

Lord Howe Island Biosecurity Strategy 2016



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Glossary and Abbreviations

Term	Definition
ALOP	Appropriate Level of Protection in reference to the level of mitigation applied to reduce a particular risk.
Biosecurity	Biosecurity refers to risks and impacts to the economy, the environment, human health or social amenity associated with pests and diseases including vertebrate pests (feral), invertebrates pests, weeds, animal diseases (including those with implications on human health), plant diseases and marine pests and diseases.
Biosecurity Continuum	Refers to steps in the biosecurity management process including: <ul style="list-style-type: none"> - prevention of incursions and outbreaks - preparedness for and emergency response to incursions and outbreaks - ongoing management of outbreaks including eradication
Biosecurity Risk Items	Items that are capable as transporting or hosting pests, weeds and diseases
Border	The physical or geographical boundary / barrier. In the context of Lord Howe island refers to the initial points of arrival i.e. the wharf and airport
DA	Department of Agriculture (Commonwealth)
DoE	Department of the Environment (Commonwealth)
NSW DPI	Department of Primary Industries (NSW)
Disease	Defined by Intergovernmental Agreement on Biosecurity (IGAB) as the presence of a pathogenic agent in a host and/or the clinical manifestation of infection that has an impact, or poses a likely threat of having an impact on the economy, the environment, human health or social amenity. Disease includes micro-organisms, disease agents, infectious agents and parasites.
Disinfection	The procedure to clean something so as to destroy disease-carrying microorganisms and prevent infection
Disinsection	The procedure whereby measures are taken to control or kill the insect vectors of diseases (i.e. mosquitoes) or insect pests (i.e. ants) that could be present in aircraft, vessels, containers, baggage, cargo and other goods. May include use of knock down or residual insecticides.
Emergency response	In relation to pests and diseases, means the actions taken in anticipation of, during and immediately after an outbreak to ensure that its impacts are minimised and may include: <ul style="list-style-type: none"> - actions constituting an initial response to an outbreak - actions that form part of a national biosecurity event response
Eradicate	In relation to biosecurity organisms, means the elimination of a pest or disease from an area. Eradication is indicated by the pest or disease no longer being detectable.
Established	In relation to pests and diseases, means a pest or disease that is perpetuated, for the foreseeable future, within any area and where it is not feasible (whether in terms of technical feasibility or a cost benefit analysis) to eradicate the pest or disease.
Feral Animal	Animal species that have been introduced to Australia either as a domesticated animal, for sport, biological control or accidentally and established wild populations in new habitat outside its original range, that have an impact, or pose a likely threat of having an impact on the economy, the environment, human health or social amenity
IGAB	Intergovernmental Agreement on Biosecurity. An agreement between the Commonwealth, State and Territory governments, to improve the national biosecurity system.
Impact	In relation to pests and diseases, means the significant negative consequences caused by a pest or disease on: <ul style="list-style-type: none"> - the economy, including impacts on the economy arising from negative consequences on human, animal or plant life, or health and relevant abiotic aspects of primary production and/or business

Term	Definition
	<ul style="list-style-type: none"> - the environment – in relation to the environment, a negative consequence means a negative change to the natural environment or an ecosystem, whether natural or made by humans, including terrestrial, freshwater and marine environments; and/or - social amenity –in relation to social amenity, a negative consequence means a negative change to human infrastructure and human health, including from zoonoses
LHI	Lord Howe Island
LHIB	Lord Howe Island Board
LHIG	Lord Howe Island Group including Lord Howe, the Admiralty Islands, Balls Pyramid and surrounding islands
Mitigation	Mitigation refers to measures taken to reduce the risk of impacts from biosecurity species across the entire continuum of prevention, preparedness and emergency response. Can include preventative actions, surveillance and monitoring, control or eradication.
MPA	Marine Park Authority (NSW)
Naturalised	Exotic species that are able to maintain populations in the wild
Noxious	A legal term referring to weeds declared noxious under State/Territory legislation, which usually means that landholders must control them. Some States/Territories now call noxious weeds 'declared' weeds
Ongoing Management	In relation to pests and diseases of environment and primary production, means: <ul style="list-style-type: none"> - activities that occur after an initial emergency response to an outbreak of a pest or disease has been unsuccessful, is not considered feasible, or has ceased - the management of established pests and diseases
Outbreak	In relation to pests and diseases, means a recently detected new outbreak of a pest or disease, including of: <ul style="list-style-type: none"> - a known exotic pest or disease - a distinguishable variant form of a pest or disease that is established - a pest or disease of unknown or uncertain origin, or - a pest or disease of potential importance to the area endangered and not yet present there or not yet widely distributed and being officially controlled.
Pathogen	Any disease-producing agent, especially a virus, bacterium, or other microorganism.
Pest	As defined by IGAB, means any species, strain or biotype of the Kingdoms Animalia (excluding human beings), Plantae, Fungi, Monera or Protista that have an impact, or pose a likely threat of having an impact on the economy, the environment, human health or social amenity.
Plant Material	Refers to any part of the plant including seeds, flowers, bulbs, rhizomes, propagule material, leaves, stems and branches
Post Border	Once it is past the border. In the context of Lord Howe island refers to the detection / management on the island away from points of entry.
Pre Border	Prior to arrival at the border. In the context of Lord Howe island refers to the mainland or offshore
Preparedness	In relation to pests and diseases, includes arrangements to ensure that, should an outbreak occur, all those resources and services needed to address the outbreak can be efficiently mobilised and deployed. A key preparedness activity is surveillance
Prevention	In relation to pests and diseases, includes regulatory and physical measures to ensure that outbreaks are prevented or their impacts mitigated, and includes pre-border, border and post-border activities.
Quarantine	Traditionally refer to measures at the border to control spread of pest and disease
Weed	Defined by Weeds Australia as any plant that requires some form of action to reduce its effect on the economy, the environment, human health and social amenity.

Executive Summary

Lord Howe Island and its neighbouring offshore islands are recognised to be of global significance and are inscribed on the World Heritage List. The Island contains extraordinary terrestrial and marine ecosystems and varied landscapes. The listing acknowledges the large number of nesting seabirds, the variety of endangered species as well as the diversity of habitat types.

Significant impacts to LHI environmental and economic values have occurred through previous establishment of a range of pests, weeds and diseases. The introduction, establishment and spread of new pests, weeds and diseases constitute a major ongoing threat to the biodiversity and ecosystem processes on LHI and the economy and health of the Island and its residents.

In order to further protect the outstanding values, and protect the economy and health and safety of the community, the Lord Howe Island Board (LHIB) has commissioned AECOM Australia to undertake a review and evaluation of the *Quarantine Strategy for Lord Howe Island* (Landos, 2003) and using the findings to develop the *Lord Howe Island Biosecurity Strategy 2016* - this report.

The review and evaluation of the 2003 Quarantine Strategy produced the following findings.

