

## 6. CHANGES IN ISLANDS

The second environmental history narrative is contained in Chapter 6, which considers ways in which the islands of the Great Barrier Reef have been transformed since European settlement took place; by 1970, numerous changes had been wrought on many islands, and some islands had been extensively modified as a result of human activities. This chapter considers the building of the beacon at Raine Island, the story of guano and rock phosphate mining, the destruction of native island vegetation, the introduction of exotic species of flora and fauna, and the development of infrastructure. The last of those impacts was associated with the growth of tourism in the Great Barrier Reef and represents one of the most dramatic changes in island landscapes. Other changes, however, have also been extensive; in particular, this chapter focuses on the transformations resulting from the creation of European coconut plantations and the introduction of goats, because these impacts were deliberate, and because they have altered contemporary perceptions of what is the natural condition of the Great Barrier Reef islands.

## 6. CHANGES IN ISLANDS

### 6.1 Introduction

More than 300 coral cays and 600 continental islands lie within the GBRWHA and these form distinctive environments of the Great Barrier Reef. The evolution and geomorphology of cays and continental islands has been discussed by Hopley, and some cays and islands have been modified by human activity since European settlement; indeed, the transformation of some island landscapes probably represents the most comprehensive human impact in the Great Barrier Reef.<sup>1</sup> Examples that illustrate the extent of this transformation, and which are discussed in this chapter, include the changes wrought by guano miners at Raine and Lady Elliot Islands, the removal of rock phosphate from Holbourne Island, the creation of coconut plantations on many islands, and the destruction of island vegetation due to the introduction of goats at Lady Musgrave Island. Other significant impacts relate to the development of infrastructure on islands, associated with the expansion of the tourist industry in the Great Barrier Reef, including tourist resorts, airstrips and jetties. As a result, many islands of the Great Barrier Reef – including Raine, Green, Magnetic, Hamilton, Heron and Lady Elliot Islands – now exist in a significantly modified condition.

In this chapter, the earliest recorded European impact on an island in the Great Barrier Reef is described first: the construction of the navigation beacon at Raine Island, in 1844 (Section 6.2). Second, the operations of guano and rock phosphate miners are considered, in Section 6.3. Third, morphological changes at Fairfax Island resulting from military target practice, from 1943-1965, are discussed in Section 6.4. Changes in the vegetation of islands are described (Section 6.5) and an overview of changes in island biota is provided (Section 6.6). Finally, some impacts of the development of infrastructure and the growth of tourism on Great Barrier Reef islands are considered, in Section 6.7. Significantly, many of the impacts described in this chapter have occurred in islands that are relatively accessible; those impacts may have been exacerbated by the exclusion of islands from the GBRMP, when that area was created in 1975, although island environments were subsequently included in the area defined by the GBRWHA.

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<sup>1</sup> Hopley, *Geomorphology, passim*; Lucas *et al.*, *Outstanding universal value*, p. 50.

In this chapter, I do not discuss those changes in island morphology that may be attributed to natural processes and that have been documented in detail by other authors.<sup>2</sup>

## 6.2 The construction of the beacon at Raine Island, 1844

The earliest significant construction on the islands of the Great Barrier Reef occurred at Raine Island in 1844, when a beacon was built to assist ships navigating in the locality. Joseph Beete Jukes, during his visit to Raine Island, sketched the island and the newly-constructed beacon; his sketch, reproduced in Figure 6.1, also illustrates the temporary settlement on the island at that time. A beacon was required in the northern part of the Great Barrier Reef to mark the entrance to the Blackwood Channel, through which ships could pass safely to the Great Barrier Reef lagoon; by building a structure that was visible from twenty nautical miles away, navigators did not have to approach the outer reefs until they were certain of their position. The beacon tower also served another purpose: it was stocked with provisions for shipwrecked mariners. The construction of the beacon commenced on 27 May 1844 and the work was carried out by a convict labour force.<sup>3</sup> By the middle of September of that year, the beacon was completed.

The beacon was built using phosphatic sandstone blocks that were quarried from the eastern part of the island, and lime that was obtained by burning *Tridacna* and *Hippopus* shells; Jukes wrote that the latter were ‘to be got in abundance from the reef at low water’.<sup>4</sup> Timber was taken from the wreck of the *Martha Ridgeway*, as was the ship’s tank, which was used to collect rainwater.<sup>5</sup> The original design for the beacon is shown in Figure 6.2, although some modifications were made to the final structure. The completed tower comprised a circular tower, 45 feet in height and 30 feet in diameter at its base. The walls were five feet thick, and a domed roof carrying a large ball raised the

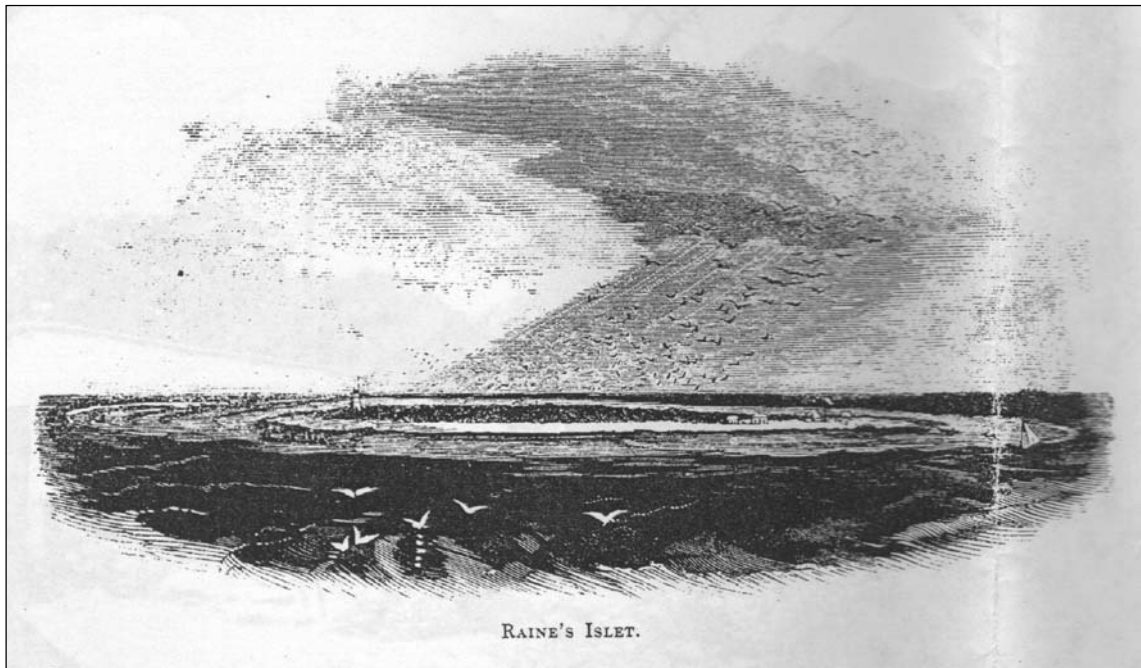
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<sup>2</sup> For example, see D. R. Stoddart *et al.*, ‘Forty-five years of change on low wooded islands, Great Barrier Reef’, *Philosophical Transactions of the Royal Society of London*, Part B, Vol. 284, 1978, pp. 63-80; P. G. Flood, ‘Variability of shoreline position on five uninhabited islands of the Capricornia Section, GBRMP’, in W. T. Ward and P. Saenger (eds), *The Capricornia Section of the Great Barrier Reef: past, present and future*, Brisbane, The Royal Society of Queensland and ACRS, pp. 17-23; see also the evidence found in various archival files in SRS5416/1 Box 62, QSA.

<sup>3</sup> Lawrence and Cornelius, ‘History, relics and tower graffiti’, p. 1.

<sup>4</sup> J. B. Jukes, *Narrative of the surveying voyage of H.M.S. Fly*, Vol. 2, T. and W. Boone, London, 1847, p. 266; Lawrence and Cornelius, ‘History, relics and tower graffiti’, p. 4.

<sup>5</sup> I. Loch, ‘Raine Island: a foul hen roost’, *Australian Natural History*, Vol. 1, Part 5, Winter 1984, pp.181-183, p. 182.



*Figure 6.1.* Raine Island as sketched by Jukes in 1844.

*Source:* J. B. Jukes, *Narrative of the surveying voyage of H.M.S. Fly*, Vol. 2, T. and W. Boone, London, 1847, p. 266.

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*Figure 6.2.* Plan of the Raine Island beacon.

*Source:* D. Lawrence and J. Cornelius, 'History, relics and tower graffiti', in A. K. Smyth *et al.* (eds), *Raine Island and environs, Great Barrier Reef: quest to preserve a fragile outpost of nature*, Raine Island Corporation and GBRMPA, Brisbane, 1993, pp. 1-11, p. 11.

total height of the structure to 63 feet.<sup>6</sup> The large size of this structure, on a relatively small island (approximately 850 × 430 metres), indicates that Raine Island sustained a significant geomorphological impact as a result of the quarrying of the phosphatic rock, as Hopley has acknowledged.<sup>7</sup> In addition, the removal of *Tridacna spp.* and *Hippopus spp.* must have occurred on a considerable scale and caused localised depletion of those species. However, these impacts were obscured by the more extensive alteration of the island that took place from 1890-1892 as a result of guano mining.

### **6.3 Guano and rock phosphate mining, 1860-1940**

Guano – the cemented deposits formed by accumulations of bird droppings – and rock phosphate represent natural resources that have been extracted by mining in order to supply phosphatic fertiliser for agriculture. The mining of guano and rock phosphate in the Great Barrier Reef has resulted in many changes in islands, which range from minor modification of vegetation to the alteration of the geomorphology of entire islands.<sup>8</sup> At least ten locations in the Great Barrier Reef have been mined for guano and rock phosphate; these locations are shown in Figure 6.3. A variety of practices occurred in the guano and rock phosphate mining industries: some islands and cays, such as Raine Island, were mined intensively with rapid depletion of the commercial resources. Other cays, such as Upolu and Michaelmas Cays, were used less intensively, but over much longer periods. Therefore, this section describes a group of diverse mining practices, locations and historical periods, based on evidence found in historical books and in the archival files of the QEPA, held at the QSA. Although the operation of the guano and rock phosphate mining industries in the Great Barrier Reef have been documented already – and the details of earlier studies are not repeated here – some additional evidence of the impacts of the industries is presented in this section, which also provides an overview of the main locations and impacts of guano and rock phosphate mining in the Great Barrier Reef.<sup>9</sup>

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<sup>6</sup> Loch, 'Raine Island', p. 182.

<sup>7</sup> D. Hopley, *Geomorphology*, p. 337.

<sup>8</sup> This point has been made by Hopley, 'Anthropogenic influences', p. 35.

<sup>9</sup> H. Heatwole. 'The cays of the Capricornia Section, GBRMP, and a history of research on their terrestrial biota', in W. T. Ward and P. Saenger (eds), *The Capricornia Section of the Great Barrier Reef: past, present and future*, Brisbane, The Royal Society of Queensland and ACRS, pp. 25-44; Hopley, *Great Barrier Reef*, *passim*.

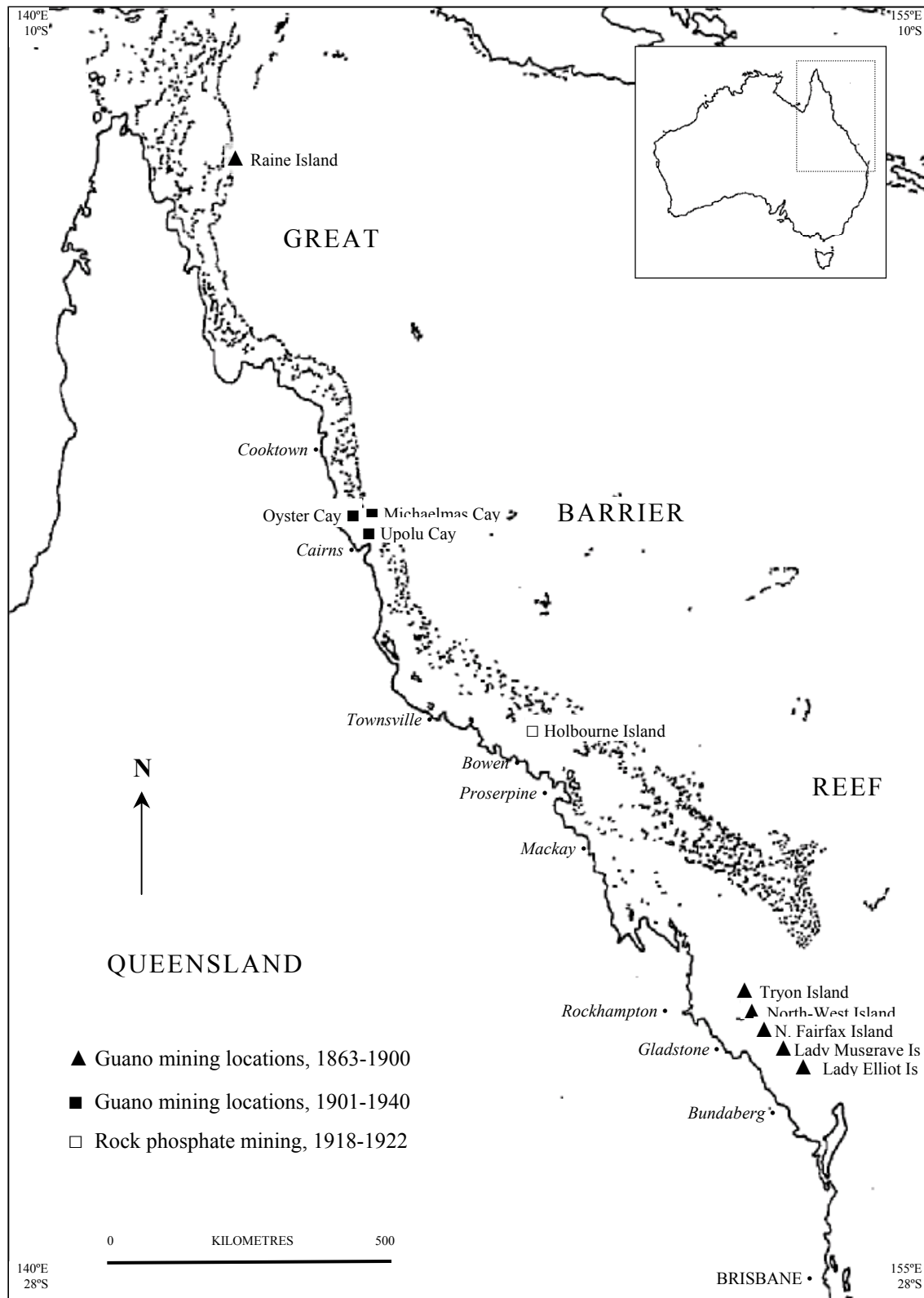


Figure 6.3. Guano and rock phosphate mining locations in the Great Barrier Reef.

The date of the earliest guano mining in the Great Barrier Reef is disputed; one account, by Golding, stated that the industry was pioneered by William L. Crowther, of Hobart, who applied to the New South Wales Government for licences to mine guano from Wreck Reef and Cato's Bank in 1861.<sup>10</sup> Golding claimed that, before the permits were issued, Crowther had commenced removing guano from Wreck Reef; one hundred tons of guano had been loaded onto the *Harp* when that boat was shipwrecked on the reef. Informal mining of this type probably took place in the period before the 1860s, when the industry became established, and also in subsequent decades, because control of the industry was hindered by political disputes about the jurisdiction of the offshore islands in the Great Barrier Reef.<sup>11</sup>

The first instance of licensed guano mining took place at Lady Elliot Island, from 1863-1873. In 1863, a tender to mine guano from the island by Mr J. Askunas was granted, at a cost of £300 per year; in 1864, Askunas transferred his lease to Crowther, who continued the operation.<sup>12</sup> After extraction from the island, the guano was dried, broken down and collected into sheds before being loaded onto barges, and a system of tramways, sheds and moorings for the barges was constructed. The impact of guano mining on the island was severe; a layer more than 2.5 metres thick was removed from the surface of the island and, more than a century later, Hopley wrote that little of the original vegetation remained.<sup>13</sup> Heatwole, similarly, found that the environment of Lady Elliot Island had been significantly disturbed; he stated that most of the vegetation and surface material had been removed by the industry, and 'old diggings, tramways, washing mounds and wells' were still detectable. Indeed, Heatwole concluded, 'Lady Elliot Island's prime ecological value is as a reminder of how destructive uncontrolled human activities can be to a coral cay, and of how prolonged those effects can be.'<sup>14</sup>

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<sup>10</sup> W. R. Golding, *Beyond horizons*, Wholesale Book and Library Suppliers, Brisbane, 1979, pp. 77-78.

<sup>11</sup> For additional details, see F. W. S. Cumbræ-Stewart, *The Boundaries of Queensland: with special reference to the maritime boundary and the Territorial Waters Jurisdiction Act, 1878*, Government Printer, Brisbane, 1930; J. F. G. Foxton, 'The Land Act, 1897, and The Pastoral Leases Act of 1869', *QVP*, Vol. 3, Part 2, 1898, pp. 903-906, p. 904; Golding, *Beyond horizons*, pp. 77-78.

<sup>12</sup> QNPWS (Queensland National Parks and Wildlife Service), *Capricornia Cays NP Management Plan*, QNPWS, Brisbane, 1999, p. 5; A. Walsh, *Lady Elliot: first island of the Great Barrier Reef*, Boolarong Publications, Brisbane, 1987, pp. 30-32.

<sup>13</sup> Hopley, *Geomorphology*, p. 340; Lawrence *et al.*, *Great Barrier Reef*, p. 20.

<sup>14</sup> Heatwole, 'Cays of the Capricornia Section', pp. 39 and 41.

After the operation at Lady Elliot Island ceased in 1873, a break occurred in guano mining. However, a decade of further, intensive guano mining took place from 1890-1900. During that period, several other islands were mined in the Capricorn-Bunker Group, and mining also commenced at Raine Island. Previously, during his visit to Raine Island in 1844, Jukes had commented on the enormous numbers of birds on the island, which produced ‘a vast deposit of guano little inferior in quality and value to the famous Peruvian variety’.<sup>15</sup> In 1865, Crowther was issued with a licence to remove guano from Raine Island for seven years; his lease was subsequently transferred to the Anglo-Australian Guano Company and, in 1871, the lease was renewed.<sup>16</sup> Some uncertainty exists about whether guano mining took place at Raine Island during the period between the issue of this licence and the commercial operation that commenced in 1890; Loch claimed that, although leases for guano mining were granted for Raine Island as early as 1862, the island was not mined at that time, because of doubts about the commercial viability of the guano deposits.<sup>17</sup>

While the activities of the earlier period are uncertain, many documentary sources indicate that intensive guano mining took place at Raine Island from 1890-1892. The operations, carried out by J. T. Arundel and Company, under the management of Albert Ellis, employed a large indentured labour force – of approximately 100 Chinese and Malay workers – and 10 European supervisors.<sup>18</sup> The huts, tramway, locomotive and jetty were installed at this time in order to transport ‘tens of thousands of tons of phosphate’ from the island to the ships.<sup>19</sup> By 1892, however, the mining ceased and the huts, tramway and jetty were removed from the island. A depression, created by the open cast mining, remained in the centre of the island, which is still visible and appears on recent maps, as Figure 6.4 exemplifies. Hopley regarded the damage to Raine Island as probably the most devastating impact on any of the islands of the outer Great Barrier Reef; the island was ‘completely altered’ by the removal of the guano.<sup>20</sup>

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<sup>15</sup> Jukes, *Narrative of the surveying voyage of H.M.S. Fly*, p. 266.

