Floristic analysis of the Great Barrier Reef continental islands, Queensland

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Abstract

There are 552 continental islands recorded along the east coast of Queensland within the Great Barrier Reef Marine Park (GBRMP). The total area of these continental islands is about 1627 km^2 or 0.1% of Queensland's land mass. A total of 2195 plant species or about one quarter of Queensland's vascular flora occurs on these continental islands. At present 79 of these plant species are listed as rare or endangered. This is 6% of Queensland's known rare flora. Current knowledge indicates that there are only three endemic island plants found within the study area, i.e. *Albizia* sp. (South Percy Island G. N. Batianoff, 11444), *Berrya rotundifolia* and *Habenaria divaricata.*

The study identified a distinctive continental island flora dominated by rainforest species (48%), open-forest species (46%) and littoral plant species (6%). There appears to be no significant difference in species richness between northern and southern island floras. Species richness of island floras in northern tropical areas is more dependent on 'woody' and rainforest species, while in southern subtropical areas, it is more dependent on herbaceous species. There is a strong relationship between species richness and insular area up to 5000 ha size of islands.

This report focuses on botanical resource inventory, current status and trends for continental island flora. Spatial pattern analyses are carried out within and between the Far Northern, Cairns, Central and Mackay/Capricorn sections of the GBRMP. Pattern analyses provided five floristic regions within the Great Barrier Reef. Starting from north, these are 'Northern Region', 'Wet Tropics Region', Dry Tropics Region', 'Whitsunday Region' and 'Capricorn Region'.

Issues concerning maintenance of island species richness such as fire and exotic species management are highlighted. All rare and endangered species recognised in this study area listed in the appendix. Management implications for long term conservation are discussed.

Introduction

This study included about 552 continental islands recorded within the GBRMP study area (Fig. 1) occurring from the tip of Cape York (10°41'S) to just north of Fraser Island (24°30'S). The total land area of these continental islands is an estimated 1627 km^2 or about 0.1% of Queensland terrestrial land, situated along more than 2000 km of the east coast.

The present day continental islands represent mountainous regions of the submerged continental shelf. According to Thom and Chapell (1975) between 12 000 and 10 000 years BP the sea level rose to 30 m below its present level. At this time some of the present day offshore islands were separated from the mainland. Some 6000 years BP the sea had risen to about its present level and during this period large amounts of sand moved inshore and along the shore to form most of the present day coastal dune systems (Capricorn Coast Beaches 1979). Some of these dunes occur on Curtis Island, Great Keppel Island, Percy Islands, Whitsunday Island, Hinchinbrook Island, Lizard Island, Turtle Head Island and Albany Island (near Cape York).