- The environmental and economic values of LHI (terrestrial and marine) are significant and important and need ongoing protection from biosecurity risks.
- Previous incursions have had significant impacts to environmental and economic values. Significant resources have been invested on control and eradication, however eradication of some things is not possible i.e. Whitefly / Queensland Fruit Fly.
- Significant improvement has been made in the biosecurity system and associated risks reduction since 2003 through the implementation of a range of mitigating measures.
- Stakeholders generally understand the need of biosecurity and are happy with a level of mitigation as long as it is applied consistently, is not too onerous or doesn't impact dramatically on cost of living.
- Current biosecurity best practice is risk based, a shared responsibility and across the continuum of prevention, preparedness, response and ongoing management, before the border, at the border and post border.
- The 2003 Strategy was quite progressive for its time and many recommendations have been achieved.
- A range of pathways exist for spread of biosecurity risk to LHI.
- New incursions of weeds, animals, invertebrates, pathogens and marine pests could have significant impacts to LHI environmental and economic values.
- Current operational controls should continue and new recommendations have been made to mitigate high and medium risks.
- Best value for money recommendations focus on
 - reducing risks at the Port Macquarie wharf through upgrades to infrastructure and increased inspections
 - effecting legislative change for biosecurity protection
 - increasing education and awareness for visitors pre arrival
 - increasing awareness for residents and suppliers both before and after import
 - increasing inspections at the LHI jetty and airport
 - increasing capacity and capability to detect and respond quickly to new incursions through early detection and emergency response planning
 - Ongoing collaboration and partnerships with key stakeholders
 - Recommendations should be considered in the context of current spend for ongoing management and eradication programs.

1.0 Introduction

Lord Howe Island (LHI) is a volcanic remnant located in the Tasman Sea approximately 570 kilometres east of Port Macquarie and 760km north-east of Sydney. It is approximately 11 kilometres long and 2.8 kilometres wide at its widest point with an area of 14.55 km² (see Figure 1).

LHI contains a high level of species diversity for its small size. LHI and the neighbouring off-shore islands; Admiralty Islands, Mutton Bird Islands and Ball's Pyramid (collectively known as the Lord Howe Island Group (LHIG)) were recognised to be of global significance when the area was inscribed on the World Heritage List in 1982 under the following two criteria:

- **Criterion (vii)** – the property contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance; and
- **Criterion (x)** – the property contains the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

The Island contains extraordinary terrestrial and marine ecosystems and varied landscapes. The listing acknowledges the large number of nesting seabirds, the variety of endangered species as well as the diversity of habitat types. The introduction, establishment and spread of new pests, weeds and diseases constitute a major ongoing threat to the biodiversity and ecosystem processes on LHI and the economy and health of the Island and its residents. The Statement of Outstanding Universal Value – for the LHIG can be viewed at <http://www.environment.gov.au/heritage/places/world/lord-howe/values>.

In order to further protect the outstanding values, and protect the economy and health and safety of the community, the Lord Howe Island Board (LHIB) is upgrading the biosecurity system on LHI in a two stage project.

- 1) **Stage 1** will design a robust biosecurity system for LHI through engaging key stakeholders and agencies, evaluating current biosecurity systems, and determining what has been achieved and what remains outstanding. This will occur through review and evaluation of the *Quarantine Strategy for Lord Howe Island* (Landos, 2003) and using the findings to develop the *Lord Howe Island Biosecurity Strategy 2016* - this report.
- 2) **Stage 2** will implement priority actions and agreed strategies identified in Stage 1 to ensure that key biosecurity measures are in place.

The upgrade to the biosecurity system is driven by:

- the ongoing need to protect the World Heritage values of LHI from biosecurity threats
- recent biosecurity reforms across Australia
- successful and ongoing eradication programs for weeds and pest species on LHI.

AECOM Australia Pty Ltd (AECOM) has been engaged by the LHIB to undertake the Stage 1 review and evaluation of the 2003 Strategy and the development of the 2016 Strategy (this document).

1.1 Defining Biosecurity

Biosecurity is defined by the Intergovernmental Agreement on Biosecurity (IGAB) (COAG, 2012) as the management of risks to the economy, the environment, and the community, of pests and diseases entering, emerging, establishing or spreading including:

- vertebrate pests (feral)
- invertebrates pests
- weeds
- animal diseases (including those with implications on human health)
- plant diseases
- marine pests and diseases.

IGAB also identifies three elements (the Biosecurity Continuum) for managing biosecurity risks:

- 1) Prevention of incursions in the first place
- 2) Preparedness for and emergency response to incursions and outbreaks
- 3) Ongoing management of biosecurity risks once established, including eradication.

Biosecurity is essentially a broadening and evolution of the term “quarantine”, which originated from management of human health at a country’s border and grew to interception of other pest and diseases. Modern biosecurity lead practice includes pre border, border and post border management.

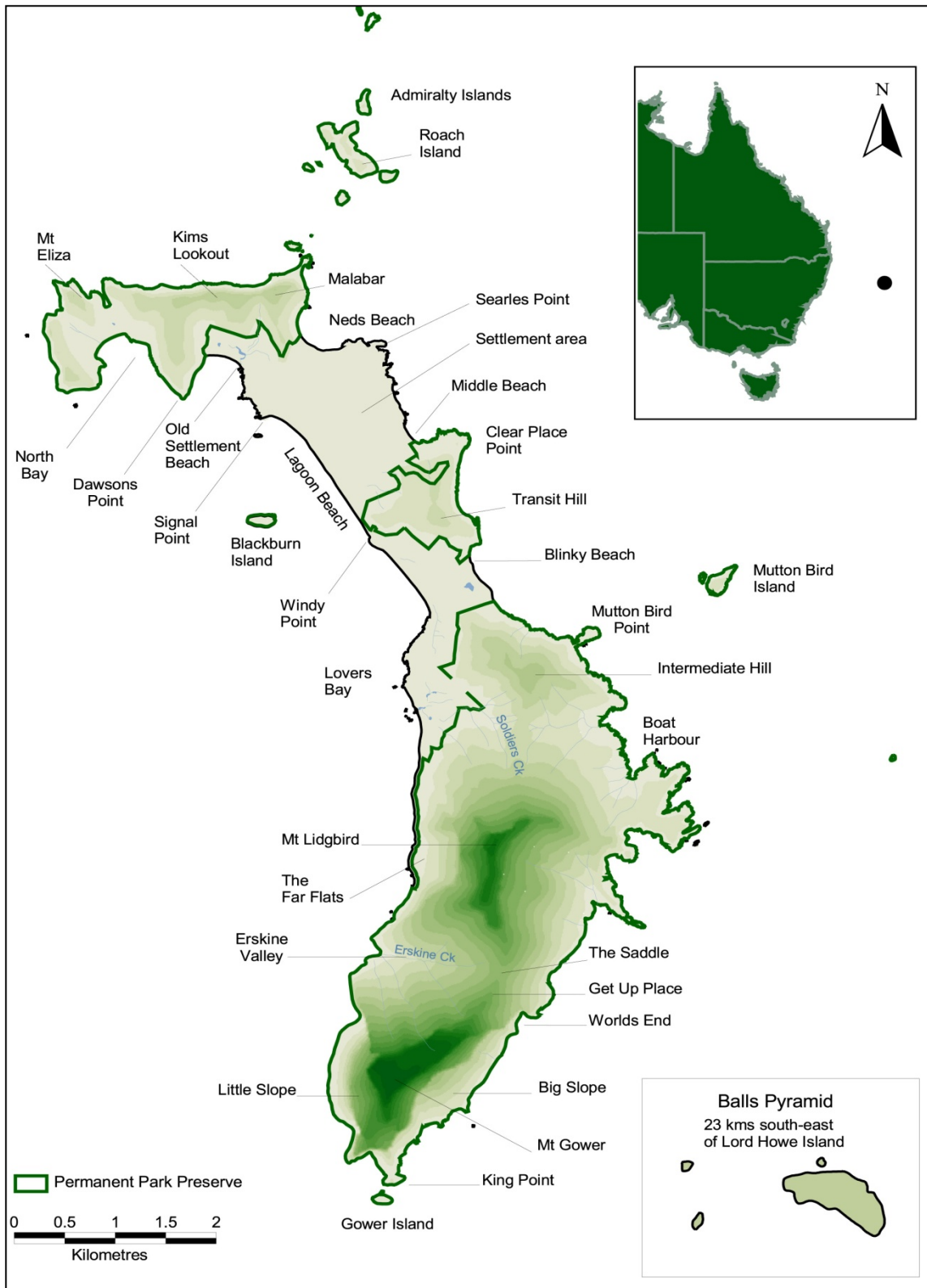


Figure 1 Lord Howe Island (DECC 2007a)