<sup>16</sup> Golding, *Beyond horizons*, pp. 80 and 82.

<sup>17</sup> Loch, ‘Raine Island’, p. 183.

<sup>18</sup> Lawrence and Cornelius, ‘History, relics and tower graffiti’, p. 5.

<sup>19</sup> Loch, Raine Island, p. 183; see also Hopley, ‘Anthropogenic impacts’, pp. 34-35.

<sup>20</sup> Hopley, *Geomorphology*, pp. 335 and 337.

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*Figure 6.4.* Map of Raine Island, showing the central depression created as a result of guano mining.  
*Source:* C. J. Limpus, 'The Reef: uncertain land of plenty', in H. J. Lavery (ed), *Exploration north: a natural history of Queensland*, rev. edn., Lloyd O'Neil, South Yarra, 1978, pp. 187-222, p. 213.

In addition to the operations at Raine Island, guano mining took place in the Capricorn-Bunker Group of islands, where profound impacts on vegetation were sustained as a result of the industry. During the 1890s, mining was carried out at North Fairfax, North-West and Lady Musgrave Islands, although the degradation caused at each of these islands was less severe than the earlier destruction at Lady Elliot Island; yet some evidence of guano mining remains in the landscape of these islands.<sup>21</sup> In particular, extensive guano mining occurred at North Fairfax Island; one report by a NP Ranger, written in 1936, stated that the island ‘has been worked very extensively many years ago and large quantities of guano have been removed.’<sup>22</sup> The NP Ranger also stated that, by 1936, all of the commercially viable guano had been removed, and he reported that the mining had extended over almost the entire island and only a few acres in the centre of the island remained undisturbed: this central part formed the only section of the island where any vegetation remained, which consisted only of *Pisonia umbellifera*.

One account of guano mining at North Fairfax, North-West and Lady Musgrave Islands was provided by Ellis, in 1936, which stated that:

[North] Fairfax Island was a difficult place to work [...]. The phosphate guano too was much mixed with immense quantities of coral slabs and shingle; the large piles of this material left on the island are good evidences as to the amount of labour we put in. Operations on a minor scale were carried on at Lady Musgrave at the same time, a ketch being employed to lighter cargoes across to the sailing vessels loading at the other island. [...].

A prospecting trip round the Capricorn Group was carried out on the cutter *Lorna Doone* during 1898. Deposits of medium quality were found on North-West Island. These were worked when Fairfax was finished.<sup>23</sup>

Of these three islands, particular degradation occurred at North-West Island, which was mined from 1898-1900, as the QNPWS stated.<sup>24</sup> Golding reported that the labour force comprised 107 Asian workers and 5 Europeans, and the infrastructure included a tramway that was laid across the island and a jetty that was built to the edge of the

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<sup>21</sup> QNPWS, *Capricornia Cays NP Management Plan*, pp. 5-6; see also OHC 44, 4 December 2003, p. 4.

<sup>22</sup> In-letter Ref. 225/2, NP Ranger to Sec., 6 October 1936, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA, p. 2.

<sup>23</sup> Ellis, *Adventuring in coral seas*, p. 162.

<sup>24</sup> QNPWS, *Capricornia Cays NP Management Plan*, p. 5.

reef.<sup>25</sup> In November 1899, 550 tons of guano were shipped on the *Van Royal* and another boat – the *Silas* – carried 1,100 tons from the island; Golding stated that, by February 1900, a total of 4,146 tons of guano had been removed from the island: most was exported to New Zealand.<sup>26</sup> As a result, Heatwole described North-West Island as ‘the most disturbed of the uninhabited islands’ in the Capricorn-Bunker Group.<sup>27</sup>

Of the other islands in the Capricorn-Bunker Group, Lady Musgrave Island was worked by guano miners during the 1890s, but little is known about the scale of that operation. Tryon Island was probably mined for guano from 1898-1900, but Heatwole suggested that those operations must have been small, since few indications of mining remain in the landscape.<sup>28</sup> The NP Ranger who visited Hoskyn Island in 1936 reported that ‘only a few tons of low grade guano occurred’ and, probably, neither of the Hoskyn Islands were mined for guano; in contrast to the higher-grade guano deposits worked at Lady Elliot and North-West Islands, the extraction of material from the Hoskyn Islands was not economically viable. By 1900, the most intensive guano mining had ceased, in Hopley’s view, because the commercial resources had been rapidly exhausted.<sup>29</sup>

However, guano mining continued after this date at Michaelmas, Oyster and Upolu Cays, near Cairns, in a less intensive manner, but for longer periods.<sup>30</sup> In 1901, Captain Robertson was granted a 21-year lease by the Queensland Government to mine Oyster Cay, ‘on which there is a large deposit of guano’. One report claimed that, over the period of his lease, Robertson removed ‘over a thousand tons of deposit’ from Oyster and Upolu Cays.<sup>31</sup> No evidence was found to indicate that the guano was used to fertilise sugar cane fields on the adjacent Queensland coast, however, exports of the product were recorded: for example, to Japan.<sup>32</sup> The operation raised public concerns about the destruction of the cays; one individual wrote to the Queensland Minister for Mines, asking, ‘Could you do anything to prevent Upola Bank [*sic*] and Oyster Cay on

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<sup>25</sup> *Brisbane Courier*, 9 February 1900, cited in Golding, *Beyond horizons*, p. 90; see also Lawrence *et al.*, *Great Barrier Reef*, p. 20.

<sup>26</sup> Golding, *Beyond horizons*, pp. 90-91.

<sup>27</sup> Heatwole, ‘Cays of the Capricornia Section’, p. 28.

<sup>28</sup> Heatwole, ‘Cays of the Capricornia Section’, p. 28.

<sup>29</sup> In-letter Ref. 225/2, NP Ranger to Sec., p. 3; Hopley, *Great Barrier Reef*, p. 20.

<sup>30</sup> QNPWS, *Michaelmas and Upolu Cays NP Management Plan*, QNPWS, Brisbane, 1998.

<sup>31</sup> *The Cairns Morning Post*, 28 May 1901, p. 2; Loch, ‘Michaelmas Cay’, p. 5.

<sup>32</sup> See, for example, the statistics provided in *SSQ*, 1920, p. 111.

the Barrier Reef being destroyed by removing the coral and guano from these banks?’<sup>33</sup> Nevertheless, the mineral leases for these cays were renewed, in 1922, and the removal of guano continued.<sup>34</sup>

By 1918, an alternative source of phosphate to the guano obtained from the cays of the Great Barrier Reef had been discovered: the rock phosphate deposits found on Holbourne Island, near Bowen.<sup>35</sup> During the First World War, superphosphate for agricultural fertiliser was sold in Queensland at a cost of £8 per ton; some investors considered that the Holbourne Island material might form a cheaper source of phosphate. The Holbourne Island Phosphate Co. Ltd. was formed to investigate and work the deposits for the Australian and New Zealand markets; an advertisement for their fertilisers is reproduced in Figure 6.5. The company took over Holbourne Island Guano Licence No. 1, which was held previously by Messrs. A. Junner and W. M. Gall; that lease was reissued as Mineral Leases Nos. 66 and 67 which and subsequently replaced by Mineral Lease No. 73.<sup>36</sup> An initial geological survey suggested that around 400,000 tons of phosphate were found on the island; a settlement was then constructed on the island, a tramline was laid, the quarried material was carried to the beach using horses and the phosphate was transported to barges using punts.<sup>37</sup>

Phosphate mining at Holbourne Island commenced in 1918, but the grade of the phosphate was found to be too low to supply the inter-state and international markets profitably.<sup>38</sup> However, the material was suitable for local markets, and phosphate was transported from the island, via Bowen, to Brisbane and Townsville for processing. The material was transported in small barge-loads; for example, one source recorded the import of 25 tons 4 cwt of phosphate to Bowen Harbour by the A.U.S.N. Co. Ltd. in May 1918.<sup>39</sup> In total, 450 tons of material were removed from the island in 1918; in 1919, the amount increased to 850 tons. However, in 1920 the annual yield declined to

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<sup>33</sup> In-letter, Mr F. H. Dean, Kuranda to Mr. Atherton, Min. for Mines, Qld. Dept. of Mines, Brisbane, 20 November 1931, PRV8340/1 Item 1, QSA.

<sup>34</sup> Loch, ‘Michaelmas Cay’, p. 5.


<sup>35</sup> This paragraph uses information obtained from an undated edition of 1941 of *The Bowen Independent*, reprinted in *The Bowen Independent*, 29 January 1971, p. 4.

<sup>36</sup> E. C. Saint-Smith, ‘Geological survey report: rock phosphate deposit on Holbourne Island, near Bowen’, *Queensland Government Mining Journal*, Vol. 20, 15 March 1919, pp. 122-124, p. 123.

<sup>37</sup> Saint-Smith, ‘Geological survey report’, pp. 122 and 124.

<sup>38</sup> ‘Shipment of phosphates’, *The Bowen Independent*, 22 February 1919.

<sup>39</sup> Harbour Board, Bowen, Statistical Book No. 1, July 1915 – February 1926, RSI5551/1 Item 1, Statistical books, QSA.



**HOLBOURNE  
ISLAND  
PHOSPHATES**

*Natural Sea-Bird Manure*

Holbourne Island Phosphates is a natural seabird manure from Holbourne Island, North Queensland. It is a widely used fertiliser that gives profitable results to Agricultural Men throughout the State. It analyses 17% Phosphoric Acid and 10% Lime, and these elements make it a splendid plant food and soil invigorator. Remember it is a NATURAL fertiliser, and one in which you can place full confidence as to results. Write for free illustrated pamphlet.

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FOR QUOTATIONS !!

**Australian Co-operative Fertilisers  
LIMITED**

Head Office—Roma Street Brisbane  
Northern Branch—Box 291 G.P.O. Townsville

Figure 6.5. An advertisement for Holbourne Island phosphates, 1921.

Source: *The Australian Sugar Journal*, 5 August 1921, p. 273, courtesy of Dr. P. Griggs.

450 tons, and in 1921 only 369 tons 10 cwt (valued at £1,570) were shipped.<sup>40</sup> Hence, the industry was short-lived and the company ceased operations at the end of 1921. The following factors contributed to the decline of the industry: (a) high production costs due to unreliable shipping; (b) the high cost of freight to the mainland; (c) the lack of drying facilities on the island, increasing the weight of the shipments; (d) labour and provisioning difficulties; (e) the low tonnage output, and (f) a high proportion of lime contained in the Holbourne Island phosphate, which made the cost of manufacturing superphosphate too high, in comparison with other sources.<sup>41</sup> After 1921, no further working of phosphate took place at Holbourne Island; subsequently, phosphate was imported from Nauru and Ocean Islands and, in the 1970s, the Holbourne Island deposits were declared not commercially viable. In 1982, Hopley indicated that evidence of the rock phosphate quarry remained in the landscape of Holbourne Island.<sup>42</sup>

The impacts that have been sustained in the Great Barrier Reef as a result of guano and rock phosphate mining of have been widespread – occurring in at least ten locations – and prolonged: from 1860 until around 1940. However, those impacts also varied in their intensity as different mining strategies were adopted, and as deposits of varying qualities were worked. The earliest instances of guano mining in the Great Barrier Reef were probably informal and unlicensed; however, by the 1860s, the industry was organised using a system of guano licences and attracted considerable capital investment. The guano at Lady Elliot and Raine Islands was stripped rapidly, and severe geomorphological and ecological transformations occurred at those islands. In 1928, Bedford reported that the descendents of domesticated fowls were found on islands that had been worked for guano, since chickens were kept by the miners as a source of food.<sup>43</sup> At Lady Musgrave Island, ridges on the island, resulting from the removal of guano, were visible to Steers in 1937, and at North-West Island, in the same year, Steers reported ‘noticeable erosion’ of the cay that had been exacerbated, he suggested, by the removal of guano.<sup>44</sup> Hopley argued that, at islands where the geomorphological impacts

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<sup>40</sup> J. C. Linedale, ‘Warden’s report on gold and mineral fields for 1921’, *QPP*, Vol. 2, 1922, pp. 599-604, p. 600; *The Bowen Independent*, 29 January 1971, p. 4.

<sup>41</sup> *The Bowen Independent*, 29 January 1971, p. 4.

<sup>42</sup> In-letter, A.C.F. and Shirleys Fertilizers Ltd. to Sec., Cairns Harbour Board, Cairns, 19 July 1950, RSI13111/1 Item 84, Batches, Harbour Board – Cairns – Leases to ACF and Shirleys, QSA, p. 2; QEPA, *Holbourne Island NP Management Plan*, QEPA, Brisbane, 2003; Hopley, *Geomorphology*, p. 376.

<sup>43</sup> Bedford, *Great Barrier Reef*, no pagination.

<sup>44</sup> Steers, ‘Detailed notes’, pp. 54 and 65.

of guano mining have been severe – especially at Raine, Lady Elliot and North-West Islands – their recovery may take hundreds of years, if in fact those impacts are not irreversible.<sup>45</sup>

By 1900, guano mining had taken place on many other islands in the Capricorn-Bunker group, with significant degradation also occurring at North Fairfax and North-West Islands, although not all of the islands that were mined contained such quantities of guano, nor experienced such devastation. Some evidence indicates that Heron Island may also have been mined for guano; in 1971, the Secretary of the GBRC stated that the vegetation of Heron Island had still not recovered from intensive disturbance as a result of guano mining, and she claimed that up to half the area of the cay may have been eroded following the removal of the guano layer, although no other documentary sources were found to triangulate this report.<sup>46</sup> From 1901, the pattern of guano mining changed; over a longer period of time, Michaelmas, Oyster and Upolu Cays were mined and thousands of tons of guano were removed. In contrast, the more intensive attempt to remove rock phosphate from Holbourne Island proved too costly to sustain although, there also, more than one thousand tons of material were taken. The account of guano and rock phosphate mining presented above, therefore, illustrates the variable nature of early industrial use of the Great Barrier Reef and the consequent, diverse impacts, rates of recovery, and landscape effects.

#### **6.4 Military target practice at Fairfax Island, 1943-1965**

Changes have occurred in the morphology, vegetation and sea-bird populations of Fairfax Island as a result of military bombing practice between 1943 and at least 1965. The use of various locations in the Great Barrier Reef as targets for military bombing and shelling practice, during the Second World War and afterwards, has been discussed in Section 5.7.3, where environmental degradation at Upolu Cay, and at Lady Musgrave and East Fairfax Islands, was considered. While Section 5.7.3 was concerned with changes in coral reefs, military target practice also affected the island habitats,

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<sup>45</sup> Hopley, *Great Barrier Reef*, pp. 19-20.

<sup>46</sup> Mather, 'Statement', SRS5416/1 Box 10 Item 60, NP268, Bunker, QSA, pp. 1 and 5; her evidence indicated that Heron Island has been significantly degraded as a result of guano mining; nevertheless, Heron Island has not been included in Figure 6.3, because no other source described guano mining at that location.

particularly at Fairfax Island, which was used many times as a bombing and shelling target. One report by a NP Ranger, describing the condition of the island before the Second World War, stated that:

one section of Fairfax Island was thickly timbered with *Pisonia umbellifera*, *Pandanus pendunculatus*, and *Casuarina* (Oak); [...] bird life is very plentiful on this island and during the time of his visit the Brown Gannet were nesting there in thousands; and [...] the island is also the nesting place of the Mutton bird during the nesting season.<sup>47</sup>

Yet when the Queensland government Ichthyologist, Mr T. C. Marshall, visited Fairfax Island shortly after 1945, he commented that the gannet rookery there ‘was not one tenth its pre-war size when you could hardly move among the thousands of nests without stepping upon one of them’, and he attributed the decline of the bird population to naval bombing practices during the war.<sup>48</sup>

In October 1953, another report, by C. Roff, described the effects of bombing practice at Fairfax Island; Roff stated that:

Large numbers of the brown gannet, *Sula leucogaster*, are breeding on the island [...]. Birds continue to sit on nests whilst aircraft roar overhead and rockets explode. [...] The gannets still extensively use the island although it has been used as a target area since 1943, and in some instances, apparently during the war years, was actually bombed and shelled. (This is evidenced, in the aerial photograph attached, by the old craters on the right end of the larger of the two islands).<sup>49</sup>

Although Roff did not observe evidence of disturbance to the sea-bird populations, his report refers changes to the morphology of the island: the craters formed as a result of the bombing and shelling. The disturbance to the island due to bombing – and evidence of the repeated breaching of Fairfax Reef – has been acknowledged by Hopley.<sup>50</sup>

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<sup>47</sup> Out-letter Ref. Res. 6181, Sec. to Surveyor and Property Officer, Qld. Dept. of the Interior, Brisbane, 28 April 1949, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA.

<sup>48</sup> Cited in *The Sunday Mail*, 26 July 1953, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA.

<sup>49</sup> C. Roff, ‘Visit to area in which Naval and Fleet Air Arm exercises are conducted off the Queensland coast’, 6 October 1953, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA, p. 2; the aerial photographs mentioned in that report were not found in the archival files consulted at the QSA.

<sup>50</sup> Hopley, *Geomorphology*, pp. 341-342.

One further account of the impacts of bombing at Fairfax Island contains additional evidence of the formation of large bomb craters and the destruction of vegetation; this report, written by Mr. D. Jolly in April 1954, contained the following description:

as the result of the bombing and shelling of the National Park by the Navy, there are some large shell craters at the eastern portion of the island in which an elephant could be buried. Fortunately this area is tree less. On the western portion of the west island are some bomb craters near and among the trees. After the attack on the island by the Navy the trees were almost stripped of leaves.<sup>51</sup>

Further bombing of Fairfax Island took place from 26 August-9 September 1963, inclusive, and an emergency notice of live air bombing and naval gunfire support firings at Fairfax Island was issued to mariners on 23 November 1965.<sup>52</sup> By that date, Fairfax Island had been bombed and shelled for military target practice for more than two decades, and considerable damage to the landscape of the island must have been sustained.

## **6.5 Changes in island vegetation**

Many changes in island vegetation have occurred in the Great Barrier Reef: as a result of the establishment of coconut plantations, from 1892-1900, due to the destruction of native island vegetation – for example, by fire, and through over-grazing by goats – and because exotic vegetation species – such as *Lantana* – have been introduced. These changes are discussed, in turn, in this section; the evidence, which has been gathered primarily from the archival files of the QEPA, held at the QSA, indicates that some islands have been extensively modified because of these changes in their biota.

### *6.5.1 The creation of coconut plantations, 1892-1900*

Significant transformations of many islands of the Great Barrier Reef took place as a result of the introduction of coconut palms, prior to 1900. This activity took place, with

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<sup>51</sup> In-letter, Mr. D. Jolly to Sec., Qld. Forestry Dept., 20 April 1954, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA.

