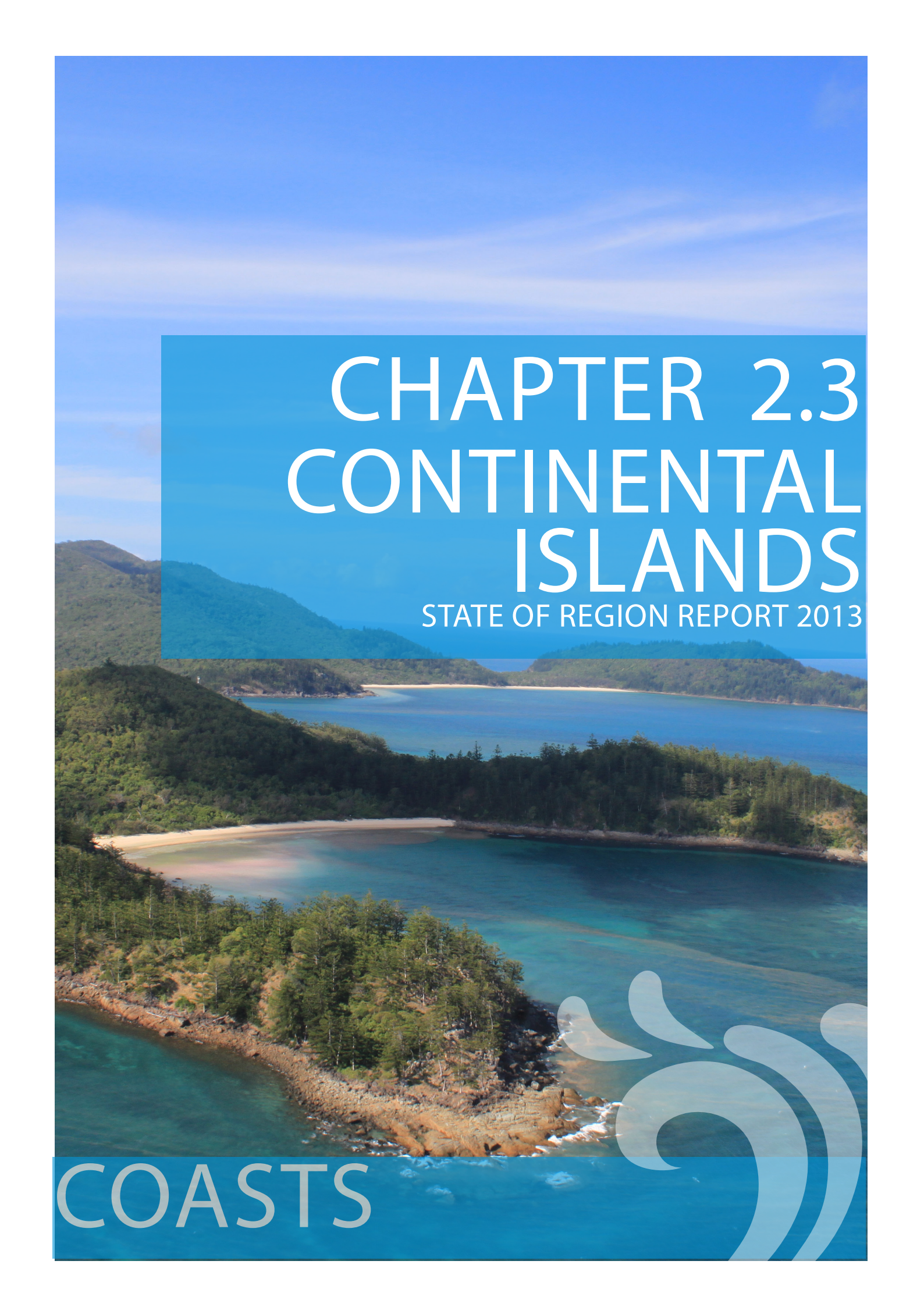


An aerial photograph of a coastal landscape. In the foreground, a rocky shoreline with sparse vegetation meets the water. A small, sandy beach is visible on the left. The water is a deep blue-green color. In the background, there are forested hills and a larger bay or inlet. The sky is a clear, bright blue.

# CHAPTER 2.3 CONTINENTAL ISLANDS

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COASTS

A stylized graphic of waves in the bottom right corner, rendered in a light blue color. The waves are composed of several curved, overlapping shapes that suggest movement and the flow of water.

