporum ferrugineum
Poaceae	Entolasia stricta
Poaceae	Imperata cylindrica
Poaceae	Ischaemum muticum
Poaceae	*Megathyrsus maximus
Poaceae	*Melinis repens
Poaceae	Paspalidium ?disjunctum
Poaceae	Thuarea involuta
Portulacaceae	*Portulaca pilosa
Rhamnaceae	Alphitonia excelsa
Rhamnaceae	Colubrina asiatica var. asiatica
Rhizophoraceae	Carallia brachiata
Rubiaceae	Aidia cowleyi
Rubiaceae	Morinda citrifolia
Rubiaceae	*Richardia brasiliensis
Sapindaceae	Dodonaea polyandra
Sapindaceae	Guioa acutifolia
Sapotaceae	Planchonella obovata
Smilacaceae	Smilax calophylla
Solanaceae	*Solanum torvum
Tiliaceae	Triumfetta repens
Verbenaceae	Avicennia marina
Verbenaceae	*Lantana camara var. camara
Verbenaceae	*Stachytarpheta jamaicensis
Violaceae	Hybanthus enneaspermus
Xanthorrhoeaceae	Lomandra banksii



Fig. 1. Location of existing tracks and beach access points at Cowley Beach

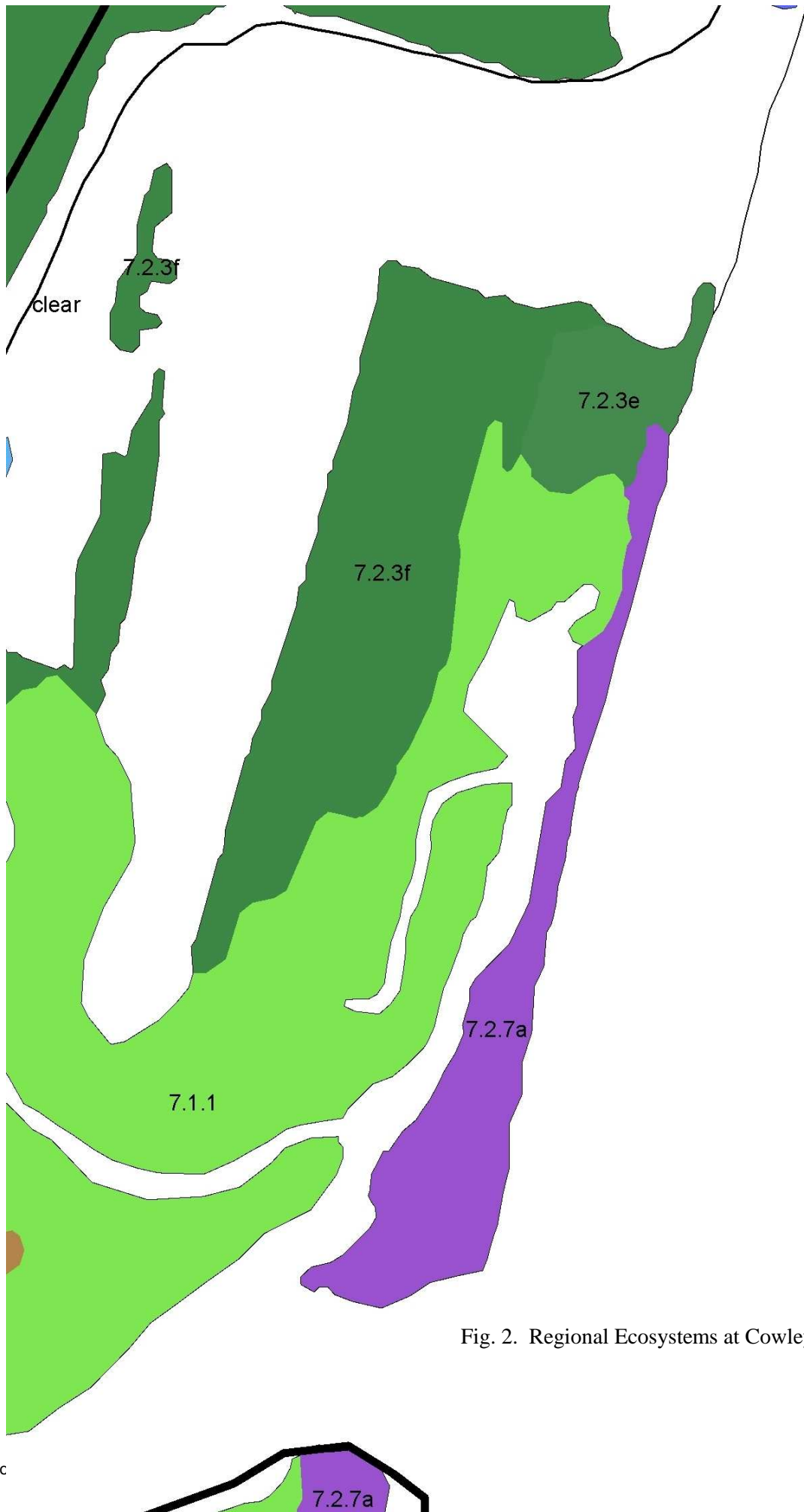


Fig. 2. Regional Ecosystems at Cowley Beach



Fig. 3. *Aidia cowleyi* has a limited distribution, commonly recorded in littoral rainforest on sand. Several mature plants and limited seedling regeneration were observed within the littoral rainforest mosaic.



Fig. 4. Weed of National Significance *Annona glabra* (pond apple) seedlings were scattered along the entire length of the track.



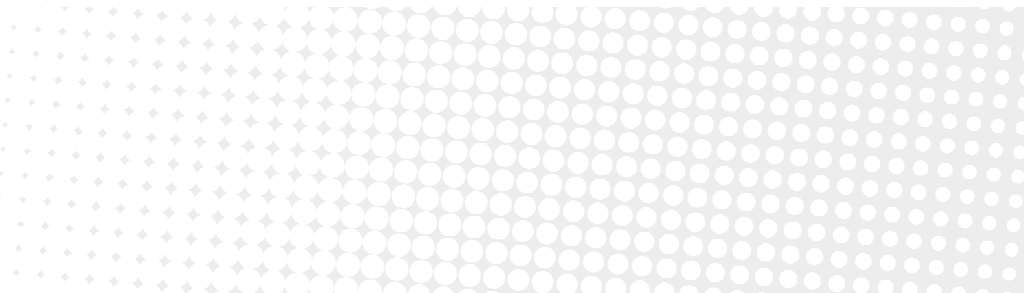
Fig. 5. *Canavalia rosea* vines creep along the sand surface; adventitious roots help bind the sand while their leaves break up wind movement over the sand surface and so reduce sand blowing.



Fig. 6. Current track on fore-dune ridge (left) isolating and fragmenting pioneering species from the rest of the dune community; casual beach access (right) is further disrupting this community, increasing the damage to turtle nesting sites and allowing sand remobilisation.



Fig. 7. Uprooted *Casuarina* trees from 4WD vehicles winching themselves out of soft sand, near the mouth of Liverpool Creek



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