<sup>52</sup> Cited in *Courier-Mail*, 24 August 1963, found in SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA; W. G. Douglas, Regional Controller, 'N.Q. No. 8 of 1965, Queensland-Hervey Bay, Gunnery and bombing area ND (R699) and Northward', Qld. Dept. of Shipping and Transport, Brisbane, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA.

the encouragement of the Queensland government, for various reasons: establishing the plantations represented a source of employment, the coconuts served as a resource for shipwrecked mariners in the Great Barrier Reef, and the plantations provided copra for export. Consequently, from 1892-1900, more than 46 locations were planted with coconut palms, and hundreds of thousands of individual plants were established on islands. Yet the practice of planting coconut palms did not occur uniquely in the Great Barrier Reef; in 1882, Reclus stated that parts of Murray Island, in Torres Strait, were 'clothed with a continuous forest of cocoanut [*sic*] palms, trees which all travellers assure us were not found in Australia before the arrival of the European immigrants.'<sup>53</sup> His account suggests that the formation of coconut plantation accompanied European colonisation and, prior to 1900, may have been a widespread practice.

The creation of coconut plantations on the islands of the Great Barrier Reef dates to at least 1892, when the Queensland Department of Agriculture and Stock (QDAS) requisitioned the cutter, *Lizzie Jardine*, for that purpose. The Annual Report of the QDAS for that year stated that:

planting has been carried on continuously. The system adopted is to first plant the nuts in nurseries, and at the proper time remove them to a permanent position. This method has been followed to secure the plants from the aborigines [*sic*], and to make germination sure. Some 6,700 nuts have been planted out on the islands lying between Mackay and Sir Charles Hardy Island, to the north of Cooktown, and from the latest reports the early plantations are making vigorous growth.<sup>54</sup>

The same report indicated that, by 1892, 6,747 coconut palms had been planted at 52 island locations, some of which received very large numbers of plants; 900 palms were planted on South Palm Island, and 1,064 plants were introduced at 'M' island, between Mackay and the Whitsunday Group. In addition, plantations of other species were created, including mangoes, guavas and Kauri pine.<sup>55</sup>

By the end of 1894, a total of 8,184 coconut palms had been planted on islands of the Great Barrier Reef: 6,984 of these had been planted on islands near Mackay, and the

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<sup>53</sup> Reclus, *Australasia*, p. 364.

<sup>54</sup> P. MacLean, AR, QDAS, 1891-1892, *QVP*, Vol. 4, 1892, pp. 604-605, p. 604.

<sup>55</sup> MacLean, AR, 1891-1892, p. 604.

remaining 1,200 were established near Bowen.<sup>56</sup> In the annual report of the QDAS for the year 1894-1895, MacLean stated:

The accessible islands in the vicinity of Mackay having been planted, and the majority of the plantations being practically out of the danger from fire or molestation by the blacks [*sic*], the base of operations has now been changed to Bowen to deal with the islands in that neighbourhood. The plantations already formed are doing well, no disease or vermin having attacked the young palms. During the past year fresh plantations have been made on Seaforth Island, at Eimeo, at Kennedy Sound, on Brampton, Goldsmith, Allonby, and Stone Islands, and a commencement has been made near Bowen.<sup>57</sup>

During the following year, 72,000 coconut palms were planted on islands; subsequently, in 1896, 222,696 coconut palms were planted.<sup>58</sup> Figure 6.6 illustrates the numbers of coconuts planted from 1894-1900, and also shows the exports of coconuts from Queensland in the following decade, when the palms were producing nuts. However, the distribution of plantations was uneven, as the Registrar-General acknowledged: they were concentrated in the northern part of the Great Barrier Reef, where the plants grew more readily.<sup>59</sup>

In northern Queensland, the islands of the Great Barrier Reef provided suitable habitats for the coconut plantations because of the availability of salt water, seaweed and marine mud; in his annual report for 1895-1896, in which he announced the establishment of one thousand new plantings, MacLean stated: 'Periodical dressings of the plants with sea weed and saline mud, or watering with sea water, has a most beneficial effect upon the plants.'<sup>60</sup> The plantations, therefore, required little capital investment once the coconut palms had been transplanted from the nurseries. However, the industry experienced difficulties as a result of damage caused by visitors to the islands. MacLean stated:

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<sup>56</sup> W. T. Blakeney, AR, Registrar-General, 1894, *QVP*, Vol. 3, Part 2, 1895, pp. 1051-1091, p. 1091.

<sup>57</sup> P. MacLean, AR, QDAS, 1894-1895, *QVP*, Vol. 3, Part 2, 1895, pp. 1015-1025, p. 1019.

<sup>58</sup> W. T. Blakeney, AR, Registrar-General, 1895, *QVP*, Vol. 4, 1896, pp. 477-520, p. 520; W. T. Blakeney, AR, Registrar-General, 1896, *QVP*, Vol. 4, Part 2, 1896, pp. 941-986, p. 986.

<sup>59</sup> Blakeney, AR, 1896, p. 969.

<sup>60</sup> P. MacLean, AR, QDAS, 1895-1896, *QVP*, Vol. 4, 1896, pp. 443-454, p. 448.

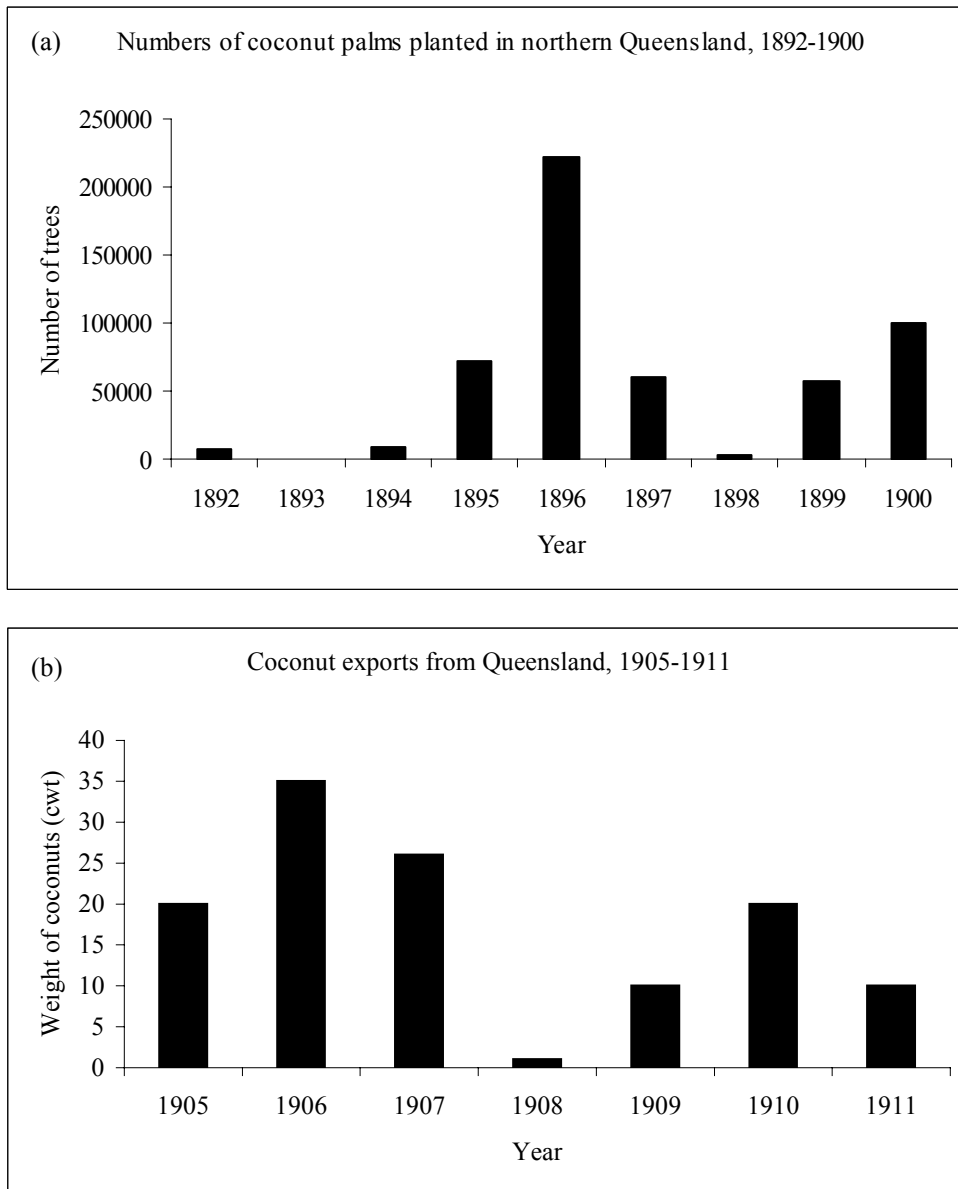


Figure 6.6. (a) Numbers of coconut palms planted in the Great Barrier Reef, 1892-1900; (b) Coconut exports from Queensland, 1905-1911.

Source: Compiled from data provided in the Annual Reports of the two Qld. Registrar-Generals, W. T. Blakeney and J. Hughes, published in *QVP*, 1895-1900, *passim*; MacLean, AR, 1891-1892, p. 604; *SSQ*, 1905-1911, *passim*.

These islands are from time to time visited by bêche-de-mer fishermen and others, who think nothing of leaving a fire burning when they leave an island, and some of them even go so far as to set the grass on fire purposely.<sup>61</sup>

Another source of damage to the early plantations was, reportedly, Indigenous people who visited the islands and who were accused of firing the vegetation and of removing the young plants in order to take the nuts.<sup>62</sup>

By 1897, a large plantation had been formed at Shaw Island, near Kennedy Sound, comprising three smaller plantations.<sup>63</sup> At that stage, MacLean reported that the prospects for the industry were good, stating:

In these cocoanut [*sic*] plantations the foundation of a profitable industry has been laid that could be fostered and built up to the advantage of all concerned without taking into account the great blessing that some of these palms may prove to any shipwrecked crews that may be thrown upon the otherwise rocky and barren islands off our coast.<sup>64</sup>

By the end of 1898, the number of established coconut plantations had reached 72, at separate locations on 47 islands, ranging from the Whitsunday Group to Sir Charles Hardy Island; the distribution of those islands is shown in Figure 6.7. The total number of plantations increased, and their geographical distribution expanded, since 1892.

In addition to offering a resource for shipwrecked crews, the industry was intended to serve other purposes, both social and economic. MacLean stated:

With regards to the manner in which the conditions of the coast aborigines [*sic*] in this district between Bowen and Mackay could be ameliorated, and at the same time ensure the safety and cultivation of the cocoanut [*sic*] plantations, it is suggested that a station on Carlisle or adjacent land be formed under the care of a married couple. A small steam launch, which would be worked as cheaply as a sailing vessel, to be purchased, and the men employed in tending the present plantations, and as opportunity offered extending their area. As a good many of the palms should fruit next year, the females could be employed in the preparation of copra and fibre.<sup>65</sup>

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<sup>61</sup> MacLean, AR, 1895-1896, p. 448.

<sup>62</sup> P. MacLean, AR, QDAS, 1896-1897, *QVP*, Vol. 4, Part 2, 1897, pp. 903-916, p. 912.

<sup>63</sup> MacLean, AR, 1896-1897, p. 912.

<sup>64</sup> P. MacLean, AR, QDAS, 1897-1898, *QVP*, Vol. 3, Part 2, 1898, pp. 1035-1041, p. 1039.

<sup>65</sup> MacLean, AR, 1897-1898, p. 1039.

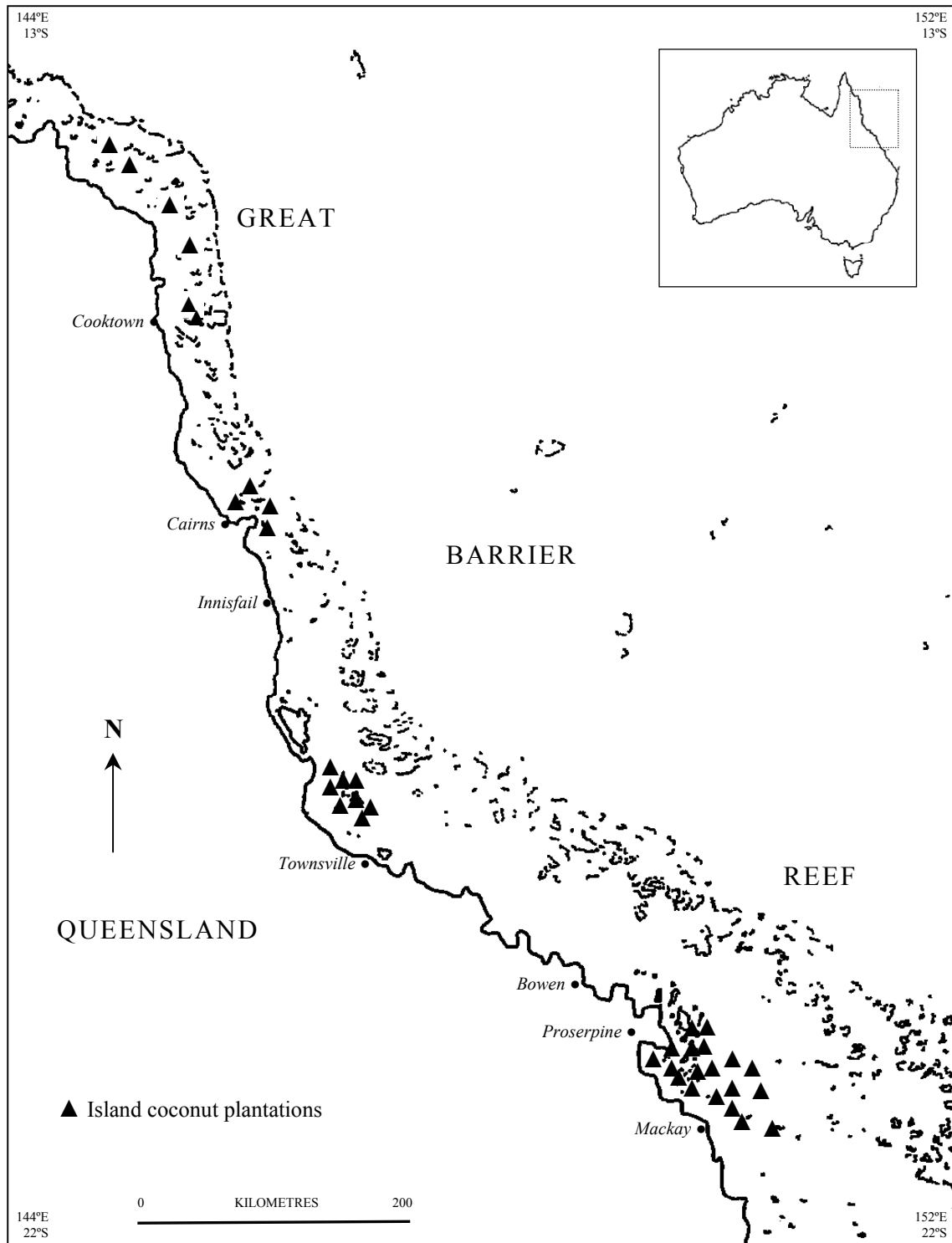


Figure 6.7. The distribution of island coconut plantations in northern Queensland, 1898.

Source: Compiled from data provided in P. MacLean, AR, 1897-1898, *QVP*, Vol. 3, Part 2, 1898, pp. 1035-1041, p. 1039.

He also reported that the initiative for the establishment of these coconut plantations was derived from the Hon. R. Philp. By 1898, however, the northern plantations had been planted, but not cultivated, and had not yet contributed to the revenue of the colony.<sup>66</sup> By 1900, limited economic benefits had been reaped from the coconut plantations, although J. Hughes, the Registrar-General, acknowledged that the plantations were still at that stage very young.<sup>67</sup>

During the subsequent decade, despite the large number of coconut palms planted on Great Barrier Reef islands, the export of coconuts and copra took place on a comparatively small scale in northern Queensland. Figure 6.6 shows the size of the coconut exports from Queensland, from 1905-1911, as reported in the *SSQ*; the major destinations for the produce were Western Australia, Victoria, South Australia and the Arru Islands. From 1902-1916, copra was also exported from Queensland; the copra trade was greatest in 1906, when 2,904 cwt were exported from Queensland to Victoria; like the trade in coconuts, however, the Queensland copra export quantities were small in comparison with the produce of some Pacific island states, of which 6,572 cwt were shipped via Queensland in 1907.<sup>68</sup> The comparatively low export quantities suggest that the majority of the coconuts that were grown remained in Queensland, though official reports of the Queensland government do not indicate the destination of the produce. Yet although the Queensland coconut industry was economically insignificant, in comparison with other industries, the plantations represented a significant modification of the landscapes of those islands of the Great Barrier Reef where they were established. Figure 6.8 illustrates the coconut plantation at Palm Island; these photographs indicate the scale of the vegetation clearance and modification that was involved in creating a plantation. At many islands, the coconuts became firmly established as part of the vegetation; numerous reports, written several decades after the palms were planted, describe the survival – and even, at Rabbit Island, the expansion – of the plantations.<sup>69</sup>

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<sup>66</sup> J. Hughes, AR, Registrar-General, 1898, *QVP*, Vol. 2, 1898, pp. 725-779, p. 758.

<sup>67</sup> J. Hughes, AR, Registrar-General, 1900, *QVP*, Vol. 4, Part 1, 1900, pp. 209-270, p. 249.

<sup>68</sup> *SSQ*, 1907, p. 264.

<sup>69</sup> In-letter, A. Busuttin, Brampton Island to Land Commissioner, Mackay, 1 October 1935, NP488 Ingot – Brampton Island, QSA refers to the coconut plantation at Brampton Island; F. Clune, *Free and easy land*, Angus and Robertson, Sydney, 1945, p. 245 describes the abundance of coconut palms at Green Island; Memo Ref. GJS/CRB, District Forester, Mackay to Sec., 18 January 1963, SRS5416/1 Box 51 Item 334, NP548, Ossa – Rabbit Island, QSA mentions the Rabbit Island plantation; In-letter Ref. 2A/NGR, S. K. Robinson, Rabbit Island to Sec., Land Admin. Board, 8 February 1938, SRS5416/1 Box 51 Item 334, NP548, Ossa – Rabbit Island, QSA, p. 1 stated that additional coconut palms were planted at Rabbit Island.



*Figure 6.8.* Two photographs showing the coconut plantation at Palm Island, c.1920.

*Source:* Photographs Refs. 3741 and 3738 T.B., SRS57/1 Item 26, Queensland Primary Production, Industry, Architecture, Views and People (Photograph Albums), Cairns and District – Barron Falls, Kuranda, Green Is., Atherton Tableland, Malanda, Port Douglas, QSA.

### 6.5.2 Impacts of introduced goats

Significant destruction of native island vegetation occurred at many islands of the Great Barrier Reef due to the introduction of goats (*Capra hircus*). Numerous documentary sources provide evidence of the impacts of goats, as the account presented below indicates; several oral history sources have also referred to damage caused by goats.<sup>70</sup> Brennan has described the impacts of goats at Brampton, South Percy and North Keppel Islands, acknowledging that the goats altered the vegetation of those islands over a period of eighty years: reducing the cover of grass and heath species, and creating scalds; in turn, those impacts exacerbated erosion and facilitated the spread of exotic plant species.<sup>71</sup> Brennan argued that the impacts of goats were greatest on oceanic, rather than continental, islands, because the biota of the former are more susceptible to disturbance than the latter. The evidence presented here suggests that, even on continental islands, the presence of goats transformed island landscapes and native vegetation was only able to recover after the goat populations had been eradicated.