# STATE OF REGION REPORT

## Continental Islands

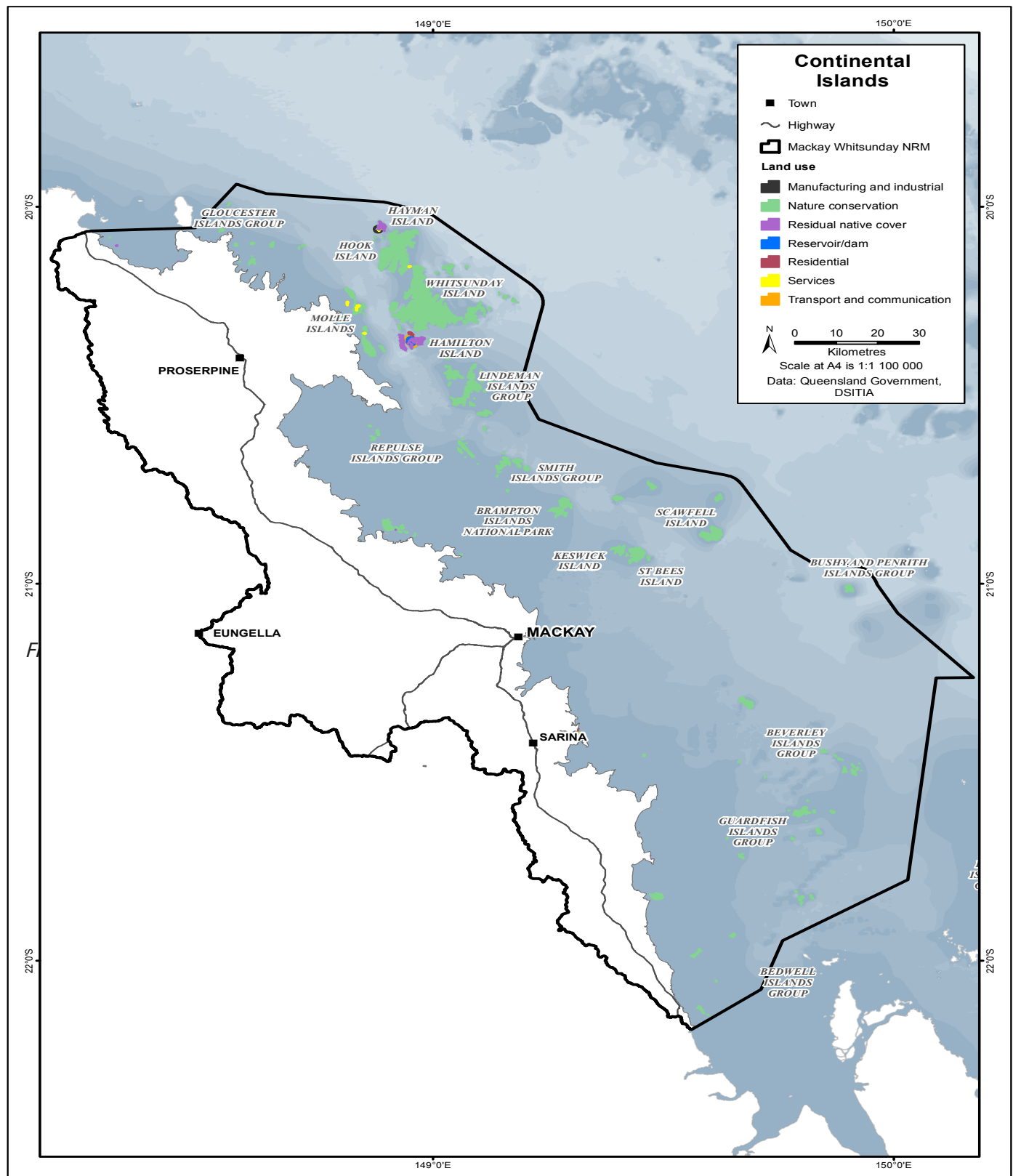


Figure 1 Islands of the region

## SUMMARY

The region contains one hundred and forty five islands, of which all but eighteen are protected as National Parks, in addition to numerous smaller islets and exposed rocks. In this respect the region contains almost 25% of all the continental islands that occur along the Queensland coast.

Of the National Park islands, five (South Molle, Long, Hook, Lindeman and Brampton Islands) have been partly developed as tourism resorts on land leased from the National Park. However, most of these are not currently operating largely because of market downturns, for example Lindeman Island and Hook Island resorts. Two resorts are on fully leased islands (Hayman and Hamilton), and resort infrastructure is currently being developed on Dent Island. Middle Percy Island has recently been converted to National Park, with a smaller area as Conservation Park with previous lessee's appointed as caretakers and trustees. A small leased area also exists on St Bees Island and a larger area of Keswick Island is partly developed as a satellite suburb of Mackay City. Several islands remain as unallocated State land where little or no active management is being undertaken.

"It is wrong to think of the individual islands or groups of islands as remnants of particular individual volcanoes. During the 100 million years after eruption, there was sufficient time for the volcanic terrain to erode into a landscape of mountains, hills and valleys only tenuously related to its origins.

The present islands and adjacent mainland are simply the mountain tops and ridges of this old landscape, which has been inundated by the sea in more recent times. No one knows for certain when this 'drowned' landscape first came about. Certainly at the depth of the last ice age 19,000 year ago, the sea level was about 150 m lower than present, and the coastline was about 140 km farther east (east of the outer Barrier Reef). As the climate subsequently warmed, the level of the ocean rose rapidly, and from 10,000 to 6,000 years ago the coastal fringe was progressively inundated and the higher hills became isolated as the islands we see today."