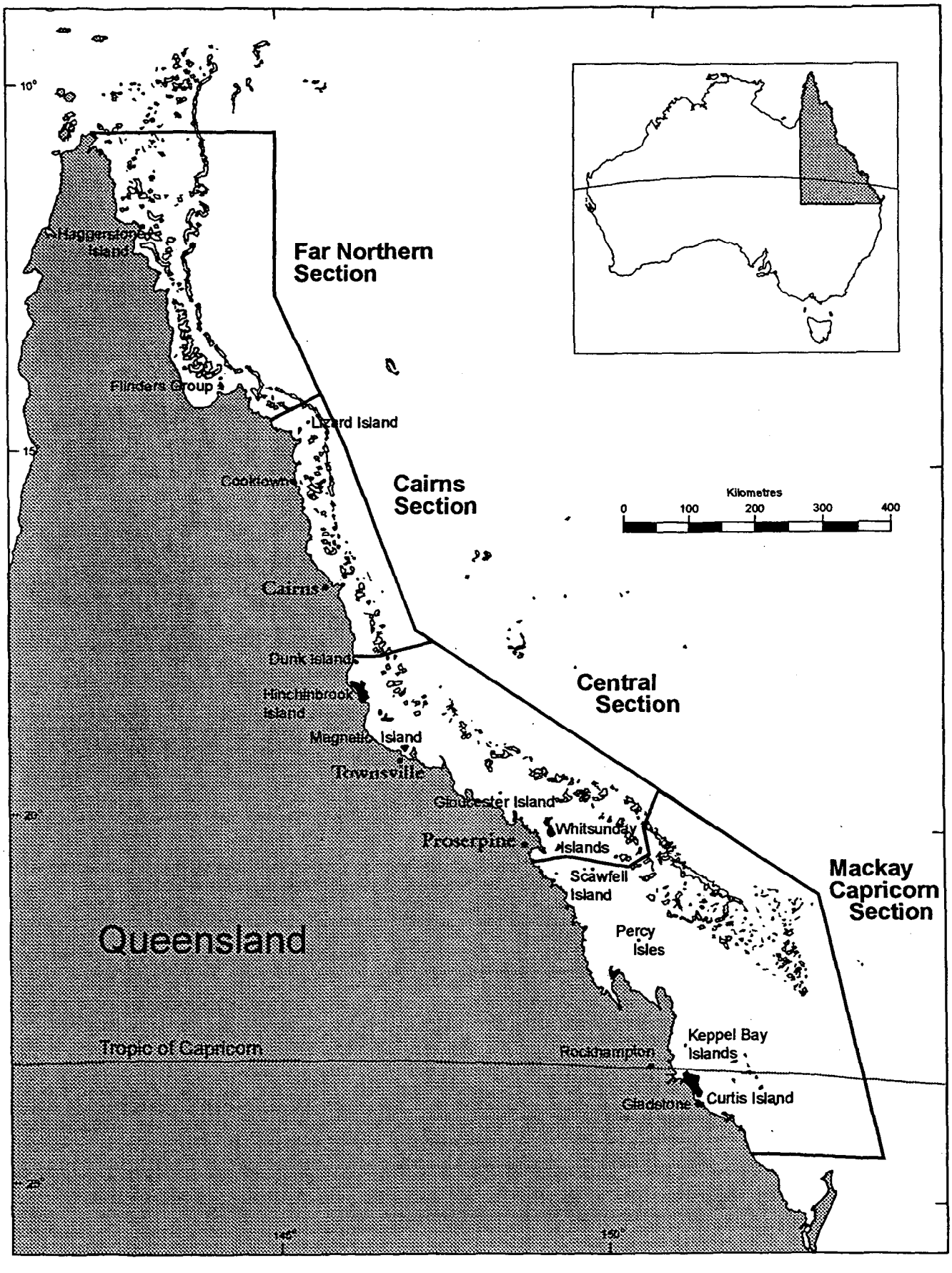

Figure 1. Locality map

As a result of the sea level rise during the Holocene period most of the mountainous areas between the present coast and continental shelf became the 552 continental islands within the area now known as the Great Barrier Reef.

Most of the major geological strata of the adjacent mainland are represented on these continental islands. Geological formations range from Devonian rocks to Quaternary deposits (Geological Survey of Queensland 1975). More common geological units include granites and Whitsunday volcanics. Also common are the Curtis Island Devonian-Carboniferous rocks from Shoalwater Bay to Gladstone (Geological Survey of Queensland 1975). A rare and unusual substrate is found on South Percy Island in the Mackay/Capricorn Section of the Great Barrier Reef Marine Park. About 70% of this island is ultramafic, largely serpentinite rock (Geological Survey of Queensland 1975). The most mountainous and rugged terrain occurs on Hinchinbrook Island, Palm Island, Magnetic island and Gloucester Island. Mt Bowen at 1121 m on Hinchinbrook Island is the highest mountain on any of the continental islands in Australia (with the exception of mountainous areas in Tasmania). The two largest islands are Curtis Island (46 000 ha) and Hinchinbrook Island (39 900 ha).

Mean rainfall in the area generally exceeds 1000 mm per annum (Anon 1971). On average, 10-14 cyclones occur each decade and bring torrential rain and destructive winds from December to April (Lourenz 1977). All areas have relatively mild winter days and hot wet summers. The climate ranges from humid tropical in the north to subtropical maritime in the south. Major maritime climatic elements affecting all islands are tides, waves, salt spray, windshear and south easterly prevailing winds. Vegetation formations are varied. Closed forests (including rainforest), open forests, woodland, scrubs (including semi-deciduous vine thickets), shrublands and grasslands are widespread. The most dominant vegetation is eucalypt forest, however most islands include rainforest, non-eucalypt open forest, littoral seashore vegetation and mangroves.

The Great Barrier Reef continental islands are covered by a variety of tenures, however most of the island areas are managed as National Parks.

We summarise botanical resource inventory data, identify trends and provide floristic spatial pattern analyses. Factors affecting species richness and issues concerning management of islands are discussed.

Methods

Floristic analysis

This paper uses floristic information collected from the 1770 to 1996 period and available to us (Batianoff and Dillewaard in prep.). Plant names used are currently accepted by the Queensland Herbarium and are on the Herbarium records database (HERBRECS) as of February 1996. 'Species-taxa' is used here to include not only the species but all other taxonomic entities such as subspecies, varieties, forms and the undescribed taxa recognised and recorded on HERBRECS.