Goats were introduced to islands of the Great Barrier Reef for several reasons. During the period of early European exploration of the Great Barrier Reef, the animals provided a resource for shipwrecked mariners, as one oral history informant, a zoologist, stated:

goats were in many cases left behind by mariners. The early survey vessels and the early guano vessels and whalers – and the guano vessels and whalers tended to be the same vessels – left goats in a number of locations, and coconut trees, for those reasons: that if people got shipwrecked, they had a goat to eat and they had a coconut to provide them with some sort of a liquid.<sup>72</sup>

The same informant stated that goats were also introduced to Lady Elliot Island, from 1863 to 1873, and at Lady Musgrave Island during the 1890s, by lighthouse keepers and guano miners, as a source of milk and meat: goats were present at the latter island until 1974, when they were eradicated.<sup>73</sup>

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<sup>70</sup> In particular, this account is based on archival files of the QEPA relating to the island NPs; additional material was obtained from several island NP *Management Plans*, published by the QEPA and the QPWS, from historical books and from oral history interviews, especially OHC 41, 12 November 2003.

<sup>71</sup> Brennan, 'Forest history', pp. 334-335.

<sup>72</sup> OHC 41, 12 November 2003, p. 5; see also ORAL TRC3178, Interview with Syd Curtis, December 1994 – June 1995, NLA, p. 147.

<sup>73</sup> QNPWS, *Lady Musgrave Island: visitor information*, QNPWS, Brisbane, 1999.

In addition to Lady Elliot and Lady Musgrave Islands, goats were introduced to many other islands. In 1926, at North Keppel Island, one report stated:

Mr Walls, Senior, a resident of the island, was interviewed. He stated that a small herd of goats existed on the island when he arrived in 1926. Soon after he introduced Sannean goats as a milking herd. He stated that the feral goat herd then began to increase until it stabilized at the present population of approximately 700 to 1,000 goats.<sup>74</sup>

In 1935, goats were found grazing on Digby, Percy, North Palm and Grassy Islands; the latter island, found in the Whitsunday Group, was reported to have at least six hundred goats present in 1936.<sup>75</sup> In the same year, large herds of goats were found ‘on Lady Musgrave and near-by islands’; the animals were also found on Penrith Island, in the Whitsunday Group, and on the northern part of Long Island. When Boyd Lee left Grassy Island, in 1938, one report stated that he ‘left behind several hundred goats, half a dozen cows, several bulls, a horse, and poultry’; the goats, however, had escaped from their enclosure and were running loose on the island, as Figure 6.9 illustrates.<sup>76</sup>

An account of 1950 reported that goat herds were present on Orpheus and North Palm Islands and also indicated that the deliberate transfer of animals between islands took place; this account stated that:

Goats and pigs have been raised on Orpheus and have gone wild. Some years ago a batch of goats was transferred from Orpheus to North Palm and these have increased greatly in numbers, much to the satisfaction of the fishermen.<sup>77</sup>

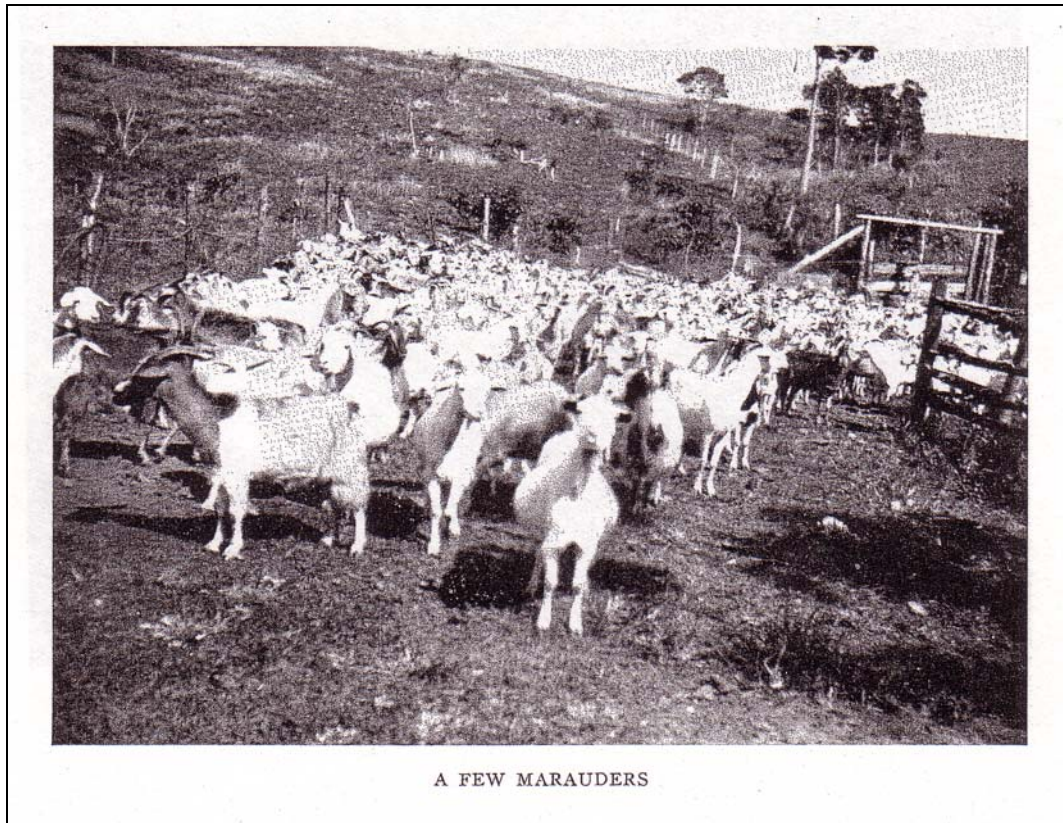
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<sup>74</sup> Cited in In-letter, J. McEvoy, Senior Zoologist, QNPWS to Acting Dir., Research and Planning Branch, 28 November 1975, SRS5416/1 Box 38 Item 243, NP612, Keppel – North Keppel Island, QSA, p. 1.

<sup>75</sup> Out-letter Ref. 2A/CT 225/35, Acting Dir. of Forests to Chairman, Land Admin. Board, 1935, SRS5416/1 Box 7 Item 44, NP509-518, Beverley – Beverley Group of Islands, QSA, p. 2; D. Birtles, *North-west by North: a journal of a voyage*, Jonathan Cape, London, 1935, pp. 101 and 153; N. Caldwell, *Fangs of the sea*, Angus and Robertson, Sydney, 1936, p. 39.

<sup>76</sup> Out-letter Ref. 895(3) 225/2, A. H. C., Acting Dir. of Forests to Chairman, Land Admin. Board, Brisbane, 18 December 1936, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA; Memo Ref. 11579 NPR, E. McKeown, NP Ranger, Tully to Sec., Qld. Forestry Sub-Dept., Brisbane, 17 December 1936, SRS5416/1 Box 44 Item 279, NP541-542 Marton, QSA, p. 2; In-letter, E. McKeown, NP Ranger, Tully to Sec., Qld. Forestry Dept., c.1940, SRS5416/1 Box 45 Item 286, NP242, Molle ‘A’, QSA; N. Caldwell, *Titans of the Barrier Reef: further adventures of a shark fisherman*, Angus and Robertson, Sydney, 1938, p. 136.

<sup>77</sup> P. Elliot, *Smoked mackerel: a tale of the Coral Sea and the Great Barrier Reef*, Robert Hale Ltd., London, 1950, p. 9.



*Figure 6.9.* Introduced goats at Grassy Island, Whitsunday Group, 1938.

*Source:* N. Caldwell, *Titans of the Barrier Reef: further adventures of a shark fisherman*, Angus and Roberston, Sydney, 1938, facing p. 124.

Two other reports, written in 1956 and 1962, indicated that small herds of goats were also present at North Molle and Saddleback Islands respectively.<sup>78</sup>

A substantial amount of documentary evidence describes the impacts of goats on island landscapes. In particular, the destruction of vegetation at Lady Musgrave Island has been documented since 1928, when Napier provided the following account:

The undergrowth has been completely eaten away by a flock of goats which have inhabited the place for years, whereas every other island that we saw was clad so thickly in its green and tangled robe of grass and weed and low-hung twisted branches that the crossing of it was a long and hot and complicated task. [...] All the undergrowth has long since gone; hardly a weed can be found from one end of the place to the other; every branch has been denuded of its leaves, and even the bark upon the trees has been gnawed away to the height of several feet.<sup>79</sup>

This account was corroborated by another, written in 1936 by the Queensland Acting Director of Forests, who stated that at Lady Musgrave and nearby islands the presence of large herds of goats was threatening both the ‘scenic charm’ of the islands and the native island wildlife; he stated that grazing by goats resulted in the ‘destruction of the grass, herbaceous and shrubby vegetation on the islands [and the] diminution of the normal food for land birds and other Australian animals.’<sup>80</sup>

Also in 1936, the destruction of vegetation at Lady Musgrave Island and other islands of the Capricorn-Bunker Group was described by NP Ranger G. Geoffrey, who reported the presence of ‘about 20 head of goats’ at Lady Musgrave Island, herds of goats in the Bunker Group, and about ‘150 head of goats’ at North Fairfax Island, which were reported to be in very poor condition as a result of lack of food and were eating the roots of *Pisonia* trees in order to survive.<sup>81</sup> The herds found in the Bunker Group were also reported by Geoffrey to be in poor condition; he recommended that the animals should be destroyed because ‘they are only a means of destroying the vegetation on the

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<sup>78</sup> Memo Ref. 62/10334, G. J. Swartz, Forester to District Forester, Mackay, 3 September 1962, SRS5416/1 Box 29 Item 187, NP261, Gloucester – Saddleback Island, QSA; In-letter, NP Ranger, Mackay to Sec., Qld. Dept. of Forestry, 27 April 1956, SRS5416/1 Box 14 Item 88, NP254, Conway, QSA.

<sup>79</sup> Napier, *On the Barrier Reef*, pp. 35-36.

<sup>80</sup> Out-letter Ref. Batch 895(3) 225/2, A. H. C., Acting Dir. of Forests to Chairman, Land Admin. Board, Brisbane, 18 December 1936, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA.

<sup>81</sup> In-letter Ref. 225/2, G. Geoffrey, NP Ranger to Sec., Qld. Forestry Sub-Dept., Brisbane, 6 October 1936, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA, pp. 1-4.

islands.’<sup>82</sup> Steers, in 1937, also described the damage caused by goats at Lady Musgrave Island, although he acknowledged that the damage was less then than in previous years; he stated: ‘A few years ago there was much less vegetation on Lady Musgrave Island; the change has been brought about by a considerable reduction in the number of goats.’<sup>83</sup> In spite of the recommendation by Geoffrey that the goats should be destroyed at Lady Musgrave Island, by 1947, the destruction of the island vegetation by goats was still occurring. Mr Marshall, the Queensland Ichthyologist, stated that ‘at present the above island has become over-run with goats. They have eaten the island bare of grass and are now destroying trees.’ In 1948, an early attempt to eradicate goats from Lady Musgrave Island was made and a NP Ranger reported that all goats on that island were removed and destroyed, although goats were subsequently re-introduced.<sup>84</sup>

Another island that was degraded by goats was North Fairfax Island where, in 1953, C. Roff investigated the impacts of military target practice on the island and also reported the effects of a herd of about 80 goats. He stated:

These goats have denuded the island, to the extent that ground-flora could not be found. The only trees on the island are *Pisonia grandis* and one solitary oak, *Casuarina equisetifolia*. The lower foliage of *all* the *Pisonia* trees has been extensively eaten to as far as the goats can reach and climb up the trees. No regeneration in the form of young trees or plants was noticeable on the island, these apparently having been eaten. On the smaller island, goats are not present and this island is covered extensively by both trees and ground-flora. These goats which do not seem to serve any useful purpose are damaging the natural flora on the island.<sup>85</sup>

More than a decade later, in 1965, a NP Ranger reported that the *Pisonia* trees of Fairfax Island were still being grazed by goats.<sup>86</sup>

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<sup>82</sup> In-letter Ref 225/2, A. H. C., Acting Dir. of Forests to Chairman, Land Admin. Board, Brisbane, 17 November 1936, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA.

<sup>83</sup> Steers, ‘Detailed notes’, p. 55.

<sup>84</sup> Out-letter Ref. 47/20202M (Lands) 2A/MC, A. G. M. to V. B. H., 30 June 1947, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA; Out-letter Ref. 4A/MB, Sec. to Forester E. Lister, Bundaberg, 18 October 1948, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

<sup>85</sup> C. Roff, ‘Visit to area in which Naval and Fleet Air Arm exercises are conducted off the Queensland coast’, 6 October 1953, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA, emphasis in original.

<sup>86</sup> Memo Ref. HWH:DMR, NP Ranger, Fairfax Island to Sec., ‘Bird life on Fairfax Island’, 19 October 1965, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA.

Further damage was documented at Lady Musgrave Island during the 1960s, including others impact besides the destruction of vegetation. In 1964, although the goat population had declined to around 18 animals, many ticks were found at the island.<sup>87</sup> In 1966, Peter Ogilvie, a zoologist at the QNPWS counted 14 goats at Lady Musgrave Island, which he argued damaged the vegetation and threatened the gull and bridled tern nesting sites on the cay.<sup>88</sup> However, a research biologist with the QNPWS, H. S. Curtis, stated that the situation at Lady Musgrave Island in 1966 – while still unsatisfactory because of the destruction of vegetation – was an improvement since MacGillivray and Rodway had reported the almost complete destruction of the vegetation, in 1927, by around 200-300 goats; nonetheless, Curtis recommended the removal of the remaining goats in order to allow the surviving vegetation to recover.<sup>89</sup>

Oral history evidence provided by Curtis corroborated this account of extensive damage by goats to island vegetation. He reported that ‘the devastation caused by goats on coral cays is total’, especially at Lady Musgrave Island, which had been ‘denuded of vegetation’ by the animals, and he stated that:

Fairfax Island, which is a double island [...], had lots of goats on both of the islands; [on] the larger of the two you wondered how the goats managed to survive because the vegetation was reduced to a group of mature *Pisonia* trees at one end of the island, trimmed flat underneath, up as high as a goat could reach standing on its hind legs. Other than that it was bare coral rubble with here and there a green sprout of a weed or something germinating, but still too far down amongst the coral for a goat to get at it. And I can only think that they managed to eat seaweed at low tide [...].<sup>90</sup>

Curtis also acknowledged that the vegetation of Lindeman Island was severely affected by goats, since the number of animals at that island was large.

Oral history evidence provided by an informant, a zoologist and environmental manager, gives a consistent impression of the impacts of goats; this informant, however,

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<sup>87</sup> P. H. Anderson, Bundaberg to Sec., Qld. Dept. of Forestry, Brisbane, 12 November 1964, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

<sup>88</sup> Report Ref. 66/18994 N.P., P. Ogilvie, Zoologist, QNPWS, ‘Inspection of Lady Musgrave Island’, 1966, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA, p. 5.

<sup>89</sup> In-letter, H. S. Curtis, Research Biologist to Sec., 12 December 1966, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

<sup>90</sup> ORAL TRC3178, Interview with Syd Curtis, December 1994-June 1995, NLA, pp. 143, 147 and 149.

added that the damage caused by the animals was exacerbated by lighthouse keepers, who cut trees to provide food for starving goats. This informant reported that:

At some locations, the damage was quite significant. [The goats] systematically wiped out all the vegetation on the island. If you go back through the lighthouse keepers' records, there are records which have these little cryptic comments: 'chopped trees to provide food for goats.' Ultimately, between them, they removed everything from the whole island. On other islands, that didn't have human occupation, where [animals] were left, they basically grazed the island so that it was virtually bare, and they browsed the trees to the extent that they could jump up and get the leaves. I've got photographic evidence from Lady Musgrave and Fairfax Islands where you can look across the whole island and it's almost as if someone's shaved the trees off up to a certain level: there's nice green vegetation above that level, and below it there's nothing at all.<sup>91</sup>

As a result of this destruction, the oral history informant also advocated the removal of goats from the island National Parks of the Great Barrier Reef.

In 1969, W. Wilkes, the Secretary of the QNPWS summarised the problem of goats in the Bunker Group National Parks as follows:

A number of National Park islands under control of this Department are suffering from the ravages of goats but little work has been done on the problem to date. It is clear however that they are a serious threat to the vegetation of an island and as exotic fauna it is desirable to eliminate them from the National Parks. Except in the case of very small islands however, this is difficult to accomplish.<sup>92</sup>

One reason why the eradication of goats was difficult to accomplish was the deliberate transfer of some animals between islands, as Julie Booth, a naturalist resident on Fairfax Island, reported in 1969. She stated: 'there have been a large number of campers at Lady Musgrave who visited Fairfax [...]. [They] brought two goats over from the other island, which they were going to leave here.' Consequently, she reported, goats were destroying vegetation at Fairfax Island.<sup>93</sup>

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<sup>91</sup> OHC 41, 12 November 2003, p. 5.

<sup>92</sup> Out-letter Ref. N/LAM 57/40, NP220, W. Wilkes, Sec. to Librarian, Western Australia Dept. of Fisheries and Fauna, Perth, 30 October 1969, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA, pp. 1-2, p. 1.

<sup>93</sup> In-letter Ref. N:MJR, 66/86548, J. Booth, Fairfax Island to W. Wilkes, Sec., 20 May 1969, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA; In-letter, J. Booth, Fairfax Island to W. Wilkes, Sec., 30 September 1969, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA.

Additional details of the destruction of vegetation at Lady Musgrave Island were sent to the Queensland Government Botanist in 1970, in a report which described the limited spread of *Caesalpinia bonduc* (the native plant known as ‘Wait-a-while’) on islands where goats were present. The report stated that, although MacGillivray and Rodway recorded the presence of *Caesalpinia bonduc* at Northwest, Hoskyn and Lady Musgrave Islands in 1927, in the *Reports of the Great Barrier Reef Committee*, by 1970 at Lady Musgrave Island only the seeds of that plant were found. That report acknowledged that ‘the island was in the final stages of devastation by goats.’ In contrast, at Hoskyn Island where no goats were present, *Caesalpinia bonduc* had grown continuously since 1927.<sup>94</sup> At Lady Musgrave Island, the goats remained on the island until their eradication in 1974; elsewhere, the impacts of goats persisted until later, as at North Keppel Island, where in 1975 there remained 800-1,000 goats on the island that were starting to cause erosion on the eastern side of the island by overgrazing.<sup>95</sup>

During the 1970s, in response to substantial evidence of destruction of island vegetation by goats, the systematic eradication of the animals from many islands of the Great Barrier Reef commenced. The Secretary of the Queensland Department of Forestry reported in 1971 that the Department had introduced ‘a policy of management or (where possible) eradication of introduced animals in National Parks. In this context, feral goats were removed from Lady Musgrave, Fairfax and Hoskyn Islands in 1971.’ By 1972, about 500 goats had been destroyed at Brampton Island, with around 150 animals remaining on the island, and goats were also removed from Lindeman Island at around the same time.<sup>96</sup> At Lady Musgrave Island in 1975, one report, by A. B. Gibb, stated:

In the interval between a visit made in June 1969 and the present one in July 1975 goats had been eradicated from the cay. I have been informed by Mr. Curtis that there was a possibility that one

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<sup>94</sup> Out-letter Ref. N:RT, Sec. to the Qld. Government Botanist, Indooroopilly, 7 April 1970, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

<sup>95</sup> In-letter Ref. SL27052, K. J. Cross, Land Inspector, Rockhampton to Land Commissioner, Rockhampton, 28 September 1975, SRS5416/1 Box 38 Item 243, NP612, Keppel – North Keppel Island, QSA; see also QNPWS, *Lady Musgrave Island*.