(Willmott, 2006; 107-108)

The islands have strong affinities with natural systems on the adjoining mainland. The Northern Group; Whitsunday, Molle, Lindeman, Repulse, Smith Islands and those of the southern Gloucester Islands aggregation, are closely similar to, and lie within the Whitsunday sub-region of the Central Queensland Coast Bioregion. The few small islands lying adjacent to the Don Basin are within the Townsville Plain sub region of the northern Brigalow Belt Bioregion. The Newry, Cumberland and Brampton Island groups have affinities with coastal hills on the adjoining Mackay coast. There is a strong environmental gradient between the Northumberland and Percy Islands which corresponds largely to a latitude change related to decreasing rainfall in the south, but also an east-west gradient as a result of sea exposure.

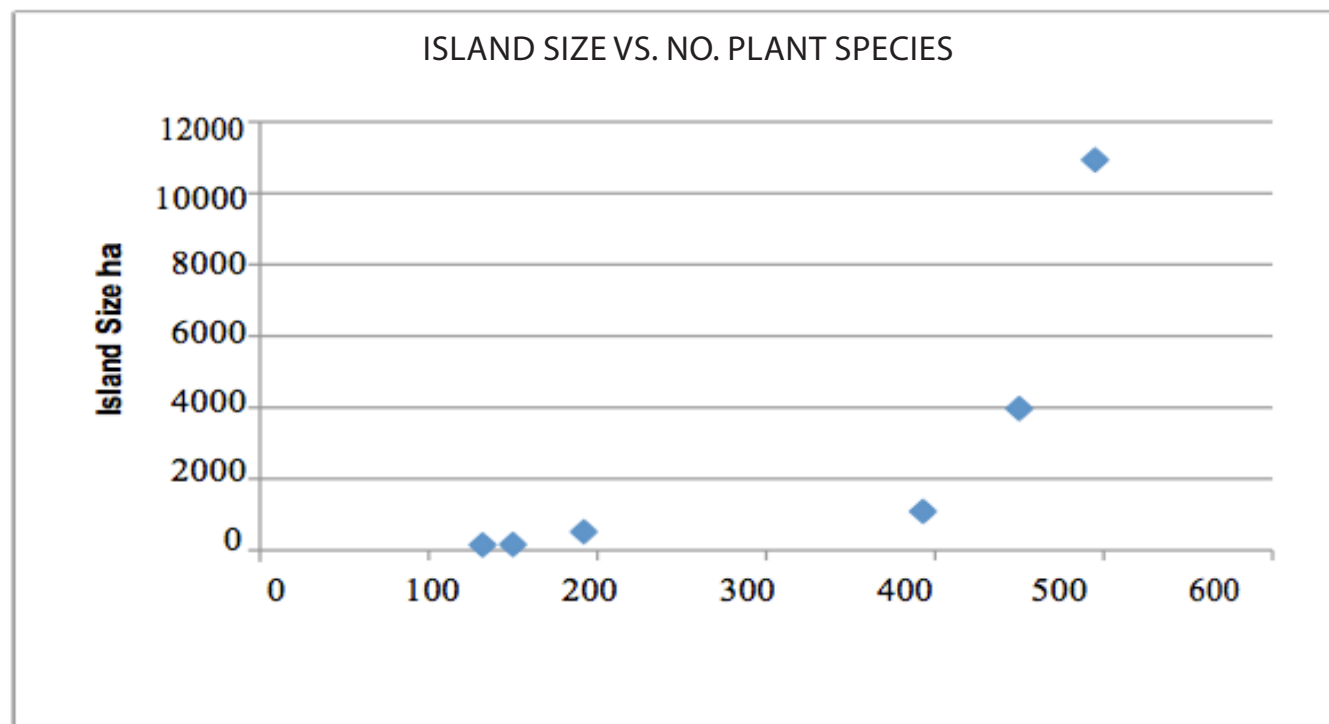


Figure 2 Island size vs. Species richness.

Several Islands are worthy of particular note as they have unique biophysical characteristics. Bushy Island is the only vegetated sand cay within the central region of the Great Barrier Reef. This island is also unique as it has developed on a reef which has formed around Redbill Islet. South Percy Island is the only continental island which is largely formed by serpentinite rocks, a rare and highly geographically restricted geological type. South Percy and Whitsunday Island are also partly formed by extensive sand dune deposits. Rabbit Island in the Newry Group has extensive areas of low lying mangroves and smaller but notable areas of lowland melaleuca wetland (Queensland Herbarium, 2013).

While little documentation exists which describes the terrestrial fauna that inhabits the continental islands, it is well accepted that few large mammals (e.g. macropods, possums, dingos) naturally occur, although some introduced populations exist (e.g. brushtail possums on Hayman, grey kangaroos on Brampton). The exception is presence of the endangered Proserpine rock wallaby on Gloucester Island and possibly unadorned rock wallabies on Whitsunday Island. In addition, goats were introduced to many of the islands, although most populations have either been eradicated or are under current control efforts.