1.2 Purpose of the Strategy

The updated Strategy will ensure that:

- The biodiversity and natural values of LHI (and the economies those values support) and the health and safety of the community are provided an Appropriate Level of Protection (ALOP) from biosecurity risks in the least trade restrictive manner, whilst also delivering a high level of sanitary and phytosanitary protection aimed at reducing risks to a very low level, but not to zero.
- Contemporary biosecurity guiding principles and legislative reforms are considered and met
- Stakeholder views are considered
- Success and challenges from implementation of the 2003 Strategy and from other case studies are recognised and lessons learnt are incorporated into the revised Biosecurity Strategy
- Recommended actions have realistic cost and resource estimates and are prioritised to allow progression to Stage 2.

1.3 Methodology

The following methodology was employed for Stage 1.

Table 1 Stage 1 Overview

Task	Purpose
Desktop review and evaluation	Identify environmental values, legislative requirements, biosecurity threats, best practice, lessons learnt and gaps.
Initial Advice	Advise identified stakeholders of the project and consultation program.
Site visit LHI	Re-evaluate natural and man-made pathways (entry points) and surrounding environs. Assess adequacy of existing passenger and cargo offloading facilities, inspection, treatment and containment facilities and potential for expansion.
Initial Stakeholder Consultation	Undertake initial consultation with LHI and other relevant stakeholders to identify: <ul style="list-style-type: none"> - Views and attitudes towards current and potential “future state” quarantine management on LHI - Activities that pose biosecurity risks and current mitigation - Capability and resources available to implement mitigation measures, for surveillance or to respond to outbreaks - Implications that mitigation measures may have on local business and industry.
Port Macquarie site visit	Assess current and potential quarantine risks, pathways and biosecurity controls to be implemented “offshore”. Discussion with suppliers and sea and air freight representatives.
Potential Threat Analysis and Risk Assessment	Determine which pests and diseases could potentially impact on LHI. Identify pathways for spread, risk species and ability to establish. Undertake a Risk Assessment to assess the likelihood and consequence of potential impacts arising from known and potential biosecurity risks to LHI.
Draft Biosecurity Strategy	Collate and summarise the methodology employed and outcomes of the above sections and includes the development of mitigation options. Recommend prioritised actions for Stage 2 Implementation.
Board Update	Update the Board of progress.
Consultation on the Draft Strategy	Present the Draft to various stakeholders, for comment. Includes a workshop and public meeting on LHI and electronic copies to other stakeholders.
Finalising the Biosecurity Strategy	Collation of Stakeholder comments. Finalise with LHIB.

*Part 1 – What Are We Trying
to Protect*



2.0 Lord Howe Island Setting

Access to LHI is by boat or plane and the island residents are heavily reliant on these modes of transport for both the economy and their own access to food and goods. Regular passenger flights arrive daily from Sydney and weekly from Brisbane and Port Macquarie (seasonally). Private and military planes and vessels also visit the island from mainland Australia and occasionally internationally. Small cargo and mail arrive by a small freight plane from Port Macquarie. A barge service (the Island Trader) runs fortnightly from Port Macquarie delivering most of the island's freight including fresh and frozen produce and goods.

Approximately 400 hectares of LHI is in the lowland settled area (residential and agricultural) and the rest of the island (almost 80%) is protected under the Lord Howe Island Permanent Park Preserve (similar to a National Park). The Reserve encompasses the land above the high water mark including both the northern and southern mountains of the main island, the Admiralty Islands, Balls Pyramid and surrounding islands that form the LHIG. Ocean waters from the high water mark to three nautical miles offshore are protected under the NSW Lord Howe Island Marine Park (approximately 47,000 hectares). Waters from three nautical miles to 12 nautical miles are protected within the former Lord Howe Island Marine Park (Commonwealth Waters), an area of approximately 3,000km². Marine Park boundaries are shown in Figure 2.

Note: At the time of writing this Strategy, the Lord Howe Commonwealth Marine Reserve (a much larger area covering more than 110,000km²) had been declared replacing the former Lord Howe Island Marine Park (Commonwealth Waters). Transitional management arrangements were in place however no operational changes were yet in effect.

The LHIG is part of the State of New South Wales that, for legal purposes, is regarded as an unincorporated area administered by the LHIB, a statutory authority established under the provisions of the *Lord Howe Island Act, 1953*. The Board is directly responsible to the NSW Minister for the Environment and comprises four Islanders elected by the local community and three members appointed by the Minister. It is charged with the care, control and management of the Island's natural values and the affairs and trade of the Island. It is also responsible for the care, improvement and welfare of the Island and residents.

The Board carries out all local government functions on behalf of approximately 400 Island residents. It controls all land tenure on the Island and administers all residential and other leases in accordance with the Act. The Board operates one trading enterprise: a liquor distribution outlet, and is responsible for the generation and reticulation of electricity and operation of the Island. The Board manages the Island Permanent Park Preserve and the protection and conservation of the Island's fauna and flora.

Management of the marine areas (both State and Commonwealth waters) is the responsibility of the New South Wales Marine Park Authority.