<sup>96</sup> Out-letter, N. McCloy, Sec. to Mr. H. Frauca, Bundaberg, 19 November 1974, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA; this is corroborated by oral history evidence found in OHC 41, 12 November 2003, pp. 2 and 5-6; see also Memo Ref. JFB:KTM, District Forester, Mackay to Sec., Qld. Dept. of Forestry, Brisbane, 22 August 1972, SRS5416/1 Box 38 Item 241, NP488, Ingot – Brampton Island, QSA..

animal had escaped at the time of the eradication but no goat or any indication of one's presence was seen on the recent visit.<sup>97</sup>

Another major eradication program occurred at South Percy Island, and by 1976, the removal of goats had also been completed at North Keppel Island.<sup>98</sup>

The shooting of goats was carried out by a team that consisted of two QNPWS Zoologists (including Ogilvie) and a Queensland Department of Forestry Overseer. However, the eradication of goats – specifically, the disposal of the carcasses – itself created an environmental problem. Curtis stated that ‘there would be a reasonable chance that you could herd to goats out onto the reef flat at low tide and shoot them and leave the tide to dispose of them’; that method was adopted at other cays in the Capricorn-Bunker Group after the eradication at Lady Musgrave Island was completed successfully.<sup>99</sup> Unfortunately the incoming tide sometimes carried goat carcasses back to the shores of the cays, rather than offshore, and at Fairfax Island one observer reported that ‘our party found the remains of about twenty goats, recently slaughtered and left to rot on the larger island.’<sup>100</sup> Nevertheless, in 1976, a report by J. S. McEvoy, the Senior Zoologist of the QNPWS, about the experimental eradication of goats at North Keppel Island – which contained photographs of the extensive degradation of the eastern foreshore of that island – concluded that eradication programs, if well-organised and conducted with sufficient resources, were an appropriate means of managing the problem of overgrazing by goats.<sup>101</sup>

The impacts of goats on the islands of the Great Barrier Reef on which they were introduced have been contested. Brennan, in his forest history of the continental islands of the Great Barrier Reef, reported that the degradation caused by goats occurred primarily to grasses and that trees were comparatively unscathed; he also argued that

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<sup>97</sup> A. B. Gibb, ‘Report on visit to Lady Musgrave Island’, 7-15 July 1975, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

<sup>98</sup> ORAL TRC3178, Interview with Syd Curtis, December 1994-June 1995, NLA, p. 150; In-letter, Dir. Management and Operations to Mr. E. J. Harten, Beach Protection Authority, QDHM, Brisbane, 2 November 1976, SRS5416/1 Box 38 Item 243, NP612, Keppel – North Keppel Island, QSA.

<sup>99</sup> ORAL TRC3178, Interview with Syd Curtis, December 1994-June 1995, NLA, pp. 147-148.

<sup>100</sup> In-letter, D. P. Scheikowski to Mr. W. Tyson, Qld. Dept. of Forestry, Brisbane, 15 September 1971, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

<sup>101</sup> J. S. McEvoy, Senior Zoologist to Dir., Research and Planning Branch, ‘Report on an experimental attempt to eradicate feral goats from North Keppel Island’, July 1976, SRS5416/1 Box 38 Item 243, NP612, Keppel – North Keppel Island, QSA.

grass communities at several islands recovered quickly after the eradication of goats was completed.<sup>102</sup> However, Brennan's forest history considers only continental islands; oral history evidence indicates that the cays that supported goat populations were severely degraded by overgrazing.<sup>103</sup> In addition, the documentary evidence presented above suggests that, even at the continental islands, substantial damage was inflicted by goats to many vegetation species, including *Pandanus* and *Pisonia* trees. Furthermore, additional environmental impacts that have been described above – including the import of ticks and the disturbance of gull and bridled tern nesting sites at Lady Musgrave Island – were also attributed to the goat populations. Together, these impacts probably constitute a substantial modification of several island habitats.

Nonetheless, after the eradication of the goats, recovery of some island vegetation species commenced. At Lady Musgrave Island, Curtis stated that when he and Ogilvie visited the island in 1966, significant re-growth of vegetation had occurred.<sup>104</sup> Additional details about the recovery of vegetation at Lady Musgrave Island since 1969 were provided by A. B. Gibb in 1975; his report is quoted at length:

The removal of goats has led to a marked increase in ground cover plants. Bare shingle edges and ridges of conglomerate exposed by guano mining had been fairly conspicuous features of the cay during the 1969 visit but are now mostly obscured by ground cover plants. There appears to have been a marked increase in the area occupied by the two thickets of *Caesalpinia bonduc*. The smaller patch is at present approx. 90 × 65 ft. and the larger approx. 330 × 215 ft.

During the 1969 visit nearly all aerial roots of *Pandanus* had their apices damaged by goats and failed to reach the ground. Aerial roots are now developing normally. Several groups of *Casuarina* seedlings were seen whereas none were noted in 1969. *Casuarina* branches frequently sweep the beach area whereas previously all were trimmed to the maximum height of the goats' reach.

In addition to species noted in 1969 the following native or naturalised species were noted in 1975: *Argemone ochroleuca*, *Boerhavia repens*, *Euphorbia tannensis*, *Panicum* spp. [and] *Tournefortia argentea*'.<sup>105</sup>

The consequences of the extensive, prolonged damage caused by goats at Lady Musgrave Island are uncertain; no evidence was found to indicate whether vulnerable or

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<sup>102</sup> Brennan, 'Forest history', p. 335.

<sup>103</sup> ORAL TRC3178, Interview with Syd Curtis, December 1994-June 1995, NLA, p. 143.

<sup>104</sup> ORAL TRC3178, Interview with Syd Curtis, December 1994-June 1995, NLA, p. 147.

<sup>105</sup> A. B. Gibb, 'Report on visit to Lady Musgrave Island', 7-15 July 1975, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

rare plant species recovered after the animals had been removed from the cay. The destruction of vegetation by goats, however, may have caused significant changes in the vegetation communities of several islands in the Great Barrier Reef. The implications of overgrazing on islands are considered in Section 8.4.

### 6.5.3 Clearance of island vegetation

Destruction of vegetation occurred at some islands for firewood and in order to clear land for planting, as several documentary sources indicate; this activity took place since the period of earliest European settlement. As early as 1857, J. S. V. Mein had cleared the centre of Green Island for firewood and for cultivation. Another island to experience vegetation clearance was Dunk Island where, in 1908, E. J. Banfield cleared and burned bloodwood forest in order to prepare land for planting.<sup>106</sup> Later, in 1939, further vegetation clearance occurred at that island as Beach Oak was cut by the crews of trochus luggers in order to supply firewood for their boilers.<sup>107</sup> Clearance of trees on Great Barrier Reef islands also occurred using the method of ringbarking, as V. Grenning, the Queensland Director of Forests, stated in 1951:

Ringbarking and other destruction on the islands not reserved and given the protection of the National Parks Regulations has already caused some marring of what otherwise must be one of the most beautiful spots in the world.<sup>108</sup>

Another method of clearing island vegetation was using fire; in 1952, B. E. Bailey, the Honorary Secretary of the Magnetic Island United Progress Association, reported that Magnetic Island experienced ‘continual burning off by grass and bush fires’, causing the destruction of flora, disturbance to fauna, soil erosion, and sediment and nutrient runoff to the fringing reefs of the island.<sup>109</sup>

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<sup>106</sup> E. J. Banfield, *The confessions of a beachcomber: scenes and incidents in the career of an unprofessional beachcomber in tropical Queensland*, 3rd edn, T. Fisher Unwin, London, 1913, pp. 12 and 43.

<sup>107</sup> J. S. V. Mein, ‘A cruise inside the Great Barrier Reef, in 1857, and discovery of a reef and harbour’, *The Sydney Morning Herald*, 26 February 1866, obtained from the CHS; In-letter Ref. 39/3705, C. Revitt, Hon. Ranger for Bird, Animal and Plant Life, Dunk Island to NP Ranger McKeown, Tully, SRS5416/1 Box 23 Item 131, NP382, Dunkalli, QSA.

<sup>108</sup> Out-letter Ref. 1A:KE 225/5, V. Grenning, Dir. of Forests to Chairman, Land Admin. Board, Brisbane, 24 July 1951, SRS5416/1 Box 58 Item 392, NP274, Shaw ‘A’ – Lindeman Island, QSA.

<sup>109</sup> B. E. Bailey, Hon. Sec., Magnetic Island United Progress Association, Arcadia to Hon. V. C. Gair, Qld. Premier, Brisbane, 30 August 1952, RSI920/1 Item 6, General correspondence batches, QSA.

Further destruction of vegetation was reported in 1954 at Henning and Carlisle Islands, in the Whitsunday Group, where half of the *Casuarina* trees had been destroyed at the northern beach of Henning Island and other *Casuarina* trees had been cut at Carlisle Island. One report, by F. O. Nixon, stated that at Henning Island ‘the wood had been stripped of bark and cut into billets, obviously the work of a crew of a trochus shell boat, several of which are operating in that area’; this destruction was regarded as serious as it would increase the erosion of sand from the beach. Another report written in the same year referred to the cutting of *Casuarina* trees, at the northern tip of Henning Island, stating that all parts of the trees that were large enough for firewood were removed.<sup>110</sup> These reports, together with the other documentary evidence above, indicate that ringbarking, the use of fire, and timber-cutting caused the destruction of vegetation at several islands of the Great Barrier Reef.

#### *6.5.4 Introduction of exotic species of vegetation*

When J. S. V. Mein cleared the centre of Green Island in 1857, that land was used to plant exotic species of vegetation that were obtained from the Botanical Gardens in Sydney, as his account in *The Sydney Morning Herald* indicates:

The centre of the island we had cleared and planted with a lot of things procured from the Botanical Gardens of Sydney. Among the plants were guava, grape vine, Indian corn, pumpkins, radish, turnips, cabbage, &c.<sup>111</sup>

Mein’s alteration of the vegetation composition of Green Island represents an early example of the introduction of exotic species of vegetation to island ecosystems. Many other examples of the introduction of vegetation species are found in documentary records. Before 1931, bananas and pawpaws were planted on Snapper Island, which the QEPA acknowledged probably represented the remains of an early Chinese market garden.<sup>112</sup> In 1933, J. V. Busuttin, the Lessee of the Repulse Islands, stated: ‘I intend to

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<sup>110</sup> In-letter Ref. 54/6815, F. O. Nixon, Sec., ‘Save the Trees’ Campaign, Brisbane to Qld. Forestry Dept., 2 July 1954, SRS5416/1 Box 72 Item 479, NP259 and NP 270, Whitsunday – Henning Island – Includes NP270 Whitsunday, QSA; In-letter, G. T. McLean, McLean Luxury Cruises, Mackay to Sec., Qld. Forestry Dept., 23 June 1954, NP259, Whitsunday – Henning Island, QSA.

<sup>111</sup> Mein, ‘Cruise inside the Great Barrier Reef’; see also GBRMPA, *Green Island Economic Study: Summary Report*, October 1979, Economic Associates Australia, 1979, SRS5416/1 Box 64 Item 434, NP836, Trinity ‘B’ Transfer Batch 4, QSA, Appendix A.

<sup>112</sup> QEPA, *Snapper Island NP and Marine Park: visitor information*, QEPA, Brisbane, 2003.

plant fruit trees on Brampton and Goldsmith if the ground is suitable', and in 1935, NP Ranger McKeown reported that pawpaws and coconuts had been cultivated at Stephens Island. Birtles, describing Snapper Island in 1935, referred to a plantation on the island containing turnips, pawpaws and sweet potatoes.<sup>113</sup>

One banana plantation, at Henning Island in the Whitsunday Group, had a significant impact on the landscape of that island, as a report by NP Ranger McKeown indicated. Prior to 1934, Henning Island had been a 'mostly jungle-covered island', but the Licensee of the Island, Dr. J. Macdonald, cleared five acres of the rainforest on the western slopes, facing the Whitsunday Passage, and established a banana plantation there. By 1936, the bananas were in 'a very dirty and neglected state', and the report stated that the clearing 'has to a large extent spoilt the scenic value of this beautiful island.' By 1938, the banana plants were still in existence at Henning Island and McKeown suggested that borers had been found at the plantation; consequently, in 1938, the eradication of banana plants on the island commenced.<sup>114</sup> A later investigation of Henning Island, in 1961, after the island was gazetted as a National Park, found that the area that had previously been used for the banana plantation had not yet recovered from that disturbance.<sup>115</sup>

One of the exotic species introduced to islands that became a particular source of concern was *Lantana*, which by 1935 was established at Brampton Island. A. Busuttin, the Lessee of that island, reported:

There is a considerable quantity of *Lantana* scattered over the island in places here and there, which appears to have gone beyond the stage where it can be economically cleared by manual labour.<sup>116</sup>

<sup>113</sup> In-letter Ref. 2A/AK (33.46081B), J. V. Busuttin, St. Bees Island to Sec., Land Admin. Board, Brisbane, 6 October 1933, SRS5416/1 Box 45 Item 289, NP246-247, Molle – Repulse Islands, QSA; Cited in Memo, H. S. Curtis to Sec., 14 November 1967, SRS5416/1 Box 38, Item 236, NP807, Hull – Stephens and Sisters Islands – North Island – South Barnard Group, QSA, p. 2; D. Birtles, *North-west by North: a journal of a voyage*, Jonathan Cape, London, 1935, pp. 182-183; Out-letter Ref. 225/39, Dir. to Chairman, Land Admin. Board, Brisbane, 13 August 1937, SRS5416/1 Box 2 Item 10, NP64, Snapper Island, QSA.

<sup>114</sup> Report Ref. 2A/AK, O.L.544, 5 May 1938, NP259, Whitsunday – Henning Island, QSA; Report Ref. 2A/CT, O.L.544, Bowen Land Agent's District, c. 1938, NP259, Whitsunday – Henning Island, QSA; Out-letter Ref. 2A/NGR, O.L.544 Bowen 225/3, Sec., Forestry to Sec., Land Admin. Board, 5 November 1936, NP259, Whitsunday – Henning Island, QSA.

<sup>115</sup> Memo, H. A. Hausknecht, NP Ranger, Mackay to Sec., Forestry Dept., 12 October 1961, NP259, Whitsunday – Henning Island, QSA, p. 1.

<sup>116</sup> In-letter, A. Busuttin, Brampton Island to Land Commissioner, Mackay, 1 October 1935, SRS5416/1 Box 38 Item 241, NP488, Ingot – Brampton Island, QSA, p. 3

Between 1938 and 1940, *Lantana* was found on several other islands in the Whitsunday Group: Lindeman, Haslewood, Henning and South Molle Islands. At Haslewood Island, the *Lantana* infestation was reported to be ‘very heavy over a large area in the vicinity of that once covered by improvements’, while at South Molle Island ‘a good deal of scattered *Lantana*’ was found.<sup>117</sup>

During the 1940s, other exotic species were introduced to islands of the Great Barrier Reef. One invasive species was the prickly pear, which was found at Hinchinbrook Island in 1941 and 1946, and also at Masthead Island. In 1947, the cultivation of pine and coconut trees in Mausoleum and Acacia National Parks by the Lessee of Mausoleum Island was referred to the Queensland Sub-Department of Forestry in an attempt to restrict the spread of pests to island habitats.<sup>118</sup> However, island residents required a source of food and some of the land found on islands was suitable for cultivation; at Magnetic Island in 1950, for example, NP Ranger McKeown stated:

Good sized areas of flat cultivable land run back from several of the largest bays. These areas have been alienated, and are under cultivation, producing pineapples, mangoes and other tropical fruits.<sup>119</sup>

The cultivation of islands, therefore, represented a conflict between the wish of NP officials to conserve native island habitats and the desire of settlers for productive land.

Another infestation of prickly pear was reported in 1951, at Pioneer Point in the Whitsunday Group, and in 1953 a flame-thrower and Diesoline were used in an attempt to control weeds at Long Island, in the Molle Group. In contrast, other exotic species were introduced deliberately, as at Long Island in 1956, when reportedly severe sand

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<sup>117</sup> Report Ref. SL12403 7A:KE, ‘Special conditions’, SRS5416/1 Box 58 Item 392, NP274, Shaw ‘A’ – Lindeman Island, QSA, p. 1; Memo Ref. 225/3, E. McKeown, NP Ranger, Tully to Sec., 6 December 1938, SRS5416/1 Box 72 Item 482, NP269, Whitsunday ‘A’ – Haslewood Island and Surrounds, QSA, p. 2; In-letter Ref. 2A/LC, J. Bergin, Land Commissioner, Mackay to Sec., Land Admin. Board, Brisbane, 30 August 1939, NP259, Whitsunday – Henning Island, QSA; In-letter Ref. SL6792 225/5, J. Bergin, Land Commissioner, Mackay to Sec., Land Admin. Board, Brisbane, 16 October 1940, SRS5416/1 Box 15 Item 90, NP275, Conway ‘A’, QSA, p. 2.

<sup>118</sup> Memo Ref. WJB/LL, J. R. Dawson, District Forester, Tully to District Forester, Atherton, 7 August 1941, SRS5416/1 Box 35 Item 218, NP95, Hecate ‘A’, QSA; Memo Ref. 2A/EM, E. McKeown, NP Ranger to Sec., 12 June 1946, SRS5416/1 Box 35 Item 218, NP95, Hecate ‘A’, QSA; Out-letter Ref. 2A/MC Res. 6505, Sec. to Mr G. P. McDonald, 28 May 1947, SRS5416/1 Box 51 Item 332, NP540, Ossa – Mausoleum Island, QSA; P. G. Flood, ‘Coral cays of the Capricorn and Bunker Groups, Great Barrier Reef, Australia’, *Atoll Research Bulletin*, No. 195, February 1977, pp. 1-7, p. 3.

<sup>119</sup> In-letter Ref. 4876, E. McKeown, NP Ranger, Tully to Sec., Qld. Forestry Dept., 9 May 1950, SRS5416/1 Box 42 Item 265, NP456, Magnetic ‘A’, QSA, p. 1.

erosion at the island's beaches prompted the introduction of marram grass to stabilise the sand.<sup>120</sup> By 1960, the control of some exotic species on islands had become a significant problem; at Brampton Island, a helicopter was used to spray pesticide in an attempt to destroy *Lantana*, which had heavily infested the island, as the District Forester at Mackay described: 'The *Lantana* has spread right through the bush and presents an impenetrable thicket in places.'<sup>121</sup> In the same year, the Lessees of North Keppel Island were required – as conditions of Special Lease 10756 – to clear the island of 'noxious weeds, noxious plants, *Lantana* and prickly-pear within six months.'<sup>122</sup>

The effects of the introduction of exotic vegetation species to some island ecosystems interacted in various ways with other human activities. For example, P. H. Anderson, the Lessee of Lady Musgrave Island, complained in 1966 that he had planted pawpaw and coconut trees on the island and those had flourished until someone brought goats to the island, which destroyed the plantations.<sup>123</sup> At Goold Island, in 1968, the landscape was altered as a result of interactions between deforestation and the spread of weed species; the District Forester at Atherton reported that at Goold Island introduced weeds had been present for more than 50 years, but they were spreading increasingly rapidly as a result of forest clearance.<sup>124</sup> In one report, A. S. Thorsborne, a naturalist, stated:

Introduced weeds are taking over [at Goold Island] because so many trees have been and still are being cut down to supply tent poles and firewood. [...] The sun beats down on the cleared spots and the native plants and shrubs die – in places there is now no vegetation at all and burr and other noxious weeds infest the vegetated parts.<sup>125</sup>

This report indicates that the direct impacts of vegetation clearance were followed by ecological succession once the pre-existing vegetation had been removed.