Considerably more information is available regarding island flora (e.g. Batianoff; 1987, 1992, 1995; Batianoff & Dillewaard, 1997). Generally there is a strong relationship between species richness and island size, with larger islands having more diverse flora. While islands do support some rare species, they generally have fewer than adjacent coastal mainland areas. There are only three plant species known to be endemic to Queensland's islands, two of which are supported within the region.

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## Continental Islands



Importantly however, the region's islands support several regional ecosystems that have no or very little representation on the mainland. These include grasslands on island slopes and headlands, woodlands to closed forest of ironbark (*E. Drepanophylla*) and brushbox (*Lophostemon confertus*), and woodlands of hybridised blue gum (*E. tereticornis*) and poplar gum (*E. Platyphylla*).

|                           |                         |                      |                                 |             |
|---------------------------|-------------------------|----------------------|---------------------------------|-------------|
| <b>WHITSUNDAY ISLANDS</b> | Wirrainbela             | Olden                | Stone                           | Curlew      |
| Bird                      | Workington              | Rattray              | Holbourne                       | Digby       |
| Black                     | Yuindalla               | Saddleback           | <b>BRAMPTON ISLANDS</b>         | Dinner      |
| Border                    | <b>LINDEMAN ISLANDS</b> | <b>SMITH ISLANDS</b> | Brampton #                      | Douglas     |
| Buddlibuddli              | Baynham                 | Allonby              | Carlisle                        | Double      |
| Cid                       | Cornston                | Anchorsmith          | Wedge                           | George      |
| Cow and Calf              | Gaibirra                | Anvil                | Round Top                       | Henderson   |
| Cowrie                    | Triangle                | Bellows              | Flat Top                        | Hirst       |
| Deloraine                 | Keyser                  | Blackcombe           |                                 | Hull        |
| Dent #                    | Lindeman #              | Blacksmith           | <b>SOUTH CUMBERLAND ISLANDS</b> | Innes       |
| Dumbell                   | Little Lindeman         | Goldsmith            | Aspatria                        | Irving      |
| Dungarra                  | Maher                   | Hammer               | Bushy                           | Keelan      |
| Esk Fitzalan              | Mansell                 | Ingot                | Calder                          | Knight      |
| Hamilton#                 | Pentecost               | Ladysmith            | Cockermouth                     | Minster     |
| Harold                    | Seaforth                | Linne                | Derwent                         | Noel        |
| Haselwood                 | Shaw                    | Locksmith            | Keswick #                       | Penn        |
| Hayman #                  | Thomas                  | Pincer               | Penrith                         | Poynter     |
| Henning                   | Volskow                 | Silversmith          | Scawfell                        | Prudhoe     |
| Hook #                    | <b>MOLLE ISLANDS</b>    | Tinsmith             | Snare Peak                      | Renou       |
| Ireby                     | Daydream #              | <b>NEWRY ISLANDS</b> | St Bees #                       | Still       |
| Langford                  | Denman                  | Acacia               | Wigton                          | Temple      |
| Long #                    | Goat                    | Mausoleum            | <b>PERCY ISLES</b>              | Thonee Peak |
| Lupton                    | Mid Molle               | Newry                | Hotspur                         | Treble      |
| Nicolson                  | North Molle             | Outer Newry          | Middle #                        | Wallace     |
| East Repulse              | Planton                 | Rabbit               | North East                      |             |
| North Repulse             | South Molle #           | <b>OTHER ISLANDS</b> | Pine Peak                       |             |
| South Repulse             | <b>NORTHERN GROUP</b>   | Carpet Snake         | South                           |             |
| Perseverance              | Armit                   | Camp                 | Vernon Rocks                    |             |
| Plum Pudding              | Double Cone             | Cave                 | Beverlac                        |             |
| Sillago                   | Eshelby                 | Green                | Bluff                           |             |
| Teague                    | Gloucester              | Gould                | Calliope                        |             |
| Titan                     | Grassy                  | Midge                | Connor                          |             |
| Whitsunday                | Gumbrell                | Pigeon               |                                 |             |

Table 1 Island occurring within the region. Shaded are non-protected areas. # = Resort Island

## VALUES AND SERVICES

During 2012 643,000 people visited the Whitsunday area, an increase of 2% on the previous year (Tourism and Events Queensland 2012). In 2004 when data was last gathered, 31% of visitors stayed at least one night on an island and 34% visited islands by boat (Anon, 2004). These figures clearly demonstrate the attractiveness of the Whitsunday Islands to tourists, and the contribution they make to local economies. A wide range of tourism experiences are available ranging from 'backpacker' accommodation, to Hayman Island Resort, which is consistently recognised as Australia's premier luxury resort by international standards. Figure 6.2 outlines some recreational opportunities within the Whitsunday area.