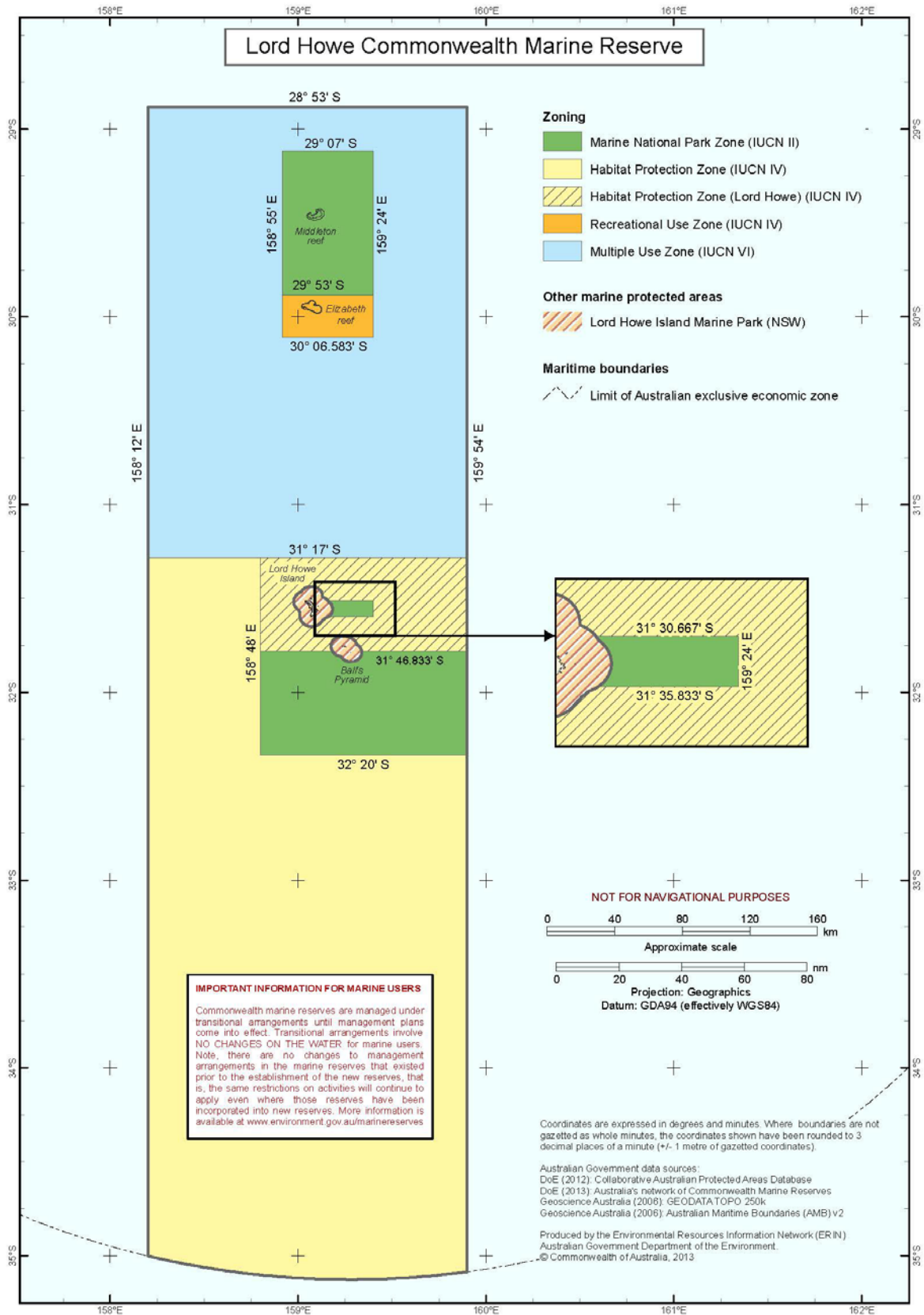


Figure 2 Marine Park Boundaries

3.0 Environmental Values

Listed on the World Heritage List in 1982, the 1,463 km² LHIG is an outstanding example of an oceanic island of volcanic origin with a unique biota of plants and animals and important and significant natural habitats for in-situ conservation of biological diversity, including those containing species of plants and animals of outstanding universal significance from the point of view of science and conservation.

This section summarises environmental values based on a review of existing information only.

3.1 Terrestrial Environment

The LHIG supports a diverse terrestrial flora and fauna with a high degree of endemic species and communities. Most of the LHIG is protected under the 1,300 hectare Permanent Park Preserve which includes both the northern and southern mountains of the main island, the Admiralty Islands, Balls Pyramid and surrounding islands.

Examples of World Heritage values of the LHIG specific to the terrestrial environment (Environment Australia, 2002) include:

- the diversity of bird taxa comprising 164 bird species, including species of conservation significance with many endemics
- seabird breeding habitats which, together, comprise one of the major breeding sites in the southwest Pacific, including for species of conservation significance
- high levels of richness and endemism of terrestrial invertebrate taxa including 100 species of spiders of which 50% are endemic
- the diversity of vegetation communities which includes 25 associations, 20 alliances and 14 sub-formations
- the diversity of indigenous vascular plant taxa comprising at least 241 species, including species of conservation significance with many endemics.

3.1.1 Fauna

Mammals

The only known native mammal on the LHIG is the large forest bat (*Vespadelus darlingtonii*) (DECC, 2010). The Lord Howe Long-eared Bat (*Nyctophilus howensis*) is thought to be extinct (DECC, 2007).

Birds

Similar to other oceanic islands, the terrestrial fauna of the LHIG is dominated by birds. The LHIG forms one of the major seabird breeding sites in the Tasman Sea and is thought to be home to the most diverse and largest number of seabirds in Australia (DECC, 2010). Many of these species are believed to have important breeding populations on the LHIG; they are the only major breeding locality for the Providence Petrel (*Pterodroma solandri*), and contain one of the world's largest breeding concentrations of Red-tailed Tropicbird (*Phaethon rubricauda*).

182 species have been recorded from the LHIG of which 20 are resident land birds, 14 are breeding seabirds, 17 are regular visitors and 120 are vagrants (DECC, 2010). 34 species have been recorded as regularly breeding on the islands. Many of the breeding seabirds found on the islands are listed migratory species.

The LHIG is the only known breeding locality in the Australasian region for the grey ternlet (*Procelsterna cerulea*) and Kermadec petrel (*Pterodroma neglecta neglecta*), and is the southernmost breeding locality in the world for the masked booby (*Sula dactylatra tasmani*), the sooty tern (*Onychoprion fuscata*) and common noddly (*Anous stolidus*).

Endemic land birds on the islands include the Woodhen (*Gallirallus sylvestris*), Lord Howe silvereye (*Zosterops lateralis tephroleurus*), Lord Howe golden whistler (*Pachycephala pectoralis contempta*) and Lord Howe currawong (*Strepera graculina crissalis*). Nine land birds and two sea birds are believed extinct.

Reptiles

There are two native reptiles, a skink *Oligosoma lichenigera* and a gecko *Christinus guentheri* (DECC, 2010). Both are now severely reduced in their range and abundance on the main island due to predation by rats;

however both are present on Blackburn Island, the Admiralty group, Mutton Bird Island and Balls Pyramid. Both species also occur on Norfolk Island, although recent genetic work indicates they are separate species.

Invertebrates

The LHIG has a very complex and biogeographically interesting invertebrate fauna, characterised by relatively high species richness (>1600 species recorded) and high endemism (DECC, 2010). This includes 157 land and freshwater snails, 464 beetles, 46 ants, 183 spiders, 21 earthworms, 137 butterflies and moths and 71 springtails. The rate of discovery of new species remains high, indicating that numerous endemic species are yet to be discovered (DECC, 2007).





Of particular note are the Lord Howe Island phasmid (*Dryococelus australis*), which was previously thought to be extinct, the Lord Howe Island wood-feeding cockroach (*Panesthia lata*), and the darkling beetle (*Promethis sterrha*) which are no longer found on the main island, but are restricted to outlying, rat-free islands (DECC, 2007).

There are more than 50 endemic species of land snails found in the island group. One large species, *Epiglypta howinsulae*, has already become extinct and another large species, the Lord Howe Island placostylus (*Placostylus bivaricosus*), is endangered with one of its subspecies presumed extinct (DECC, 2010).

It is believed that numerous invertebrate extinctions have occurred including one endemic ant and ten endemic beetles (DECC, 2007). However, Dr Ben Hoffmann has confirmed the extinct ant has since been rediscovered during a recent survey (pers comm.).

Freshwater Fishes

Three species of freshwater fish (two eels and a galaxias) occur on the LHIG (DECC, 2007).