<sup>120</sup> In-letter, NP Ranger to Sec., 18 June 1951, SRS5416/1 Box 13 Item 82, NP227, Conway, QSA; In-letter, E. McKeown, NP Ranger, Tully to Sec., Forestry Dept., 16 June 1953, SRS5416/1 Box 45 Item 287, NP242, Molle 'D', QSA; In-letter Ref. TB/AP, Forest Ranger, Tully to Sec., Qld, Sub-Dept. of Forestry, 10 February 1956, SRS5416/1 Box 45 Item 287, NP242, Molle 'D', QSA.

<sup>121</sup> Memo Ref. JDM:CRB, District Forester, Mackay to Sec., Qld. Dept. of Forestry, 1 December 1960, SRS5416/1 Box 38 Item 241, NP488, Ingot – Brampton Island, QSA.

<sup>122</sup> 'Conditions of Special Lease 10756', 5 May 1960, SRS5416/1 Box 38 Item 243, NP612, Keppel – North Keppel Island, QSA.

<sup>123</sup> P. H. Anderson, Bundaberg to Sec., Qld. Dept. of Forestry, Brisbane, 1 November 1966, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

<sup>124</sup> Memo Ref. AWG:LMP, District Forester, Atherton to Sec., Qld. Dept. of Forestry, Brisbane, 15 November 1968, SRS5416/1 Box 36 Item 223, NP389, Hecate – Goold Island, QSA, p. 2.

<sup>125</sup> In-letter Ref. 1A:HG, A. S. Thorsborne to Sec., Qld. Dept. of Forestry, Brisbane, 20 October 1968, SRS5416/1 Box 36 Item 223, NP389, Hecate – Goold Island, QSA, p. 2.

Other references to introduced, exotic plant species are found in documentary sources: for example, potatoes and onions planted by campers were found at Lady Musgrave Island in 1975; rubbervine was growing at Holbourne Island in 1998; several exotic species have colonised Hinchinbrook Island, and *Lantana* and sensitive plant grow at Dunk Island.<sup>126</sup> These species introductions may have occurred after 1970 – and, hence, their documentation lies beyond the scope of my research – but the evidence is inconclusive. Nevertheless, the evidence presented in this section suggests that significant changes in island habitats may have occurred as a result of the introduction of exotic plant species, throughout almost the entire period of European settlement, and that further scientific investigation of the vegetation histories of the islands of the Great Barrier Reef is required if those changes are to be reconstructed with greater precision.

## 6.6 Changes in island fauna

Changes in island fauna since European settlement can be categorised in two groups: changes relating to the destruction of birds on islands and transformations of islands resulting from the introduction of exotic species of animals. The latter category includes the introduction of goats at many islands, although that activity is not considered here; changes due to overgrazing by goats have been considered above, in Section 6.5.2, because those impacts were sustained predominantly by island vegetation. This section focuses on the destruction of birds on islands and the introduction of other grazing animals, although various other changes in island fauna are also mentioned.

### 6.6.1 Destruction of birds on islands

Many documentary accounts describe the destruction of birds on islands, especially as a result of shooting and the collection of eggs. Several accounts of the former activity were written for the period from 1944-1974. A letter by Mr. A. M. Lewis to the Queensland Society for the Prevention of Cruelty to Animals (QSPCA), in January 1944, described his observations of ‘people blazing away with a gun at sea-birds’ at Heron Island; another report, written in 1950, referred to parties destroying nesting

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<sup>126</sup> ‘Report on visit to Lady Musgrave Island by A. B. Gibb, 7-15 July 1975’, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA; QNPWS, *Holbourne Island NP Management Plan*, QNPWS, Brisbane, 1998; QNPWS, *Hinchinbrook Island NP Management Plan*, QNPWS, Brisbane, 1999, p. 20; QNPWS, *Family Islands NP Management Plan*, QNPWS, Brisbane, 2000, p. 11.

birds at Wheeler Island, in the Family Group. At Purtaboi Island, in the Family Group, G. S. Stynes of the Dunk Island Tropical Tourist Board reported that ‘shooting has been, and is still taking place on Purtaboi Island [and] many terns have met an untimely death at the hands of shooters.’<sup>127</sup> In 1969, K. McArthur, the Honorary Secretary of the Caloundra Branch of the Wildlife Preservation Society of Queensland, stated: ‘As is usual at this time of year, we have had reports of pigeon shooting around Hinchinbrook Island National Park.’ Shooting of birds, including two nesting white-breasted sea eagles, was reported at Fairfax Island in 1969, by Julie Booth, and A. S. Thorsborne provided evidence of the shooting of 200 Torres Strait pigeons at North Brook Island in 1971. In 1974, A. W. Carle, the Director of the Cape York Environmental Centre, acknowledged that the shooting of large numbers of Torres Strait pigeons at North Brook Island demonstrated that adequate protection of birds had not been enforced.<sup>128</sup>

Other impacts resulted from the collection of eggs from nesting sites by visitors to several islands. Stynes claimed in 1958 that visitors to Dunk Island were camping, lighting fires and removing hundreds of tern eggs from nests.<sup>129</sup> Concern about the destruction of birds and their rookeries at Lady Musgrave Island was expressed in 1966, and campers from Lady Musgrave also visited Fairfax Island in 1969, where P. H. Anderson reported that ‘they collected eggs of the boobies that nested at both islands; another party disturbed the nests, with the result that hundreds of eggs and chicks were taken by gulls’.<sup>130</sup> At Purtaboi Island, in 1972, A. Chisholm wrote that picnickers were

<sup>127</sup> Cited in In-letter Ref. 44/2011 G.D.Q., A. E. Cole, Dir. to Sec., QDHM, Brisbane, 28 January 1944, SRS5416/1 Box 10 Item 61, NP231, Bunker – Heron Island, QSA; Report Ref. 7A:MB, Innisfail Land Agent’s Office, Innisfail, 24 February 1950, SRS5416/1 Box 24 Item 134, NP384, Dunkalli, QSA; In-letter Ref. 7A:CN 75/1, G. S. Stynes, Dunk Island Tropical Tourist Board to Sec., Forestry, 30 December 1958, SRS5416/1 Box 24 Item 139, NP418, Dunkalli, QSA.

<sup>128</sup> In-letter, K. McArthur, Hon. Sec., Wildlife Preservation Society of Qld. (Caloundra Branch) to Hon. H. Richter, Min. for Conservation, Brisbane, 16 January 1969, SRS5416/1 Box 36 Item 223, NP389, Hecate – Goold Island, QSA; In-letter, J. Booth, Fairfax Island to W. Wilkes, Sec., Qld. Dept. of Forestry, Brisbane, 20 March 1969, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA; In-letter, A. S. Thorsborne to Sec., Qld. Dept. of Forestry, 1 February 1971, SRS5416/1 Box 36 Item 223, NP389, Hecate – Goold Island, QSA; In-letter Ref L.6540, A. W. Carle, Dir., Cape York Environmental Centre, Gordonvale to Mr. H. S. Curtis, Dir. Forestry, 7 January 1974, SRS5416/1 Box 36 Item 223, NP389, Hecate – Goold Island, QSA.

<sup>129</sup> In-letter Ref. 7A:CN 75/1, G. S. Stynes, Dunk Island Tropical Tourist Board to Sec., Forestry, 30 December 1958, SRS5416/1 Box 24 Item 139, NP418, Dunkalli, QSA.

<sup>130</sup> In-letter, P. H. Anderson, Bundaberg to Sec., Qld. Dept. of Forestry, Brisbane, 1 November 1966, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA; In-letter, J. Booth, Fairfax Island to W. Wilkes, Sec., Qld. Dept. of Forestry, Brisbane, 30 September 1969, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA.

disturbing birds by intruding into their nesting sites.<sup>131</sup> In addition to the disturbance of eggs and nesting sites, however, some visitors inflicted deliberate cruelty on birds, as a report by Booth in 1966 demonstrated for Fairfax and Heron Islands:

You may have noticed a slide or two of a gull's legs tightly bound with wire and strong thread. Some monster goes to their main rookery each season and performs this cruel act of tying the legs up, probably before they can fly. Eventually the legs are so badly damaged that the feet drop off. I cared for six of these birds two years ago at Heron Island (they do not breed there) and another four last year. I have found more here this year.<sup>132</sup>

In addition, at Heron Island in 1970, an observer reported that a 'member of the staff of Heron Island Pty. Ltd., Mr. Pat Ryan, has over a period of weeks been killing the small birds called White Eyes.'<sup>133</sup>

As a result of such impacts, some documentary evidence indicates that numbers of birds declined at several islands. In 1970, the Secretary of the QNPWS stated: 'Comparison of the present situation with early records indicates that the tourist resort on Heron Island has resulted in that island being largely deserted by some species of ground-nesting terns; and, in 1978, at Michaelmas Cay – one of the most significant sea-bird rookeries in the Great Barrier Reef – the Secretary of the North Queensland Naturalist's Club (NQNC) stated: 'reports from local and visiting ornithologists reveal that the number of birds present has decreased markedly compared with film and reports taken some few years ago.' Some of the disturbances of seabird colonies at Michaelmas Cay were attributed to post-1970 impacts – including the operations of a seaplane taxiing to the beach and conducting low-flying over the cay – that lie outside the scope of my research.<sup>134</sup> Nevertheless, the evidence given above suggests that large numbers of birds had been destroyed, at several islands, before the formation of the GBRMP in 1975.

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<sup>131</sup> In-letter, A. Chisholm to Mr C. Haley, Conservator of Forests, Brisbane, 21 October 1972, SRS5416/1 Box 24 Item 139, NP418, Dunkalli, QSA.

<sup>132</sup> In-letter, J. Booth, Fairfax Island to Mr. W. Wilkes, Sec., Qld. Dept. of Forestry, Brisbane, 5 November 1966, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

<sup>133</sup> In-letter, 'A guest' to Dir. General, QDPI, Brisbane, 28 August 1970, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

<sup>134</sup> Out-letter, Sec., QNPWS to Sec., Land Admin. Commission, Brisbane, 23 February 1970, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA, pp. 1-2, p. 2; In-letter Ref. 53.1183, Sec., NQNC, Cairns to Hon. Mr T. Newberry, Min. for National Parks, Recreation and Culture, Brisbane, 12 August 1978, SRS5416/1 Box 62 Item 430, NP779, Trinity 'A', QSA.

### 6.6.2 *Introduction of exotic species of fauna*

In common with the introduction of goats, described in Section 6.5.2, the transfer of a range of other exotic species of fauna to islands occurred throughout most of the period of European settlement. The animal species introduced to islands were diverse; an indication of this diversity was given by Heatwole, who reported the presence of feral cats, wallabies, pea fowl, guinea fowl, dogs and an emu on the cays of the Capricornia Section.<sup>135</sup> The transformation of island landscapes by introduced animals was in some cases prolonged; the QPWS reported that sheep grazing commenced in the mid-1800s at the Keppel Islands and continued until the early 1960s, by which time the landscape of the island had been severely degraded.<sup>136</sup> The documentary and oral evidence presented below gives an overview of the scale and variety of introduced fauna. Although some of those introductions of exotic animals were deliberate, others occurred accidentally as animals were carried to islands in ship or boat cargoes; one example of the latter impact occurred at North-West Island, where the fowls found on the island in 1928 were reported to have descended from several birds that escaped from a shipwreck.<sup>137</sup>

Evidence of the deliberate stocking of islands for pastoralism dates to 1933, when J. V. Busuttin, the Lessee of St. Bees Island, reported that his father placed stock on the Repulse Islands, although the animals were later stolen; Busuttin also reported that his brothers had stocked Penrith Island. By 1938, cows, bulls, a horse and poultry had been introduced at Grassy Island by Boyd Lee; horses, sheep and pigs were found at Haslewood Island, in the Whitsunday Group; Mr. H. G. Lamond, the Lessee of several Molle Islands, had introduced grazing herds at Molle, Mid Molle, Denman and Planton Islands; and Mr. C. F. Pike, the Lessee of Partridge Island, had applied to graze sheep and milking cows on North Molle Island.<sup>138</sup> In 1948, the NP Ranger at Mackay reported that at Long Island Mr. Rasmussen had introduced some cattle and a horse, which were

<sup>135</sup> Heatwole, 'Cays of the Capricornia Section', pp. 28 and 31.

<sup>136</sup> QNPWS, *Keppel Bay Islands NP: visitor information*, QNPWS, Brisbane, 1996.

<sup>137</sup> Napier, *On the Barrier Reef*, p. 117.

<sup>138</sup> In-letter Ref. 2A/AK (33.46081B), J. V. Busuttin, St. Bees Island to Sec., Land Admin. Board, Brisbane, 6 October 1933, SRS5416/1 Box 45 Item 289, NP246-247, Molle – Repulse Islands, QSA; Caldwell, *Titans of the Barrier Reef*, p. 136; Memo Ref. 225/3, E. McKeown, NP Ranger, Tully to Sec., 6 December 1938, SRS5416/1 Box 72 Item 482, NP269, Whitsunday 'A', QSA, p. 2; Memo Ref. 2A/PM 225/5, Sec., Qld. Sub-Dept. of Forestry, Brisbane, 'Proposed National Park over Molle, Mid Molle, Denman and Planton Islands', 24 May 1938, SRS5416/1 Box 14 Item 89, NP257, Conway, QSA; In-letter Ref. 2A/PM S.L. 6763, C. F. Pike, Partridge Island to Sec. for Lands, Lands and Survey Office, Brisbane, 25 September 1938, SRS5416/1 Box 14 Item 89, NP257, Conway, QSA.

damaging the track on the island. By 1950, eight head of cattle were being grazed on Long Island and over 30 head of stock were present at Lindeman Island, and by 1956, cows had been introduced at North Molle Island and 22 pigs were kept on South Molle Island. By 1960, the Secretary of the QNPWS stated that ‘any track work on Brampton Island has been deferred because of the number of horses, sheep and goats on this island.’<sup>139</sup>

In contrast to these reports of the deliberate stocking of islands with grazing animals, other documentary and oral sources indicate that the introduction of pest species also occurred. In 1932, when Cristian Poulsen established the first tourist resort at Heron Island, the cay was ‘so infested with rats that it was almost impossible for anything or anybody to live there.’<sup>140</sup> Subsequently, domestic cats were introduced in an attempt to control the rats; however, the cats were allowed to breed and were subsequently reported to be feeding on the juvenile mutton birds on that island. By 1966, rats had also infested other islands, including Fairfax and Wreck Islands, where they were reportedly responsible for significant destruction of the seabird population, as one oral history informant – a zoologist and environmental manager – acknowledged. By 1969, Booth reported that the Fairfax Islands were infested with two species of rats, and by cockroaches.<sup>141</sup> Other exotic fauna included rabbits, which were found by fishermen in 1951 at Humpy Island, near Keppel Island; taipans, which were introduced to South Molle Island in 1957 by Mr. Sacks; a fox that also inhabited South Molle Island; an

<sup>139</sup> Memo, NP Ranger, Mackay to Sec., Forestry Dept., 11 November 1948, SRS5416/1 Box 45 Item 287, NP242, Molle ‘D’, QSA; In-letter, NP Ranger, Mackay to Sec., Qld. Dept. of Forestry, 27 April 1956, SRS5416/1 Box 15 Item 90, NP254, Conway, QSA; Memo, Hausknecht, NP Ranger, Mackay to Sec., Forestry Dept., 21 February 1950, SRS5416/1 Box 45 Item 287, NP242, Molle ‘D’, QSA; In-letter Ref. 56/6792, A. A. Fielding, Overseer, South Molle Island to NP Ranger, Mackay, 25 August 1956, SRS5416/1 Box 15 Item 90, NP275, Conway ‘A’, QSA; Out-letter, Sec. to General Man., Carapark Motels Ltd., Leichhardt, New South Wales, 27 April 1960, SRS5416/1 Box 38 Item 241, NP488, Ingot – Brampton Island, QSA.

<sup>140</sup> In-letter Ref. SL7291, C. Poulsen, Heron Island to Sec., Land Admin. Board, Brisbane, 15 May 1944, SRS5416/1 Box 10 Item 61, NP231, Bunker – Heron Island, QSA, p. 3.

<sup>141</sup> Cited in In-letter Ref. 44/2011 G.D.Q., A. E. Cole, Dir. to Sec., QDHM, Brisbane, 28 January 1944, SRS5416/1 Box 10 Item 61, NP231, Bunker – Heron Island, QSA; see also In-letter Ref. CN/NC, C. Poulsen, Heron Island to Sec., Qld. Sub-Dept. of Forestry, Brisbane, 15 May 1944, SRS5416/1 Box 10 Item 61, NP231, Bunker – Heron Island, QSA, p. 1; Report Ref. 66/18994 N.P., P. Ogilvie, Zoologist, QNPWS, ‘Inspection of Lady Musgrave Island’, 1966, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA, pp. 5-6; these accounts are corroborated by OHC 41, 12 November 2003, pp. 5-6; J. Booth, Fairfax Island to W. Wilkes, Sec., 20 March 1969, SRS5416/1 Box 10 Item 58, NP220, Bunker, QSA.

agile wallaby that was photographed at Heron Island in 1966, shown in Figure 6.10; and African Guinea Fowls that were released at Lady Musgrave Island in 1974.<sup>142</sup>

After the formation of the GBRMP, an evaluation of changes in animal populations at Green Island was made in 1978 by Col Limpus, who concluded that the fauna had ‘almost certainly changed from its original state’ as a result of the introduction of house sparrows, rats, cats and a small range of reptiles.<sup>143</sup> Other, more recent faunal changes include the presence of cane toads at Lizard Island by 1980, as an oral history informant reported; the introduction of feral pigs at Hinchinbrook Island, reported in 1999; and the establishment of feral pigs and cane toads at Dunk Island by 2000.<sup>144</sup> Those species introductions, however, may have taken place after 1970 and lie beyond the period considered in my research; nevertheless, those introductions represent the most recent of a series of changes in island fauna that commenced in the earliest period of European settlement in the Great Barrier Reef. The narrative presented here suggests that as a result of the introduction of a variety of animal species, over an extended period of time, the landscapes of several islands have been substantially modified.