The region's islands support over 1000 species of vascular plants, well over 10% of all the plants found in Queensland. Gloucester Island supports the endangered Proserpine rock wallaby (*Petrogale persephone*), the only naturally occurring island population. Recent survey found this population to be healthy but nevertheless limited in abundance by its required rainforest habitat (Ball, 2012 pers obs). A trans-located population of this species occurs on Hayman Island, having been introduced as 'insurance' against declines in mainland populations.

Other threatened species occurring on the islands include the death adder (*Acanthopis antarcticus*), coastal sheath-tail bat (*Taphozous australis*) and beach stone curlew (*Esacus neglectus*) (Wildnet, 2007). Shorebirds and sea birds are particularly notable island fauna with islands such as Eshelby, Tern, and Redbill Islet known nesting areas. Bushy Island supports a large colony of common noddies (*Anous stolidus*), numbering in the thousands despite the relatively small size of the island. Many of the continental islands and rocky islets are important nesting habitat for the migratory pied imperial pigeon (*Ducula bicolour*) during its seasonal movement patterns along the Queensland coast. Marine turtles including flatback turtles (*Natador depressa*), loggerhead turtle (*Caretta caretta*) and green turtles (*Chelonia mydas*) nest on islands within the region (Anon, 2005). Significant green turtle rookeries occur on Bushy, Pine Peak and South Percy Islands. Bushy Island is the northern limit for loggerhead turtle nesting and some also occurs on South Percy Island (Anon, 2005).

Islands are of significant scientific interest as they are living examples of the results of climate change and consequent sea level rise. The different diversity supported by islands of different size, location, altitude and exposure offers opportunity to understand how further climate change may affect other natural systems. In addition, islands with relatively simple ecosystems offer learning opportunities in terms of management of more complex areas. One of the key values of islands is that they can be more easily maintained in natural condition, particularly if robust bio-security measures are put in place to restrict the arrival of pest species (Island Arks 2013). In addition, unlike mainland areas, it is often possible to eradicate feral animals and to a lesser degree some exotic plants. Islands also offer significant opportunities for translocation and management of threatened species populations which otherwise may not survive in mainland situations.