	
<p>Plate 1 White Tern <i>Gygis alba</i> (courtesy LHITA)</p>	<p>Plate 2 Woodhen (courtesy LHITA)</p>
	
<p>Plate 3 Lord Howe Island Phasmid (courtesy LHITA)</p>	<p>Plate 4 LHI Gecko (courtesy Dave Hunter)</p>

3.1.2 Flora





Over thirty vegetation communities have been described from the LHIG and many of these are endemic or have highly restricted distributions. Eighteen of these communities are considered to be of particular conservation concern (DECC, 2007).

There are currently believed to be approximately 240 native species of vascular plants in the LHIG (DECC, 2010). While the vegetation has affinities with the flora of northern New South Wales, southern Queensland, New Zealand, Norfolk Island and New Caledonia, there is a high level of endemism (113 species (47%)). The high degree of endemism is illustrated not only at the species level, but also at the generic level, where there are five endemic vascular plant genera including three endemic palms (DECC, 2007).

There are ten plant species and three Endangered Ecological Communities listed as threatened under the NSW Threatened Species Conservation (TSC) Act 1995 or the Federal Environmental Protection and Biodiversity Conservation (EPBC) Act 1999.

The southern mountains are considered a hot spot for endemic species community diversity and uniqueness, with Balls Pyramid, the eastern settlement area, the northern hills, the offshore islands, Steven’s Reserve and Transit Hill are also recognised as hotspot areas. (DEC, 2007).

The non-vascular flora of terrestrial and freshwater habitats (bryophytes, lichens and freshwater algae) is less well known, but is also considered to be diverse with many endemic species. For example, 105 species of mosses are known, 21 (20%) of which are endemic.

	
<p>Plate 5 Mountain Rose <i>Metrosideros nervulosa</i> in flower at the Razorback Mount Gower (courtesy Sue Bower)</p>	<p>Plate 6 Fungi (courtesy Jack Shick via LHITA)</p>
	
<p>Plate 7 Crinum Lilly <i>Crinum pedunculatum</i> (courtesy LHITA)</p>	<p>Plate 8 Gnarled Mossy Cloud Forest (courtesy LHITA)</p>

3.2 Marine Environment

The marine environment comprises most of the area within the LHIG World Heritage Area and provides an unusual mixture of temperate and tropical biodiversity as well as a high level of endemism that provides significant environmental, heritage and economic value.

Ocean waters from the high water mark to three nautical miles offshore from Lord Howe Island (including the Admiralty Islands and Balls Pyramid) form part of the state of NSW and are protected under the approximately 47,000 hectare NSW Lord Howe Island Marine Park, declared in 1999. Waters from three nautical miles to out to a distance of 200 nautical miles are considered Commonwealth waters with waters from three nautical miles to 12 nautical miles protected within the former Lord Howe Island Marine Park (Commonwealth Waters), an area of approximately 3,000km².

Note: At the time of writing this Strategy, the Lord Howe Commonwealth Marine Reserve (a much larger area covering more than 110,000km²) had been declared replacing the former Lord Howe Island Marine Park (Commonwealth Waters). Transitional management arrangements were in place however no operational changes were yet in effect.

The waters of Lord Howe Island are renowned for their clarity, relatively high coral and algae cover. The island supports the southernmost barrier coral reef and associated lagoon in the world, differing considerably from more northerly warm water reefs. It also provides a rare example of the transition between coral and algal reefs due to movement of tropical and temperate water around the Island (known as the Tasman Front). This front forms where the eastward flow of the warm East Australian Current meets the waters of the southern temperate Tasman Current (Environment Australia, 2002).

The fringing coral reef and associated sheltered lagoon, open coast, nearshore rocky reefs, sandy beaches, mid-shelf reefs, intertidal reefs, seagrass beds, mangroves, unconsolidated shelf habitats, rugged seamount shelves and slopes, pelagic waters shallow inshore lagoons, and the steep drop offs to deep ocean create a diverse topography that maximises exposure to ocean currents from all directions and thus the potential for high biodiversity (Environment Australia, 2002). Tropical species tend to dominate in terms of total species counts, although temperate animals and plants dominate in terms of abundance and biomass (Marine Parks Authority 2010b). A number of conservation significant species are recorded within Lord Howe Island waters.

Examples of World Heritage values of the Lord Howe Island group specific to the marine environment (Environment Australia, 2002) include:

- the unusual combination of tropical and temperate taxa of marine flora and fauna, including many species at their distributional limits, reflecting the extreme latitude of the coral reef ecosystems which comprise the southernmost true coral reef in the world;
- the diversity of marine benthic algae species, including at over 300 species of which 12 per cent are endemic
- the diversity of marine fish species, including 447 species of which 400 are inshore species and 15 are endemic; and
- the diversity of marine invertebrate species, including more than 83 species of corals and 65 species of echinoderms of which 70 per cent are tropical, 24 per cent are temperate and 6 per cent are endemic (Environment Australia, 2002)

Limited information is available on the productivity and ecological importance of the flora, fauna or communities of the deeper shelf waters other than to note that they are clearly unique (Environment Australia, 2002).

The seamount areas appear to be isolated marine systems and that low species overlap between different seamounts in the region leads to highly localised species distributions that are exceptional for the deep sea. (Environment Australia, 2002)

Fish

Lord Howe Island supports a diverse fish fauna, with 447 species and 107 families recorded the Island. There are 47 species of wrasse, 25 of damselfish, 23 gobies and 22 coralfish. Butterfly cod, parrot fish, painted morwong and the doubleheader are commonly found in the lagoon (Environment Australia, 2002).

The deep-water pelagics known through fishing activities include marlin (blue and striped), sharks (Galapagos, whalers, some tigers, whites and makos), sailfish, dolphin fish, yellowfin tuna, wahoo, trevally, bonito, yellow-tail kingfish and spangled emperor.

Corals, Invertebrates and Echinoderms

Coral and echinoderm species found at Lord Howe Island include common and widespread tropical forms which also occur on the Great Barrier Reef, as well as tropical species at their southern limits of distribution and subtropical species which are rare or absent from the Great Barrier Reef.

There are at least 83 species from 33 genera in 11 families; this represents relatively high diversity considering the Islands' latitude and isolation from other major coral communities. More than 65 species of echinoderms, made up of 70 per cent tropical species, 24 per cent temperate species and 6 per cent endemic species, have also been recorded (Environment Australia, 2002).

Mobile invertebrates are highly diverse, with more than 1,500 species of molluscs (snails and shellfish) likely to occur in the park, in addition to at least 110 species of echinoderms, and 70 species of crustaceans (Marine Parks Authority 2010b).

Whilst there is limited information available on deep-water invertebrates offshore from the Lord Howe Island Group, it is believed that the shelves had a high conservation value due to their relatively pristine state compared to other Australian shelves and the high endemism of the Island's fauna (Environment Australia, 2002).

Algae

Algae form one of the most striking features of the marine habitat within the Lord Howe Island area. For its size, the Island is one of the richest localities for green macroalgae. Lord Howe Island is also particularly important because it sits at the extreme latitudinal limit of many green algal species and genera. It holds the world's highest latitude populations of many species. There are 174 species of red algae, 68 species of brown algae and 76 species of green algae, which include at least 47 (15%) endemic species. The close proximity of temperate macroalgal and tropical coral community species is considered to be unique globally (Marine Parks Authority 2010b).