In some spatial pattern analysis we used rainforest, open forest and littoral seashore species to divide entire continental island floras into three sections. In those analyses the rainforest species are defined as plants listed in the rainforest flora of Queensland and recorded on the database 'Queensland rainforest species identification key' (Jessup 1996, pers. comm.). The littoral seashore species are mostly sandy shore plants including mangroves and sea grasses. The remaining open forest species are the non-rainforest and non-littoral seashore species and include not only all the 'dry' land plants but also freshwater aquatic species.

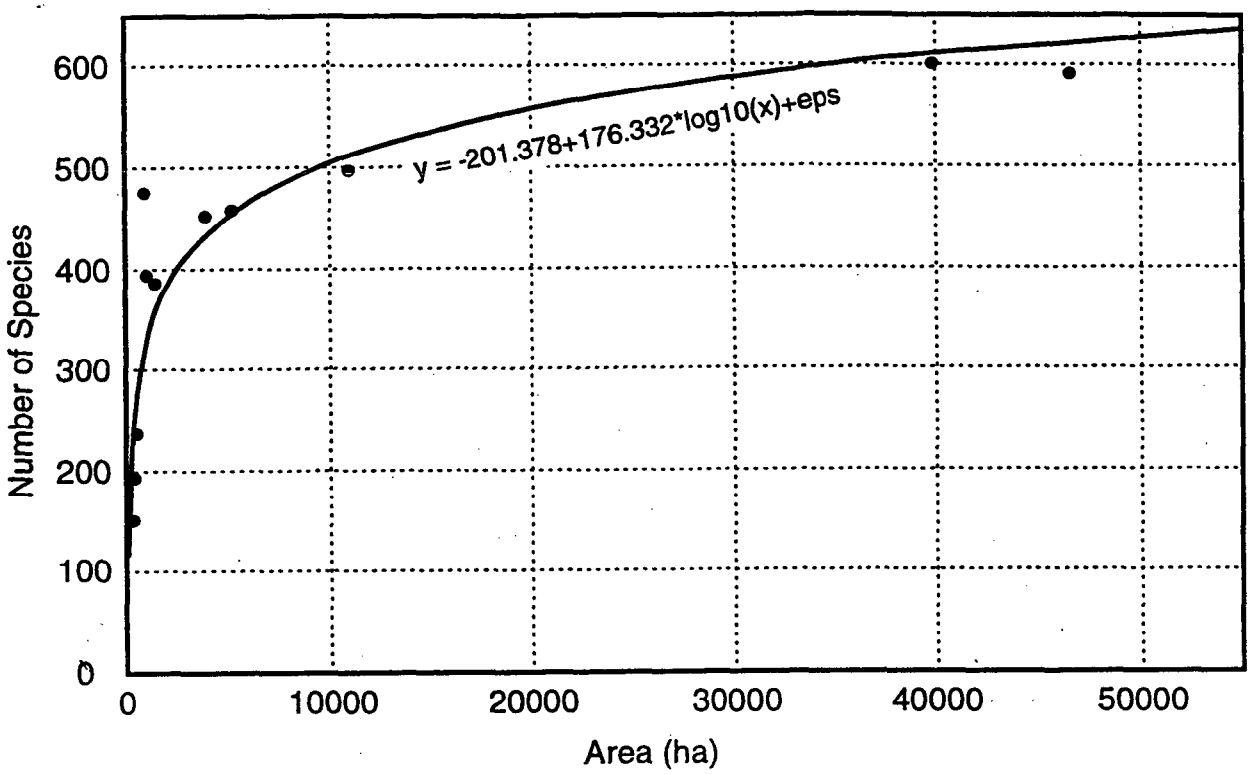

Figure 2. The relationship between species richness and island area

Table 3. List of islands with known number of native species and area

Island Names	Species Number	Area (ha)
Haggerstone Island	131	50
Calder Island	132	150
Penrith Island	150	162
Prudhoe Island	192	518
North Keppel Island	235	627
Lizard Island	475	1012
Scawfell Island	393	1090
Great Keppel Island	386	1454
Gloucester Island	450	3970
Magnetic Island	457	5164
Whitsunday Island (estimated)	495	10 935
Hinchinbrook Island	600	39 900
Curtis Island	590	46 600

Table 4. Botanical summary data for the four sections of the Great Barrier Reef Marine Park

	Far Northern	Cairns	Central	Mackay/ Capricorn	Total GBRMP
Area km^2 +	75.57	14.99	748.23	788.19	1626.98
% of total area	4.6%	0.9%	46.0%	48.5%	100%
No of island	139	47	161	205	552
All species	856	700	1434	1252	2195
Exotic species	47	57	152	163	215
Rare/endangered species	24	9	47	13	79
Exclusive regional species	168	43	456	361	1028