## 6.7 Development of infrastructure on islands

Dramatic changes have occurred in numerous islands of the Great Barrier Reef as a result of the development of infrastructure, including lighthouses, jetties, research stations, tourist resorts and airstrips. The following account provides an overview of the construction of some of these structures, based on documentary and oral history sources, and indicates that several islands have been substantially modified through their construction. The development of infrastructure on islands reflects the expansion of tourism in the Great Barrier Reef since 1930; some of the major tourist resort islands,

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<sup>142</sup> Out-letter Ref. 51/13260 Lands, Sec. to Land Admin. Board, Dept. of Public Lands, Brisbane, 26 November 1951, SRS5416/1 Box 39 Item 250, NP621-627, Keppel, QSA; Out-letter, Sec. to Mr. O. M. Bauer, South Molle Island Tourist Resort, 8 August 1957, SRS5416/1 Box 15 Item 90, NP275 Conway ‘A’, QSA; Memo Ref. 1A/KO, Sec. to NP Ranger Kausknecht, Forests Office, Mackay, 19 February 1957, SRS5416/1 Box 15 Item 90, NP275, Conway ‘A’, QSA; Gunn, *Barrier Reef by trimaran*, facing p. 97; Out-letter, Sec. to Editor, *News Mail*, Bundaberg, 18 November 1974, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA; Out-letter, Dir., Fauna Conservation Branch, QDPI, Brisbane to Mr. H. Frauca, Bundaberg, 16 January 1975, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

<sup>143</sup> C. J. Limpus, Green Island Management Plan – Resource Evaluation, 19 September 1978, SRS5416/1 Box 63 Item 431, NP836, Trinity ‘B’ Transfer Batch 1, QSA, p. 1.

<sup>144</sup> OHC 11, 1 July 2003, p. 4; QNPWS, *Hinchinbrook Island NP Management Plan*, p. 19; QNPWS, *Family Islands NP Management*, p. 11.

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Figure 6.10. An agile wallaby photographed at Heron Island, 1966.

Source: Gunn, *Barrier Reef by trimaran*, facing p. 97.

including Green, Magnetic and Hayman Islands, have experienced the most visible transformations, especially in the views of some oral history informants.<sup>145</sup> In part, changes at those islands are particularly obvious because of the scale of tourist facilities that were constructed; in addition, however, those islands were most frequently visited and changes in their habitats, consequently, were noticeable by many people.

#### *6.7.1 Construction of lighthouses and jetties*

After the construction of the navigation beacon at Raine Island in 1844, described in Section 6.2, the next significant structures to be built on several islands were lighthouses and jetties. Evidence of the construction of several lighthouses is found in the *NP Management Plans* for various islands. By 1866, a temporary lighthouse had been established at Lady Elliot Island, which was replaced by a more substantial lighthouse and cottage in 1873; details of the construction of those lighthouses have been provided by Walsh.<sup>146</sup> In 1878, the Low Island lighthouse was constructed, which the GBRMPA acknowledged represents a rare location at which long-term human habitation took place on a NP cay. In 1897, another lighthouse was established at Kent Island, in the Barnard Group, and in 1929 the lighthouse at Russell Island, in the Frankland Group, was built. More recently, modern navigation lights were constructed in several island NPs, including the lights at Lady Musgrave Island, constructed in April 1974, and the light at Three Isles. On small islands, such as Low and Lady Elliot Islands, the presence of the lighthouses comprised a major alteration of island landscapes.<sup>147</sup>

More extensive documentary evidence describes the construction of jetties at Green, Magnetic and Molle Islands. The earliest jetty at Magnetic Island was constructed at Picnic Bay in 1902 by Robert Hayles, in order to facilitate the landing of tourists at the

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<sup>145</sup> For example, see OHC 2, 9 November 2002, pp. 2-4; OHC 11, 1 July 2003, p. 2; OHC 30, 3 October 2003, pp. 2 and 5-6; OHC 32, 6 October 2003, pp. 3-4; the substantial increase in recreational use of the Great Barrier Reef has been described in OHC 30, 3 October 2003, p. 1.

<sup>146</sup> Walsh, *Lady Elliot Island*, pp. 36-43.

<sup>147</sup> QNPWS, *Low Isles Marine Park: park guide*, QNPWS, Brisbane, 1998; GBRMPA, *Cairns Area plan of management*, GBRMPA, Townsville, 1998, p. 10; QNPWS, *Barnard Islands NP Management Plan*, QNPWS, Brisbane, 1998; QNPWS, *Frankland Islands NP Management Plan*, QNPWS, Brisbane, 1998; QNPWS, *Three Isles NP Management Plan*, QNPWS, Brisbane, 1998; In-letter Ref. QL6126, W. Deegan for Chief Property Officer, Dept. of Services and Property, Qld. Branch, Brisbane to Sec., Qld. Dept. of Forestry, Brisbane, 21, February 1974, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

island from his launch, the *M.V. Phoenix*; that jetty was destroyed by Tropical Cyclone Leonta on 9 March 1903 and a replacement was constructed. Subsequently, jetties were also built at Nelly Bay and at Arcadia; both of those were destroyed in cyclones and rebuilt in about 1927. Damage to the later jetties occurred in another cyclone, in 1940, and replacements were built.<sup>148</sup> At Green Island, the first jetty was built by the Cairns Harbour Board in 1906, although regular commercial launches to Green Island did not commence until 1928. Shortly afterwards, in 1931, a second jetty was constructed at the island by the Cairns Town Council at a cost of over £1,600, which was used to facilitate the construction of ‘other improvements’ at the Green Island tourist resort, including a kiosk and an accommodation block, which were completed by 1936. In 1938, Charles Hayles, of Hayles Magnetic Pty. Ltd., was granted a lease to develop Green Island as a tourist resort; this lease involved the provision of regular public ferry services to the island. In 1946, the jetty at Green Island was destroyed in a cyclone and was reconstructed by the Cairns Harbour Board; the new jetty, illustrated in Figure 6.11, was replaced by another in 1960-1961, also built by the Cairns Harbour Board.<sup>149</sup> In addition to the jetties at Green and Magnetic Islands, another jetty had been built at Molle Island by 1969, which extended to the north-north-east of the island as far as the outer edge of the coral reef.<sup>150</sup> The construction of jetties at these islands was significant because the structures facilitated access to, and further development of, the islands.

### 6.7.2 Construction of tourist resorts

In particular, the construction of jetties assisted the development of tourist resorts on many islands of the Great Barrier Reef; before about 1900, their relative inaccessibility had precluded their use by large numbers of visitors. However, subsequently the islands became increasingly popular as tourist destinations; Davitt described their attraction in the following account of 1898:

<sup>148</sup> J. L. O’Donoghue, *Robert Hayles Snr., a magnetic life: the story of his family and Hayles Magnetic Island Pty. Ltd.*, J. L. O’Donoghue, Brisbane, 2001, pp. 20-21, 53 and 55.

<sup>149</sup> Baxter, *Green Island information review*, p. 11; QEPA, *Green Island National and Marine Park: park guide*, QEPA, 2003; Town Clerk, Cairns to Chairman, Marine Board Office, Brisbane, 26 September 1931, SRS146/1 Item 2, Correspondence Subject Files – Permit protecting coral and surrounds of Green Island, QSA; GBRMPA, *Green Island economic study: summary report*, Appendix A.

<sup>150</sup> I. Bennett, ‘Notes made on a trip on *MV Cape Moreton*, September-December 1969’, Manuscripts, MS9348, Papers 1944-2000, Box 6, Folder 7, NLA.



*Figure 6.11.* One of the jetties constructed at Green Island, c.1956.

*Source:* Image No. P55090, Image Library, CHS.

There is no other coastal scenery in the world to equal this in changing vistas of loveliness and grandeur. You move along in endless windings in and around the islands of coral, with their silvery sands and grassy slopes, and wooded vesture of varied foliage. I journeyed by night in one trip, and by day in another, through this enchanted world of coral islands, and had a double enjoyment of its scenic beauties.<sup>151</sup>

Davitt also described the Great Barrier Reef islands as ‘Nature’s necklace of coral islands’, although even in this account the islands were viewed from a passing vessel rather than regarded as destinations in their own right.

The earliest island tourist resorts included Double, Green and Magnetic Islands, which were more accessible from the coastal centres at Cairns and Townsville than the offshore islands. In particular, the resorts at Green and Magnetic Islands, which were serviced by the Hayles Magnetic Pty. Ltd. ferries, were frequently visited. Indeed, by 1925, the Green Island resort had become so popular with visitors that W. W. M. McCulloch, the Superintendent of the Yarrabah Aboriginal Mission, expressed concern that the island was being degraded; in a report to the Queensland Chief Protector of Aboriginals, he stated:

Green Island at present owing to excursionists is like a sewerage farm and I have been told that several influential Cairns folk, including the Mayor [...] and some of the Councillors, who have always spent their holidays there, want to go to Turtle Bay this year instead.<sup>152</sup>

Besides Green Island, the early development of tourist resort islands also took place in the Whitsunday Group; in 1935, A. Busuttin, the Lessee of Brampton Island, stated that a small village resort, with accommodation for 50 or 60 people and other facilities, had been constructed on that island since about 1930.<sup>153</sup>

More extensive construction of tourist facilities occurred in 1938 and 1939 at Lady Musgrave Island, in the Capricorn-Bunker Group, and at various Whitsunday Islands. In 1938, H. F. Baker reported that the construction of a tourist resort, including six

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<sup>151</sup> M. Davitt, *Life and progress in Australia*, Methuen and Co., London, 1898, p. 282.

<sup>152</sup> W. W. M. McCulloch, Superintendent, Yarrabah Mission, Cairns to Chief Protector of Aboriginals, South Brisbane, 21 December 1925, SRS4356/1 Box 27 Item 6818, Aboriginals – Reserves N – Turtle Bay, QSA.

<sup>153</sup> In-letter, A. Busuttin, Brampton Island to Land Commissioner, Mackay, 1 October 1935, SRS5416/1 Box 35, SRS5416/1 Box 38 Item 241, NP488, Ingot – Brampton Island, QSA, p. 3.

cottages and other facilities, was about to commence at Lady Musgrave Island.<sup>154</sup> In the same year, Caldwell acknowledged the popularity of the fishing grounds around the Whitsunday Islands, several of which were being developed as tourist resorts.<sup>155</sup> By 1939, however, E. O. Marks, the Honorary Secretary of the GBRC, acknowledged that some islands of the Great Barrier Reef – especially in the vicinity of the tourist resorts – had been degraded by the thoughtless behaviour of tourists.<sup>156</sup> In the same year, C. J. Trist, the Secretary of the Queensland Sub-Department of Forestry, wrote:

Despite the protective measures that are already in existence to preserve the natural beauty of the islands of the Barrier Reef, complaints are still being made that vandalism occurs. Thoughtlessness rather than vandalism can better describe the desire of this temporary [tourist] population to souvenir and interfere with the natural beauty of these islands.<sup>157</sup>

By 1940, the impacts of tourism in the Great Barrier Reef were concentrated in the vicinity of ten major resort islands, from Heron to Green Island; the distribution of those resorts is shown in Figure 6.12. Lady Musgrave and Heron Islands were accessed from Bundaberg and Gladstone respectively; the Whitsunday Islands were reached from Mackay and Proserpine; Magnetic Island was reached from Townsville; Dunk Island services departed from Tully, and Green Island was accessed from Cairns.<sup>158</sup>

Another account of environmental degradation at a tourist resort island was produced in 1940, when an officer of the QGTB visited Lady Musgrave Island; this officer reported that tourists had caused damage to corals, turtles and other wildlife at that island. In addition, the impacts of tourists spread beyond the resort islands to include nearby islands; G. Gentry acknowledged the degradation of Hoskyn and Fairfax Islands as a result of frequent visits by tourists from the Lady Musgrave and Heron Island resorts.<sup>159</sup> Nevertheless, tourism continued to develop in the Great Barrier Reef. In particular, the

<sup>154</sup> In-letter Ref. 38/14007B, H. F. Baker, West Bundaberg to Sec., Qld. Forestry Sub-Dept., Brisbane, 29 October 1938, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA.

<sup>155</sup> Caldwell, *Titans of the Barrier Reef*, *passim*.

<sup>156</sup> In-letter Ref. 38/14394, E. O. Marks, Hon. Sec., GBRC, Brisbane to the Hon. F. A. Cooper, Treasurer, Brisbane, 12 January 1938, PRV8340/1 Item 1, QSA.

<sup>157</sup> Memo, 'Protection of Islands – Barrier Reef, Circular No. 727', C. J. Trist, Sec., Qld. Sub-Dept. of Forestry, Brisbane, 23 March 1939, PRV8340/1 Item 1, QSA.

<sup>158</sup> QGTB, *Winter tours on the Great Barrier Reef*, Government Printer, Brisbane, 1940, p. 3.

<sup>159</sup> In-letter Ref. 40.2373.11, Sec., Office of the Commissioner for Railways, Brisbane to Sec., QDHM, Brisbane, 22 May 1940, PRV8340/1 Item 1, QSA; Out-letter Ref. 225/45, G. Gentry to Sec., Qld. Sub-Dept. of Forestry, Brisbane 11 October 1940, PRV8340/1 Item 1, QSA.

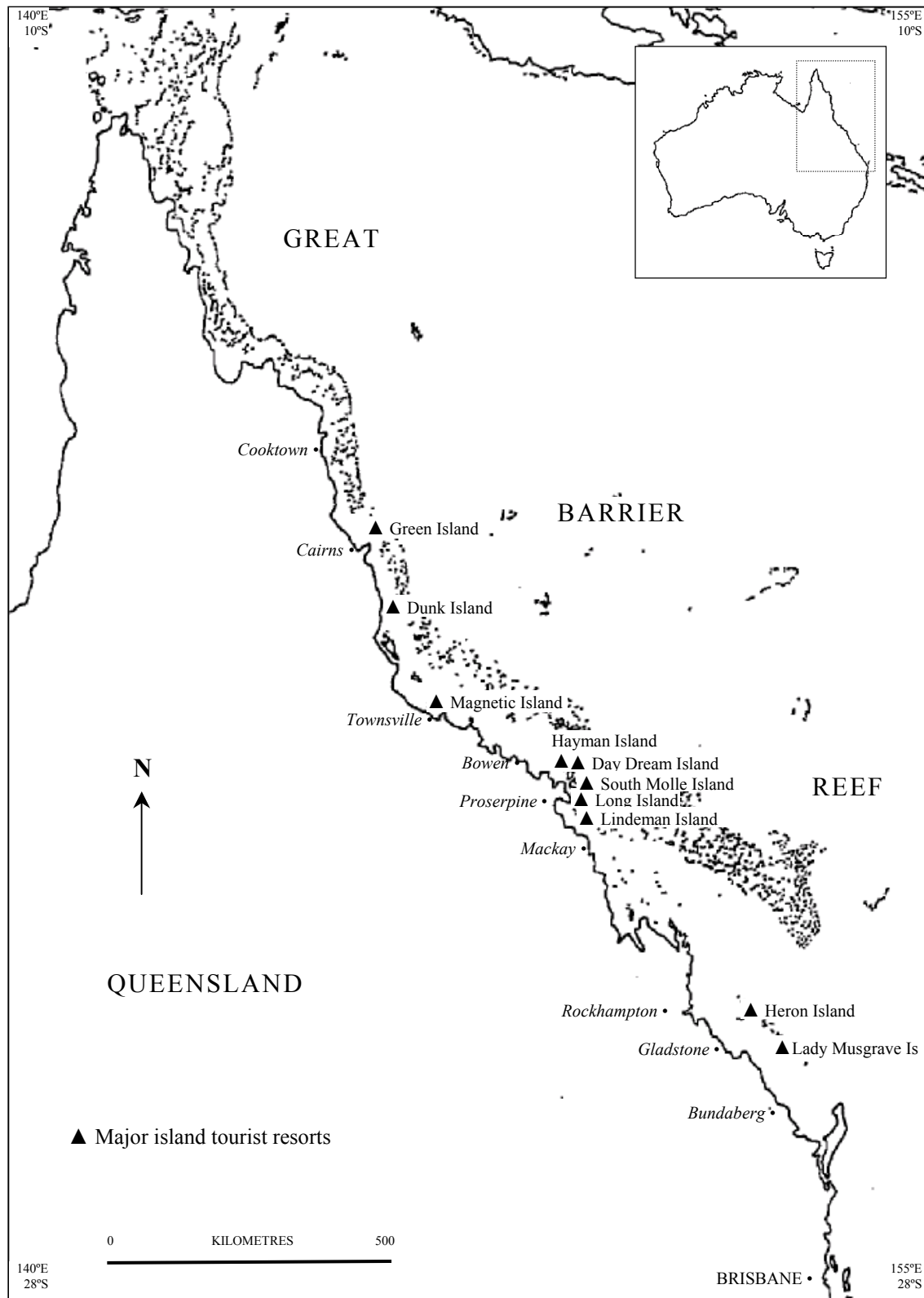


Figure 6.12. The ten major island tourist resorts of the Great Barrier Reef, 1940.

Source: QGTB, *Winter tours on the Great Barrier Reef*, Government Printer, Brisbane, 1940, p. 3.

Green Island resort expanded considerably, due to the popularity of glass-bottom boat tours, which commenced in 1937 and which were probably the first ever example of that activity. By the early 1940s, Green Island had been declared a National Park, the visitor facilities and camping areas at the cay had been developed, and the Coral Cay Hotel had been constructed.<sup>160</sup>

By 1948, the tourist resort at Heron Island had also expanded and comprised about 10 cabins in addition to other facilities; an inspection of the resort during that year by the Director of the QGTB revealed that:

The island has enjoyed a wide popularity with tourists over a period of about fifteen years, because of its excellent geographical situation, its excellent coral, fishing and opportunities to see Barrier Reef life.<sup>161</sup>

The growth of tourism at Heron Island was facilitated by a twice-weekly air service from the Brisbane River to the Heron Island resort, operated by Barrier Reef Airways using a Catalina flying-boat, which commenced in about 1947; before that date, tourists travelled by rail from Brisbane to Gladstone before making a 6-7 hour crossing by boat from the mainland to the cay. In addition to the service to Heron Island, Barrier Reef Airways also provided weekly flights to Lindeman and Day Dream Islands, both in the Whitsunday Group, and in the first two months of its operation, Barrier Reef Airways carried 1,000 passengers to the Barrier Reef.<sup>162</sup>

Further expansion of tourist facilities on Great Barrier Reef islands took place in the 1950s. By 1950, Dunk Island had become a popular resort island, as NP Ranger McKeown acknowledged:

Dunk Island is one of the major, and most popular, tourist resorts of North Queensland, where fish and oysters are largely featured. The fact that they can wander over a reef, and pick up a feed of oysters as they go, has a strong appeal to many southern, and overseas tourists.<sup>163</sup>

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<sup>160</sup> GBRMPA, *Green Island Economic Study*, Appendix A.

<sup>161</sup> Out-letter, E. A. Ferguson, Dir., Qld. Tourist Services to US, Qld. Dept. of Health and Home Affairs, Brisbane, 3 November 1948, RSI920/1 Item 14, General correspondence batches, QSA, pp. 1-2, p. 1.

<sup>162</sup> N. Bartlett, 'By air to the reef', *South West Pacific*, New Series, No. 18, 1947, pp. 6-9.

<sup>163</sup> In-letter Ref. NPR R382 Dunkalli, NP Ranger McKeown, Tully to Sec., Qld. Dept. of Forestry, Brisbane, 14 February 1950, SRS5416/1 Box 23 Item 131, NP382, Dunkalli, QSA.