Marine Mammals

The bottlenose dolphin *Tursiops truncatus* is common in Lord Howe Island waters. Migratory dolphins, such as the spinner dolphin, the dusky dolphin and pan tropical spotted dolphin, may pass through. The marine park is in the migratory pathways of species such as the humpback whale *Megaptera novaeangliae*. Other whale species recorded around Lord Howe Island include the sperm whale *Physeter macrocephalus*, pilot whales *Globicephala* sp. and the dense-beaked whale *Mesoplodon densirostris* (Marine Parks Authority 2010b).

Reptiles

Marine reptiles in the park consist of turtles and sea snakes. At least four species of turtle (green, hawksbill, leatherback and loggerhead) have been recorded (Marine Parks Authority 2010). There are no recent records of turtles nesting on the islands of the park. 11 species of sea snake including the yellow-bellied sea snake have been recorded (Marine Parks Authority 2010b).

Cultural Heritage

The marine environment has contributed significantly to the cultural heritage value of the LHIG through the first reported sighting European sighting and subsequent claiming as a British possession in 1788, to visiting ships of the First, Second and Third Fleets to whaling, early settlement, trading and provisioning, scientific expedition, and the kentia palm and tourism industries. In addition it is believed that several ships have been lost in the Lord Howe area, including six believed to have been lost in the vicinity of Lord Howe Island however no shipwrecks have been located. Lost ships include the Wolf, wrecked in 1837, the Zeno, wrecked in 1895, Maelgyn, lost in 1907, and the Laura, wrecked in 1913. Another important part of the island's history is the era of the flying boat service, planes that were used for transport to the island from Sydney. Aircraft wreckage of some of these planes is known to be submerged in the deeper waters of the island

The marine environment continues to be of primary importance to LHI residents and the local economy through recreation, food security and tourism and trade. The local fishing charter operators sell their catch to restaurants and visitors on the island.



Plate 9 Coral (courtesy LHITA)



Plate 10 Coral (courtesy LHITA)



Plate 11 Galapagos Shark *Carcharhinus galapagensis* (courtesy LHITA)



Plate 12 Double Header Wrasse *Coris bulbifrons* (courtesy LHITA)

4.0 Economic and Other Values

4.1 Tourism

Tourism is the most significant industry and major source of income on the Island and is heavily focused around the World Heritage values of both the marine and terrestrial environments.

A profile of local business undertaken by Arche Consulting Pty Ltd (Arche, 2010) identified that there were 18 lodge operators, 18 tour operators (now 20), 13 restaurants and cafes and nine retail stores operating on LHI. The same study summarised the primary reasons for visiting LHI were “to visit a place that was un-touched/un-developed”, “to experience nature on land/ocean” and “for the World Heritage Status”. A separate Visitor and Expenditure Survey found that 98 percent of respondents rated the natural marine and land environments of the island as important. These results show the island’s natural values (including the marine park) were the most important driver of island visitation (MPA, 2010a).

The same survey indicated 95% of respondents were of domestic origin. 61% of respondents came from NSW with 37% of these respondents coming from Sydney.

The 2011 census (Australian Bureau of Statistics - ABS, 2015) data shows almost 50% of the LHI workforce is employed in accommodation, cafes and restaurants alone, with another 4% employed in Agriculture, Forestry and Fisheries, and another 3% in Arts and Recreation.

There is little known information about the total size of the Lord Howe Island economy. However Arche 2010 surmised that the tourism annual expenditure is in the vicinity of \$23.4 million (based on an annual visitation of 16,000 people, or an average of approximately 300 people per week, staying 7 nights and expending a typical \$1,500 per 7 night stay).

Key tourism activities include:






- Marine activities in the Marine Parks such as beach and reef walking, swimming, snorkelling, scuba diving, fish feeding, surfing, underwater photography, windsurfing, sea-kayaking, fishing, sightseeing cruises and eco tours, and other water sports and beach activities
- Terrestrial activities such as hiking, bird watching, golf, walking, bike riding, sightseeing and eco tours, lawn bowls.



Plate 13 Snorkelling (courtesy LHITA)



Plate 14 Hiking / Sightseeing (courtesy LHITA)

		
<p>Plate 15 Kayaking (courtesy LHITA)</p>	<p>Plate 16 Fishing (courtesy LHITA)</p>	
		
<p>Plate 17 Glass bottom tours (courtesy LHITA)</p>	<p>Plate 18 Golf (courtesy LHITA)</p>	<p>Plate 19 Diving (courtesy LHITA)</p>

4.2 Kentia Palm Industry

Export of the Lord Howe Kentia Palm (*Howea forsteriana*) and to a lesser extent, three other palm species endemic to LHI, has been a major industry since the late 1800s. The species is now one of the most popular decorative palms in the world.

Seed is collected from natural forest and plantations and then germinated in soil-less media and sealed from the atmosphere to prevent contamination. After testing, they are picked, washed (bare-rooted), sanitised and certified then packed and sealed into insulated containers for export.

Previously the Kentia Palm Nursery on LHI was owned and operated by the LHIB, however in 2013 the Board made the decision to lease the nursery to a private operator, Kentia Fresh Pty Ltd. The company is currently implementing a two stage approach, with the following activities in Stage One:

- Production and sale of Kentia palm seedlings and, depending on demand, sale of semi-mature Kentia palms
- Vegetable and fruit production pursuant to an initial pilot program
- Native plant production for local sale and Board revegetation initiatives
- Limited tourism activities, including tours of the Kentia nursery
- Feasibility studies regarding future tourism initiatives for Stage 2.



4.3 Island Way of Life

Island way of life is another important value on LHI. Whilst difficult to quantify, it can be described as a combination of the following

- Deep connection to and pride in long ancestry on LHI
- Appreciation and enjoyment of the natural values of LHI. This includes recreational activities in the terrestrial and marine environments
- Ability to source food from within the Marine Park and grow their own food and produce on LHI minimising reliance on importation
- Reluctance to “over regulation”
- Acceptance of biosecurity if not overly onerous.

Part 2 – The Current State



5.0 Previous Incursions

Since settlement on LHI, a number of pest and non-native species have been introduced, either intentionally or inadvertently, to LHI. The table below attempts to summarise these incursions, the likely pathways, known or potential impacts and current (or historical) control activities based on desktop information available.