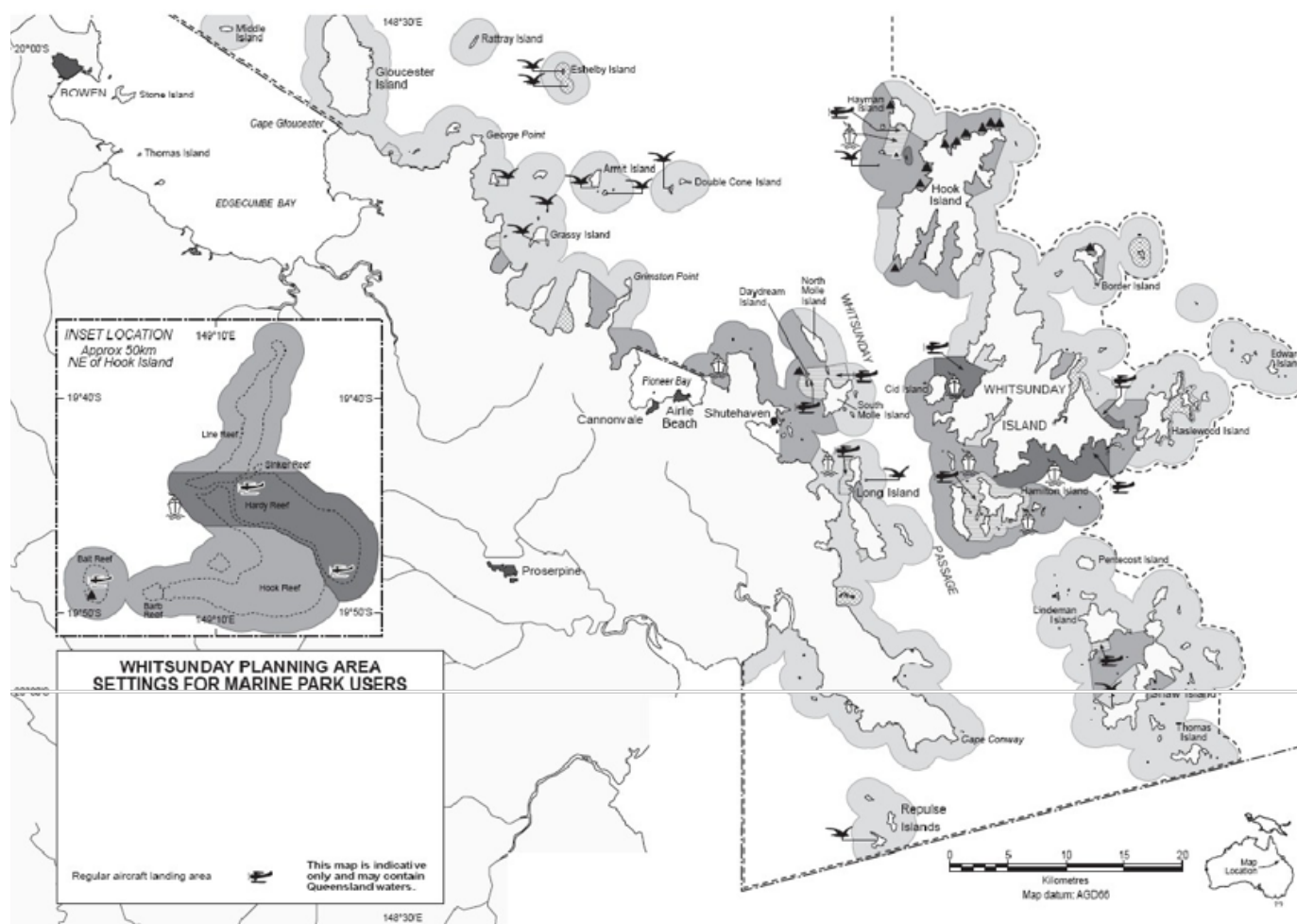


Figure 3 Recreational opportunities and constraints in the Whitsunday Islands (reproduced from the Whitsunday Plan of Management EPA/QPWS, 2008)

## PRESSURES AND THREATS

Fire is an integral component of the Australian landscape and has been widely used by both traditional and contemporary land managers for a large range of purposes. However, the science of fire use is in many respects in its infancy, and opinions vary about its appropriate application, particularly on islands. Comparison of historical and more recent aerial photography makes it clear that vegetation patterns on some islands have changed markedly this century (Ball, unpublished data). This is particularly the case on inshore islands, with those further offshore exhibiting significantly more stability. This situation is almost certainly related to both fire management and exposure to marine influences such as wind and a salt laden atmosphere.

The Whitsunday Islands experience significant visitation from tourists and built infrastructure such as fencing, toilets and camping facilities have been provided to reduce impacts from visitors. However, islands off Mackay have relatively less visitation and fewer facilities. There exists continual risk of introducing exotic plants and disease such as the root rot fungi (*Phytophthora cinnamomi*). This is an important consideration for more remote, less visited areas as these tend to have less management presence and thus unwanted introductions could go unnoticed for longer periods of time, allowing pests to become well established. There is also potential for exotic garden plants to 'escape' from island resorts, lighthouses and other gardens into adjoining National Park areas.

In addition to these challenges, resourcing for management of the islands has declined considerably, particularly those off Mackay. However, emergent conservation based tourism is beginning to provide additional resourcing models, for example voluntary groups Wildmob who participate in land management and education activities, and Ecobarge Clean Seas who specialise in the collection of marine debris.

"The role of Aboriginal peoples in the relationship between rainforest and sclerophyll forest is controversial. There were a number of good reasons for Aboriginal peoples to burn islands regularly, i.e. to facilitate travel and food gathering (Brennan 1986). Perhaps mainland tradition alone may well have been enough reason to burn (Haynes 1985). In our view there is a tendency to overestimate the importance of Aboriginal fire regimes on islands. Not all of the 552 continental islands have good access for landing and many are too isolated, small and rocky to offer food or water. We speculate fewer Aboriginal induced fires occurred on islands than on the adjacent mainland. Burning by Aboriginal peoples may have led to changes in the floristic composition and structure but confined to larger islands with fresh water and possibly smaller islands with easy landing. After studying anthropogenic modifications of vegetation on continental islands in the Whitsunday region, Brennan (1986) suggested that much of the *Araucaria cunninghamii* (fire sensitive species) distribution may reflect extensive use of fire by Aboriginal peoples. He cites that most of the Araucarian forests occur on the steep rocky slopes and/or protected gullies of 'topographic refugia'. Brennan (1986) also found that most of the islands supporting large areas of grassland in the Whitsunday region were remote, smaller, offshore islands. Brennan (1986) concluded that most of these grasslands occur on southeast sides of the islands and were natural formations maintained by windshear and salt spray."

Batianoff & Dillewaard, 1997; 307

Some islands have populations of feral animals present, for example goats, cane toads, cats and on Haslewood and Long Islands, feral pigs. In addition, native species such as brush tail possums (*Trichosurus vulpecula*) and macropods have been introduced to some islands with detrimental impacts to natural systems. This is most likely due to the lack of a population of regulating predator species, which are not present on the islands.

## CONDITION AND TRENDS

Visitation to the islands in the Whitsunday area continues to rise as indicated by tourist expenditure increases of approximately 30% between 2004 and 2006 (Anon, 2007), however this increase is beginning to stabilise. The Whitsunday Plan of Management (GBRMPA, 2008) and Whitsunday and Mackay Islands Visitor Management Strategy (EPA, 2007) provide a structured management of visitation, and many islands remain protected from intensive use.