One oral history informant, a charter boat operator, stated that the resort at Dunk Island was owned by Australian Airlines. At the resorts in the island National Parks, another oral history informant – who was an official of the Queensland Forestry Department – explained, the facilities were developed to the satisfaction of the Queensland Minister for Tourism and then the resorts were excised from the National Parks; the resort owners were also issued with Special Leases for the remaining part of the islands in order to prevent other companies from establishing competing resorts on the same islands. Access to the resort at Dunk Island was facilitated by a daily ferry service; the ferry operator also offered glass-bottom boat tours to Bedarra Island, at which another resort was located.<sup>164</sup>

During the 1950s, significant developments took place at Green Island. In 1954, the Coral Gardens underwater observatory was constructed at the end of the jetty, following a successful application by Vincent Vlasoff and Lloyd Grigg, who were issued with Special Lease SL25283 over a popular area of the coral reef. NP Ranger McKeown described the location of the observatory in the following terms:

The most attractive coral garden at Green Island is located adjacent to the jetty, on its northern side. Visitors to the island are conveyed over this coral in a large flat bottom boat, into which glass windows have been fitted, allowing a good view of coral, and other marine life on the ocean bed. A small, but very beautiful patch of coral is located close to the jetty, on the southern side, and is easily viewed from the jetty deck. This coral patch never fails to attract the attention of all visitors.<sup>165</sup>

The observatory consisted of a cylindrical steel chamber with glass windows and weighed 70 tons; the structure was floated from Cairns harbour to the end of the Green Island jetty, where it was sunk and anchored. The coral gardens surrounding the observatory were supplemented with coral that had been transplanted from the surrounding reefs, as described in Section 5.5. In 1955, the observatory commenced operations; from 1957-1958, 28,000 people visited Green Island; in 1960, further expansion of accommodation and other facilities commenced and 47,646 visitors to the island were recorded.<sup>166</sup>

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<sup>164</sup> OHC 25, 16 September 2003, pp. 1-2, 6 and 11-12; ORAL TRC3178, Interview with Syd Curtis, December 1994-June 1995, NLA, p. 166.

<sup>165</sup> In-letter, E. McKeown, NP Ranger, Tully to Sec., NP836, Trinity 'P' – Green Island – Underwater Observation Chamber, QSA.

<sup>166</sup> GBRMPA, *Green Island Economic Study*, Appendix A.

Considerable development of infrastructure also took place at Hayman Island during the 1950s. The island was leased by Barrier Reef Islands Pty Ltd. and the main attraction for visitors was the large fringing reef on the southern side of the island, of which more than 1,000 acres was exposed at low tide. A hotel had constructed, which the Director of Queensland Tourist Services described in 1950 as follows:

The hotel is situated on the foreshore of a sheltered bay on the south side of the island, where a flat triangle of land, eighty to a hundred acres in extent, provides the finest possible location for a hotel. Here the island cows graze.<sup>167</sup>

Subsequently, the owners of the Hayman Island Resort applied for a large area of the island to be excised from the NP and leased to them; in spite of a recommendation to the contrary by the Queensland Conservator of Forests, the Hayman Island NP – which comprised 1,758 acres – was cancelled during the year 1959-1960, as oral history evidence indicates.<sup>168</sup> The construction of the extensive resort on the leased land is shown in Figure 6.13.

The expansion of island tourist resorts led to further concerns about various forms of environmental degradation. In 1966, at Lady Musgrave Island, Curtis reported that a large proportion of the coral inspected on the reef was dead and, in 1969, the Hon. V. B. Sullivan, the Queensland Minister for Lands, also wrote that the coral at Lady Musgrave Island was poor and greatly inferior to the less-visited Heron Island reef.<sup>169</sup> During the late 1960s, the oral history informant, Curtis, reported that the Lindeman Island Resort top-dressed their golf course using soil from the NP. At Green Island – which was by 1975 visited by over 100,000 people annually – the effects of sewerage outfall from the resort and amenities, which reportedly caused the proliferation of seagrass beds in areas where coral reef flats had previously grown, were acknowledged, as oral history evidence revealed.<sup>170</sup> By 1978, when an estimated 150,000 people visited Green Island,

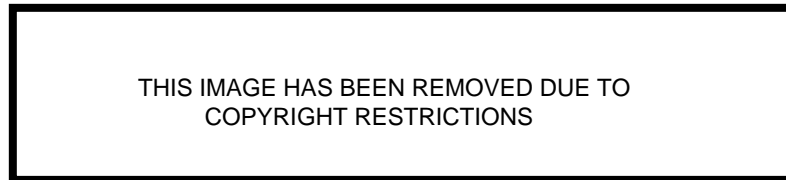
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<sup>167</sup> Memo, Dir., Qld. Tourist Services to US, Qld, Dept. of Health and Home Affairs, Brisbane, 3 July 1950, RSI920/1 Item 12, General correspondence batches, QSA.

<sup>168</sup> ORAL TRC3178, Interview with Syd Curtis, December 1994-June 1995, NLA, pp. 91-92.

<sup>169</sup> The reason for the perceived inferiority of the reef at Lady Musgrave Island was not made explicit.

<sup>170</sup> H. S. Curtis, Research Biologist to Sec., Forestry Dept., Brisbane, 12 December 1966, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA; Hon. V. B. Sullivan, Min. for Lands, Brisbane to the Hon. John Herbert, Qld. Min. for Labour and Tourism, Brisbane, 14 November 1969, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA; ORAL TRC3178, Interview with Syd Curtis, December 1994-June 1995, NLA, p. 166; B. Collins, 'Recollections of the reef', p. 2; GBRMPA, *Green Island Economic Study*, Appendix A..



*Figure 6.13.* Construction of the Hayman Island Resort, c.1962.

*Source:* Photograph Ref. 3273, SRS189/1 Box 17 Item 73, Queensland Industry, Services, Views, People and Events; Photographic Proofs and Negatives; Islands – Barrier Reef, QSA.

G. Goeden of the Queensland Fisheries Service acknowledged that the marine resources of the island had been depleted.<sup>171</sup> Additional evidence of changes in islands due to tourist developments exist for the later period; such changes include the construction of the tourist resort at Lizard Island, which had been completed by 1995, and the extensive modification of the Spit at Dunk Island by 2000, although those changes lie beyond the scope of the narratives presented here.<sup>172</sup> Overall, by the time of the formation of the GBRMP, the construction of tourist infrastructure in the Great Barrier Reef, as narrated above, had resulted in dramatic changes to the landscapes of some islands, especially Green, Dunk, Magnetic, Hayman and Lady Musgrave Islands.

### 6.7.3 Construction of airstrips

The landscapes of several Great Barrier Reef islands have been modified by the construction of airstrips, which require substantial areas of flat land; that land was prepared either by the clearance of vegetation or by the reclamation of part of the shoreline. One documentary report stated that an airstrip was constructed on Lindeman Island in July 1946, that trees were cleared using a bulldozer that was transported from the mainland, and that the creation of the airstrip took place without permission being obtained. However, by 1957, that airstrip was unserviceable and another was proposed for the island; NP Ranger Hausknecht stated that the construction of the new airstrip would involve the destruction of between 1,500 and 2,000 trees. The second airstrip and a terminal building were commissioned in 1957, and air services to the island commenced in April 1958.<sup>173</sup> The Lindeman Island airstrip is shown in Figure 6.14, which illustrates the extent of deforestation that took place. Comparable land clearance took place during the construction of the Dunk Island airstrip, shown in Figure 6.15, which also involved the drainage of a freshwater swamp to the south of Brammo Bay, at the location indicated in the map (Figure 6.15).

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<sup>171</sup> G. Goeden, Queensland Fisheries Service, *Green Island Management Plan: submission on marine resources*, 1978, SRS5416/1 Box 63 Item 431, NP836, Trinity 'B' Transfer Batch 1, QSA.

<sup>172</sup> I. Bennett, 'Audio-visual: the Great Barrier Reef', Manuscripts, MS9348, Papers 1944-2000, Box 6, Folder 18, Miscellaneous, 1967-1995, NLA, p. 12; QPWS, *Family Islands NP Management Plan*, p. 10.

<sup>173</sup> Memo, [illegible] to Sec., 9 November 1956, NP274, Shaw 'A' – Lindeman Island, QSA; Memo, NP Ranger Hausknecht, Mackay to Sec., 14 October 1957, NP274, Shaw 'A' – Lindeman Island, QSA, p. 2; In-letter Ref. 7AMC:CN, L. Nicolson, Man., Lindeman Island Pty. Ltd. to Sec., Land Admin. Board, Brisbane, 2 December 1957, NP274, Shaw 'A' – Lindeman Island, QSA.

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*Figure 6.14.* The Lindeman Island airstrip, October 1963.

*Source:* Photograph Ref. 3273, SRS189/1 Box 17 Item 73, QSA.

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*Figure 6.15.* The Dunk Island airstrip. Former land use, including the freshwater swamp to the south of Brammo Bay, is shown on the map together with the approximate position of the airstrip (dotted line).

*Source:* Photograph Ref. A2975, Photograph Ref. 3273, SRS189/1 Box 17 Item 73, QSA; and SRS5416/1 Box 24 Item 139, NP418, Dunkalli, QSA.

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*Figure 6.16.* The Brampton Island airstrip, photographed in November 1969. and sketch map indicating the extent of modification of the former shoreline.

*Source:* SRS189/1 Box 17 Item 73, QSA; and SRS5416/1 Box 38 Item 241, NP488, Ingot – Brampton Island, QSA.

Other alterations of island landscapes were made by the construction of airstrips during the 1960s. In contrast to the airstrips at Lindeman and Dunk Islands, where land clearance took place, at Brampton Island the airstrip was constructed by reclamation of part of the island's shoreline and by excavating an area near the tourist resort to a maximum depth of about 40 feet, as shown in the diagram given in Figure 6.16. The creation of this airstrip resulted in a major change in the landscape of Brampton Island, as the photograph reproduced in Figure 5.16 illustrates. Other infrastructure for aviation include the helipad constructed at Happy Bay, on Long Island, which was built using material quarried without authorisation from the National Park; an airstrip established at Lady Elliot Island; and the more recent runway built at Lizard Island.<sup>174</sup> As a result of the large areas required for airstrips – particularly the facilities at Lindeman, Dunk, Hayman and Brampton Islands described above – their construction has resulted in significant – and highly visible – transformations of the natural landscapes of those islands.

#### *6.7.4 Construction of research stations*

Research stations have been constructed on at least five islands of the Great Barrier Reef: at Low Isles and on Heron, Lizard, One Tree and Orpheus Islands. These structures are relatively small yet some oral history evidence indicates that they have reduced the attractiveness of some islands. In 1928-1929, a marine laboratory on Low Island was established that was used for 13 months by the researchers of the Royal Society of London Great Barrier Reef Expedition. In 1952, the GBRC founded a marine research station at Heron Island, and in 1973 the Lizard Island marine research station was established by the AM.<sup>175</sup> One oral history informant, a marine biologist, argued that the development of the research stations had caused degradation of the landscapes at One Tree and Lizard Island; she stated:

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<sup>174</sup> ORAL TRC3178, Interview with Syd Curtis, December 1994-June 1995, NLA, p. 166. In-letter, D. C. Adams, Managing Dir., Island Airways Pty. Ltd. to Sec., Premier's Dept., Brisbane, 21 January 1970, SRS5416/1 Box 9 Item 57, NP224, Bunker – Lady Musgrave Island, QSA; OHC 44, 4 December 2003, p. 3; Bennett, 'Audio-visual: the Great Barrier Reef', NLA, p. 12; SRS5416/1 Box 28 Item 179, NP153, Flattery 'A' – Lizard Island, QSA.

<sup>175</sup> P. Mather, Hon. Sec., GBRC, 'Statement on the possible effect following construction of a landing strip on Heron Island (Statement compiled by the GBRC)', 22 July 1971, SRS5416/1 Box 10 Item 61, NP231, Bunker – Heron Island, QSA, pp. 1-5, p. 2.

I think the most marked changes have really been in the islands themselves, in terms of the infrastructure that's on places like Lizard. When I first went to One Tree, there were two huts; now they're about to build almost a dormitory block. Just watching [...] the massive destruction going on with the rebuilding of aspects of the marine station [...], one just cannot believe that those small islands – and Heron far more so than Lizard – it cannot *not* be impacting.<sup>176</sup>

In particular, this informant expressed concern about the scale of development of infrastructure at One Tree Island, stating: 'I do worry about the [...] increased development at One Tree. I don't think an island that size can sustain twenty researchers.' Similarly, another oral history informant reported that the development the research station at Heron Island had degraded the landscape of that island; the extent of the development of infrastructure at the Heron Island research station is shown in Figure 6.17.<sup>177</sup>

## 6.8 Conclusion

In this chapter, many changes in islands have been described; these changes span almost the entire period of European settlement, beginning with the construction of the navigation beacon at Raine Island in 1844. The activities of guano and rock phosphate miners, the establishment of coconut plantations, the introduction of goats, the clearance of native vegetation and the construction of tourist resorts are prominent in the narrative presented above because these constitute substantial changes in the appearance of many islands, although many smaller changes in island landscapes have also occurred. Cumulatively, these impacts represent extensive modification of island habitats in the Great Barrier Reef. Some islands that have sustained particular impacts include Raine, Green, Dunk, Magnetic, Lindeman, Hayman, South Molle, Brampton, Holbourne, Heron, Fairfax, Hoskyn, Lady Musgrave and Lady Elliot Islands, and Michaelmas, Upolu and Oyster Cays. A summary of the main impacts sustained by at these islands is provided in Table 6.1.

Significantly, the activities responsible for these transformations in Great Barrier Reef islands have varied in their timing, duration, intensity, location and impacts. Thus some changes such as guano mining and the formation of coconut plantations occurred early

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<sup>176</sup> OHC 30, 3 October 2003, p. 2.

<sup>177</sup> OHC 30, 3 October 2003, p. 6; OHC 44, 4 December 2003, p. 3.



*Figure 6.17.* The marine research station at Heron Island, 1981.

*Source:* Photograph taken by Isobel Bennett, used with permission.

<i>Location</i>	<i>Period</i>	<i>Impacts</i>
<b>Raine Island</b>	1844; 1890-1892	Construction of navigation beacon; Severe degradation due to guano mining
<b>Lizard Island</b>	By 1973	Construction of airstrip and research station
<b>Snapper Island</b>	By 1935	Introduction of exotic vegetation species
<b>Low Isles</b>	1928	Construction of research station
<b>Michaelmas Cay</b>	1900-1930	Significant degradation due to guano mining
<b>Oyster Cay</b>	1900-1930	Significant degradation due to guano mining
<b>Upolu Cay</b>	1900-1930	Significant degradation due to guano mining
<b>Green Island</b>	Since 1857 Since the 1920s	Introduction of exotic vegetation species; Construction of tourist resort and facilities
<b>North Brook Island</b>	By 1971	Extensive destruction of birds
<b>Dunk Island</b>	By 1940 By 1958 By 1960	Construction of tourist resort and facilities; Extensive destruction of birds Construction of airstrip
<b>Wheeler Island</b>	By 1950	Extensive destruction of birds
<b>Purtaboi Island</b>	By 1958	Extensive destruction of birds
<b>Hinchinbrook Island</b>	By 1941 By 1969	Introduction of prickly pear; Extensive destruction of birds
<b>Magnetic Island</b>	Since the 1920s	Construction of tourist resort and facilities
<b>Holbourne Island</b>	1918-1921	Substantial rock phosphate mining
<b>Long Island</b>	By 1948	Introduction of cattle
<b>Hayman Island</b>	By 1962	Construction of tourist resort and facilities
<b>South Molle Island</b>	By 1938 By 1940	Introduction of grazing stock; Introduction of <i>Lantana</i>
<b>Lindeman Island</b>	By 1940 1946 and 1957 By 1950 By 1970	Introduction of <i>Lantana</i> ; Construction of airstrips; Introduction of grazing stock; Significant degradation due to introduced goats
<b>Brampton Island</b>	Since 1930 By 1935 By 1969 By 1970	Construction of tourist resort and facilities; Introduction of <i>Lantana</i> ; Construction of airstrip; Significant degradation due to introduced goats
<b>Henning Island</b>	By 1940	Introduction of <i>Lantana</i>
<b>Haslewood Island</b>	By 1940	Introduction of <i>Lantana</i>
<b>Repulse Islands</b>	By 1933	Introduction of grazing stock
<b>Keppel Islands</b>	Mid-1800s-1960s	Significant degradation due to sheep grazing
<b>North-West Island</b>	1890-1900	Significant degradation due to guano mining
<b>Heron Island</b>	By 1932 Since 1940 By 1944 1952	Introduction of rats and domestic cats; Construction of tourist resort and facilities; Extensive destruction of birds; Construction of research station
<b>Wreck Island</b>	By 1966	Destruction of birds; introduction of rats
<b>One Tree Island</b>	By 1970	Construction of research station
<b>Masthead Island</b>	By 1947	Introduction of prickly pear
<b>Fairfax Islands</b>	1890-1900 1943-1965 1953-1970s By 1966	Significant degradation due to guano mining; Severe degradation due to military bombing; Significant degradation due to introduced goats; Destruction of birds; introduction of rats
<b>Lady Musgrave Island</b>	1890-1900 1890-1974 Since 1938	Significant degradation due to guano mining; Significant degradation due to introduced goats; Construction of tourist resort and facilities
<b>Lady Elliot Island</b>	1863-1873 From 1863 By 1970	Severe degradation due to guano mining; Significant degradation due to introduced goats; Construction of airstrip

Table 6.1. Summary of major changes in islands described in this chapter.

in the period since European settlement; others such as the development of tourist resorts occurred more recently and still continue. The extraction of resources from islands usually occurred over short time spans (in general, one or two decades), whereas the destruction of birds, eggs and nesting sites was reported over a far longer duration. Extractive industries – for example, the mining of rock phosphate at Holbourne Island from 1918-1921 – generally occurred intensively and affected comparatively small areas of individual islands; in contrast, the introduction of *Lantana* was widespread and patchy in the Great Barrier Reef. Coconut plantations were concentrated in certain parts of the Great Barrier Reef: nearshore islands in the vicinity of Cairns, Townsville and Mackay; other changes were probably more evenly distributed: for example, the cutting of firewood by the crews of trochus luggers, since those vessels worked throughout the Great Barrier Reef. Furthermore, some changes in islands – while significant – were apparently reversible; at several islands, some native vegetation degraded by goats may have recovered after the animals were eradicated, although the evidence does not indicate whether ecological communities regained their pre-impacted condition. Other activities, especially the removal of guano at Raine and Lady Elliot Islands, altered the geomorphology of islands and their effects remain in the landscape.

Even within particular industries, such as guano mining, variations occurred in the nature of those activities and their consequences for island landscapes. The early phase of guano mining, which had ended by 1900, was characterised by the most intensive exploitation in which all commercially-viable guano was stripped from the cays; later operations, including the mining that commenced at Michaelmas, Upolu and Oyster Cays after 1900, took place over several decades and, although large quantities of material were nonetheless removed from those cays, the industry was carried out in a more sustainable manner than previously. In contrast, the early use by tourists of the islands of the Great Barrier Reef, before about 1930, was limited by a lack of access and facilities available to visitors whereas, after that year, the influence of tourists on islands caused increasing environmental degradation. These examples serve to illustrate the complexity of the changes in the islands of the Great Barrier Reef since European settlement: many, diverse transformations have occurred that have varied in their significance. The narrative contained in this chapter, nevertheless, suggests that those various changes together amount to a considerable human impact on many island environments. Furthermore, although only a small proportion of the total number of

more than 300 cays and 600 continental islands of the Great Barrier Reef have been affected by human activities, those effects have in general been sustained in the most accessible and most frequently visited of the cays and islands. Some of the management implications of these changes are discussed in Section 8.4.