Table 2 Previous Incursion Summary

Species	Likely pathway and timing	Impacts	Control Activities	Eradicated
Weeds				
<p>There are at least 600 introduced plant species found on the main Lord Howe Island, of which around 270 species have become naturalised. There are 59 declared noxious weeds (and several known weeds that are not declared). Of particular concern are:</p> <ul style="list-style-type: none"> - cherry guava (<i>Psidium cattleianum</i>); - African boxthorn (<i>Lycium ferocissimum</i>) - ground asparagus (<i>Asparagus aethiopicus</i>) - bridal creeper (<i>Asparagus asparagoides</i>) - climbing asparagus (<i>Asparagus plumosus</i>) - ochna (<i>Ochna serrulata</i>) - bitou bush (<i>Chrysanthemoides monilifera</i>) - sweet Pittosporum (<i>Pittosporum undulatum</i>) - Crofton weed (<i>Ageratina adenophora</i>) - Tiger lily (<i>Lilium formosanum</i>) - exotic grasses, such as kikuyu (<i>Pennisetum clandestinum</i>), buffalo grass (<i>Stenotaphrum secundatum</i>) and Rhodes grass (<i>Chloris gayana</i>) 	<p>Deliberate introduction of garden ornamentals and pasture plants</p> <p>Hitchhiker weeds in fodder</p> <p>Ocean currents or birds</p>	<p>Depletion of native species through competition, hybridisation, and the alteration of ecosystem structure and function i.e. establishment of monocultures, limiting burrow access for animals</p> <p>Colonisation of bare areas</p> <p>Inhibit regeneration and native recruitment</p> <p>Amenity impacts</p>	<p>Ad hoc control near settlement since 1970's</p> <p>Annual weed inspections since 1997</p> <p>Significant ramp up of the weed management program since 2004</p>	<p>Eradication is the ultimate target for LHI's noxious weeds</p>

Species	Likely pathway and timing	Impacts	Control Activities	Eradicated
Mammals				
Ship Rat and House Mouse	From ships	<p>Predation on invertebrates, reptiles and bird eggs</p> <p>Competition with invertebrate seed predators</p> <p>Seed, fungi and seedling predation including Kentia Palm</p> <p>Impact on World Heritage values and obligations under International conventions on migratory species.</p>	Warfarin based baiting control program ceased in 2009 due to unavailability of commercial quantities required on LHI due to widespread resistance to the product on the mainland. Currently implementing a baiting program using coumatetralyl through an off label permit by the APVMA	Eradication proposed and under current consideration
Feral Cat (<i>Felis catus</i>)	Deliberate introduction or escape	Predation on reptiles, birds and bird eggs	Prohibited import	Eradicated 1981
Feral Goat (<i>Capra hircus</i>)	Deliberate introduction or escape	<p>Habitat degradation through browsing, grazing and trampling</p> <p>Spread of weeds such as cherry guava</p>	Prohibited import	Eradication program undertaken in 1999. Wild population reduced to a few non breeding individuals now thought to be extirpated. Aging non breeding domestic herd of less than 5 nanny goats remain in settlement and will not be replaced once deceased.
Feral Pig (<i>Sus scrofa</i>)	Deliberate introduction or escape	Habitat degradation through wallowing and trampling	Prohibited import	Eradicated 1979

Species	Likely pathway and timing	Impacts	Control Activities	Eradicated
		Predation on reptiles, birds and bird eggs Seed, rhizome and seedling predation Spread of weeds such as cherry guava		

Species	Likely pathway and timing	Impacts	Control Activities	Eradicated
Birds				
<p>18 land bird species and five sea bird species have established populations on the LHIG since settlement. These include :</p> <ul style="list-style-type: none"> - Masked owl (<i>Tyto novehollandiae</i>) - feral pigeon (<i>Columba livia</i>) - mallard (<i>Anas platyrhynchos</i>) - song thrush (<i>Turdus philomelos</i>) - common blackbird (<i>Turdus merula</i>) - common Starling (<i>Sturnus vulgaris</i>) - Barn owl (<i>Tyto alba</i>) 	<p>Deliberate introduction i.e. for biological control of rats, weevils</p> <p>Unassisted colonisation</p>	<p>Spread of weeds such as cherry guava</p> <p>Competition for food, shelter and nest sites</p> <p>Predation on invertebrates, reptiles and other birds</p> <p>Predation on seeds</p>	<p>Periodic control of pigeons and starlings</p>	<p>Barn Owls thought to be eradicated but recent record suggests periodic natural colonisation possible. Masked Owl to be coincidentally eradicated with proposed rodent eradication program</p>
Invertebrates				
<p>Introduced invertebrate species currently comprise at least 5% of the recorded invertebrate fauna (although this number is assumed to be much higher), including:</p> <ul style="list-style-type: none"> - African Big-headed Ants and 26 other ants - 13 land snails and slugs - 21 beetles - Nine spiders - Five earthworms, - Six butterflies and moths - Terrestrial Isopod (<i>Ligia exotica</i>) - Whitefly (<i>Bemisa</i> sp, <i>trialeurodes</i> sp) - Queensland Fruit Fly (<i>Bactrocera tryoni</i>) - Banana borer (<i>Cosmopolites sordidus</i>) 	<p>Hitchhiker pests in cargo such as building material and food</p>	<p>Predation on natives</p> <p>Depletion of native species through competition</p> <p>Damage to local produce and inability to grow crops</p>	<p>African Big - headed Ant baiting with Amdro bait since 2008</p>	<p>Eradication in progress for African Big - headed Ant</p>
Reptiles and Amphibians				
<ul style="list-style-type: none"> - Rainbow Skink (<i>Lampropholis delicata</i>) - Bleating tree frog (<i>Litoria dentata</i>) - Green tree frog (<i>Litoria caerulea</i>) 	<p>Hitchhiker pests in cargo and food</p> <p>Via post</p>	<p>Likely to compete with, and prey upon, native invertebrates</p>	<p>n/a</p>	<p>No Asian House Gecko not recorded recently</p>

Species	Likely pathway and timing	Impacts	Control Activities	Eradicated
<ul style="list-style-type: none"> - Eastern Snake-necked Turtle (<i>Chelodina longicollis</i>) - Asian House Gecko (<i>Hemidactylus frenatus</i>) - Snakes 	Deliberate introduction as pets		Green tree Frog occasionally detected and euthanised and sent to Museum Asian House Gecko euthanised and sent to Museum Pet snake intercepted and sent back to mainland	
Pathogens				
<i>Phytophthora cinnamomi</i> <i>Phytophthora multivora</i>	Soil Plant stock Visitors footwear Vehicles, plant/equipment,	Root rot causing dieback of a range of plants	Infestation detected and controlled in 2002. Ongoing management including quarantine, treatment with fungicides and establishment of scrub down bins. Ongoing monitoring	Eradication ongoing
Onion smut (<i>Urosystis cepulae</i>)	Soil Infected onions		n/a	No
Marine Pests				
19 cryptogenic species (unclear if the species is native or introduced) recorded in 2006 (Aquenal, 2006b). Cryptogenic species identified consisted of: <ul style="list-style-type: none"> - two compound ascidians - three hydroids - two bryozoans - four crustaceans - one echinoderm - one polychaete When the field survey findings were combined with a literature search, a total of 54 cryptogenic species was recorded, with 50 of these confirmed as occurring in marine habitats	Ballast water Hull fouling Ocean Currents	Globally, marine ecosystems have been dramatically altered by the spread of invasive and exotic species including reduced densities of native species through competition and predation, habitat alteration, changes in trophic dynamics and community composition, fisheries declines, fouling of marine structures and loss of aesthetic and amenity values (Aquenal 2006b).	n/a	n/a

Species	Likely pathway and timing	Impacts	Control Activities	Eradicated
<p>of the island. With the exception of one crustacean species, all of the cryptogenic species recorded from the literature (not the field survey) were algae.</p>				

		
<p>Plate 22 Rat (courtesy LHIB)</p>	<p>Plate 23 Treated Climbing Asparagus (courtesy LHIB)</p>	<p>Plate 24 African Big-headed Ant Survey (courtesy LHIB)</p>
		
<p>Plate 25 African Big-headed Ant (courtesy Antweb.org)</p>	<p>Plate 26 Asian House Gecko (courtesy LHIB)</p>	
		
<p>Plate 27 Green Tree Frog (courtesy LHIB)</p>	<p>Plate 28 Cherry Guava Control Mt Gower (courtesy LHIB)</p>	

6.0 The Existing Quarantine System

The existing quarantine system on Lord Howe Island is made up of several legislative (described in section 9 below), procedural and operational aspects including:

- The LHI Quarantine Strategy 2003
- a number of policies specific to particular biosecurity aspects (i.e. importation conditions or restrictions for dogs, avian species, goats, stock, plants and plant material etc. including myrtle rust protocols.
- biosecurity considerations in management plans such as the Lord Howe Island Permanent Park Preserve Plan of Management 2010
- various operational controls including awareness, inspection, surveillance and eradication programs.