The Whitsunday Islands Visitor management Strategy (EPA, 2007) to provide structure and guidelines for managing visitor use to the region's islands and applies a level of setting to a particular location. For example, high-use sites such as Whitehaven Beach are designated "High-use" setting. Large-scale infrastructure and site hardening strategies such as raised wooden access ramps, picnic tables extensive interpretative signage and a large toilet block is present to cope with the higher visitation. These sites provide a focus for tourism and a site specific strategy is in place to provide management guidance and determine appropriate development. In contrast, undeveloped, rarely visited sites such as Carlisle Island are managed primarily as a 'Protected' setting, where the focus is conservation orientated. "Protected" areas are defined as "Natural areas set aside for conservation with minimal visitor use" (EPA 2007; 13) with a small area of 'Natural' setting surrounding Neil's campground on the south-western edge allowing for basic infrastructure such as signage. Sites in the "Natural" setting are "Visitor sites generally free of facilities...unless they are essential to minimise visitor impacts" (EPA, 2007; 16).

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|                              | Visitors       | Holiday        | VFR           | Business      | Expenditure (\$m) |
|------------------------------|----------------|----------------|---------------|---------------|-------------------|
| Domestic overnight           | 480,000        | 319,000        | 82,000        | 50,000        | \$509             |
| Annual % change <sup>1</sup> | ▼ -9%          | ▼ -4%          | ▲ n/p         | ▲ n/p         | ▼ -7%             |
| Trend % change <sup>2</sup>  | ▲ 4%           | ▲ 3%           | ▲ n/p         | ▲ n/p         | ▼ -2%             |
| International overnight      | 163,000        | 155,000        | 5,000         | 1,000         | \$108             |
| Annual % change              | ▼ -2%          | ▼ -3%          | ▲ n/p         | ▲ n/p         | ● 0%              |
| Trend % change               | ▼ -10%         | ▼ -11%         | ▲ n/p         | ▲ n/p         | ▼ -13%            |
| <b>TOTAL</b>                 | <b>643,000</b> | <b>474,000</b> | <b>87,000</b> | <b>51,000</b> | <b>\$617</b>      |
| Annual change                | ▼ -7%          | ▼ -3%          | ▲ n/p         | ▲ n/p         | ▼ -6%             |

Figure 4 Tourism Whitsunday End of Year Snapshot (2012)

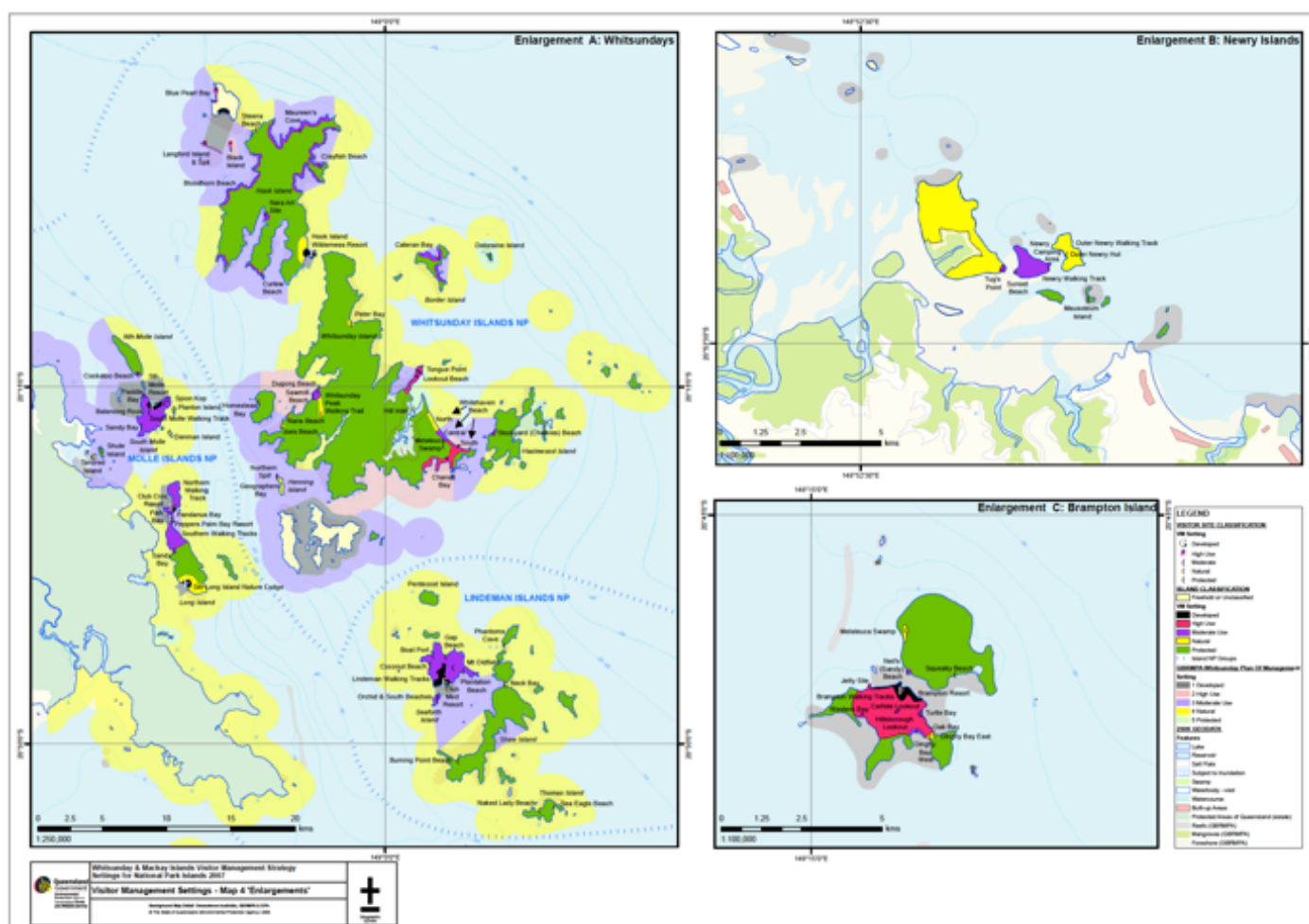


Figure 5 Whitsunday and Mackay Islands Visitor Management Settings for the Whitsunday, Brampton and Newry Island Aggregations (VMS, 2007). Note: Carlisle Island is the most northerly of the Brampton Islands Group (Enlargement C).

At least 163 exotic plants are known on the region's islands. Many of these do not have the capacity to significantly displace other species or modify habitats. However some such as Guinea grass can smother other ground covering species and significantly increase fuel loads with subsequent changes to fire patterns.

Other exotic plants such as sisal hemp aggressively out compete native species through prolific reproduction. Sisal hemp propagules are also able to float and can sustain extreme conditions and continue to germinate (K. McCallie, pers. ob). This species is found in most areas frequented by visitors. Others species such as rubber vine, present on Gloucester Island, have the potential to dramatically dominate native vegetation and substantially reduce habitat condition for the Proserpine rock wallaby. Increased use of the islands by people will present the Queensland Parks and Wildlife Service with increased weed control challenges.

Fauna species not naturally occurring on the islands (including native species from mainland systems) can cause significant damage. Damage includes over grazing/browsing, subsequent weed infestation, erosion, damage to wetlands and soaks and alterations to fire patterns. Goats are a major issue on some islands and a population of feral pigs has established on Long Island. However, this is not the case for introduced koala populations, which appear to have developed balanced populations on Rabbit and St Bees Island. Similarly, the Proserpine rock wallaby population on Hayman Island is not having any known detrimental impact.

A number of endemic species exist within the Whitsunday Islands. *Carlia pectoralis inconnexa* is a species of skink known only from Whitsunday Island (Hobson, 2008) while two subspecies of the Queensland leaf-tail gecko are also found on Whitsunday Island, one of which was only recently described (Couper & Hoskin, 2013).

It is clear that the distribution of vegetation types on some islands has changed significantly as a result of prevailing fire regimes. These changes may result in loss of some vegetation types from some islands, notably grasslands and open sclerophyll woodlands (McCallie, 2009., Ball, 2003).

Given the lack of quantitative baseline data and subsequent monitoring, the status of all key fauna species on the islands cannot be determined. Proserpine rock wallaby populations are actively monitored and indications are that the Gloucester Island population is stable, and numbers are increasing on Hayman Island (Nolan, pers. comm.). Limited seabird and shorebird surveys on outer islands off Mackay indicate that populations are stable, and turtle nesting although variable, does not display any consistent downward trend (Ball, unpublished data).

## GOVERNANCE

National Park islands are to be managed in accordance with the Nature Conservation Act 1992. The management principles provided by this act are to:

- Provide, to the greatest possible extent, for the permanent preservation of the area's natural condition and the protection of the area's cultural resources and values;
- Present the area's cultural and natural resources and their values; and
- Ensure that the only use of the area is nature based and ecologically sustainable.

Management responsibility for National Park Islands lies with the Queensland Parks and Wildlife Service.

Resort and several private leases on the islands are administered by the provisions of the Land Act 1994. Conditions of these leases include both general requirements for 'Duty of Care' and also specific management requirements. Some islands remain as Unallocated State Land and are the responsibility of the Department of Natural Resources and Mines. A small number of islands e.g. Pine Islet, once supported lighthouses, and remain under Commonwealth control.

## INDICATORS

Tenure of islands, and the negotiation and gazettal of nature conservation covenants, can be readily tracked by the Department of Natural Resources and Mines and the Department of National parks, Recreation, Sport and Racing.

Exotic plants are in most cases more likely to be prevalent in areas of higher visitation. These areas can be used as sentinel sites within monitoring programs. Infestation of exotic animals are normally reported by members of the public as regular surveys, while ideal, are not feasible.

Knowledge relating to the historic distribution and condition of vegetation types, habitats and flora and fauna populations on the islands needs to be reviewed, and acceptable thresholds of change around those conditions adopted and monitored. Current vegetation mapping, while recently updated for the Central Queensland Coast Bioregion (Queensland Herbarium, 2013) remains inadequate for some islands and should be updated. Few fauna surveys have been conducted except in association with specific projects (WIGW Fauna Survey report).

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