These are described in more detail below.

6.1 The 2003 Quarantine Strategy

In 2003, the LHIB engaged a quarantine consultant (John Landos) to develop a Quarantine Strategy to minimise the risk of serious unwanted incursions of pests, weeds or disease. The Strategy was developed through consultation with island and mainland stakeholders, identifying pathways and assessment of risks. The Strategy recognised the importance of stakeholder engagement and partnerships, the need for realistic costs and accepting residual risk as important.

The Strategy identified 67 recommendations for improvement across the biosecurity continuum of pre border, border and post border control. The adoption and implementation of the 2003 Quarantine Strategy has led to significant improvements in quarantine management on the island. Some of the major improvements are discussed below in the following sections.

In 2012 the LHIB reviewed implementation of the Strategy in a Business Paper (LHIB, 2012), which highlighted the status of recommendations made in the Strategy. Some tasks were completed, some were in progress and some were yet to be commenced. A detailed analysis of current progress of recommended actions is provided in Section 10.

6.2 LHIB Policy and Procedures

The LHIB have developed and implemented several policies to manage biosecurity risks through the restriction or prohibition on importation of plants, animals and other biosecurity risk items. The policies outline permissible, restricted and prohibited items and the relevant approval conditions. Penalties for offences in contravention of the policies are also described. A summary of these policies is described below.

Table 3 LHIB Policies Summary

Policy and Date	Restricts	Prohibits
Avian Importation Policy (Aug 2011)	Caged Birds as pets - Cockatiels, budgerigars, canaries. Only with LHIB approval and disease screening.	Other species of caged birds as pets.
	Domestic poultry Chickens and Turkeys - day old chicks and fertile eggs. Only with LHIB approval and disease screening.	Other species of domestic poultry.
Keeping of Domestic Goats Policy Feb 2011	Pet goat ownership to island residents who owned goats at 8 Sept 1999 under licence.	Further Importation of goats and goat breeding material
Importation of Stock Policy Mar 2011 (cattle, sheep, horse and alpaca)	Importation of stock. Only with LHIB approval and after quarantine period with weed free fodder. Must be certified free of certain diseases and parasites.	Other stock species Current moratorium on sheep and alpaca until proposed rodent eradication

Policy and Date	Restricts	Prohibits
	Certified grain, milled (not rolled) feed, pellets and heat treated products where weed seeds have been rendered non-viable are permitted	Other grains and feeds
	Horses – only certified gelded males and mares not in foal	Colts and stallions
	Sheep, approved breeds and certified free of Footrot	
Plant Importation Policy May 2013 and Plant Importation Strategy May 2014	<p>LHIB approval for importation of all plants and plant material.</p> <ul style="list-style-type: none"> - Potted plants; - Plant material that is intended for the use of growing e.g. seeds, bulbs, seedlings cuttings and root stock (bare-rooted); - Cut flowers and foliage, including bouquets; - Stock feed/hay; and - Mulch. <p>Approval for import and assessment of the potential entry of a pathogen or pest is determined by the LHIB through a Weed Risk Assessment</p> <p>Excludes fresh fruit and vegetable for consumption and clean and packaged permissible" flower and vegetable seeds</p> <p>Permissible list of plants and seeds</p>	<p>Plants and plant material from the Myrtaceae family including cut flowers and tea tree mulch</p> <p>Plant imports are prohibited from nurseries unless they hold NIASA accreditation (or equivalent), or a current Myrtle Rust Management Plan or operate under ICA 42</p> <p>Soil</p> <p>Plants in the same genus as LHI endemic plants</p> <p>Any declared Noxious Plant within any Australian jurisdiction. Plants which have escaped gardens on LHI and plants which are known to be invasive in similar climatic regimes elsewhere</p> <p>All species of palms (Family Arecaceae), Grasses (Family Poaceae) and Ferns (Class Pteridiophyta)</p> <p>All species of fresh and saltwater marsh plants (Class Najadales)</p> <p>All marine algae and seagrasses, including aquarium plants and live plant food material for aquaculture</p>

6.3 Quarantine Awareness Training

In 2010-2011, the LHIB engaged a biosecurity consultant (John Thorp), to undertake a range of quarantine awareness activities including:

- Familiarisation training with island residents and tourism operators
- Assessment of procedures and awareness at mainland suppliers and the wharf at Port Macquarie.

In general Thorp found a high level of awareness, support and compliance across the stakeholders. A number of recommendations and procedures for improving biosecurity were also tabled as a result (Thorp, 2011).

In 2012 the LIHB reviewed implementation of these recommendations in a Business Paper (LHIB, 2012), which highlighted the status of recommendations made. Some tasks were completed, some were in progress and some were yet to be commenced. A detailed analysis of current progress of recommended actions is provided in Section 10.

6.4 Consideration in other Plans and Policies

Biosecurity, the impacts and management of non-native species is also considered in other relevant management plans. Examples include:

- Lord Howe Island Permanent Park Preserve Plan of Management (LHIB, 2010b) particularly sections 5.3 and 6.1
- Lord Howe Island Biodiversity Management Plan (DECC, 2007) particularly sections 4-6
- The Draft Lord Howe Island Rodent Eradication Plan (LHIB, 2010a).
- Weed Management Strategy for Lord Howe Island (LHIB, 2006)
- Draft Lord Howe Island Weed Management Strategy (LHIB 2016)
- Work Plan to Guide the Eradication of the African Big-headed Ant (*Pheidole megacephala*) from Lord Howe Island (LIHB, 2013)
- Strategic Plan for the Lord Howe Island Group World Heritage Property (LHIB, 2010b).
- The Lord Howe Island Board Corporate Plan 2014-2016 (LHIB, 2014)

6.5 Existing Operational Controls

Pre Border

- Implementation of policies as described above
- Contractual
 - VENM certificates for road base
 - Biosecurity requirements into major contracts
- Lord Howe Island Sea Freight – Port Macquarie
 - Awareness training
 - Hardstand and shed
 - No loading of vehicles without written LHIB Approval
 - Awareness training to stevedores.

At the Border

- Wharf:
 - Trained stevedores with low turnover
 - Some signage
 - Quarantine (plant) room and yachties room for high risk materials
 - Hardstand lay down area
 - Targeted inspection of high risk goods (determined from LHIB review of the manifest)
 - Random intuitive inspection for other goods
 - Timber and dunnage collected and burnt
 - Enforcement of policies
 - Power to seize and destroy

- Animals arriving are held at the jetty until inspected by LHIB officer and then taken to destination. All fodder/bedding and manure is collected and bagged and shipped back to mainland
- Moorings provided inside and outside lagoon
- Airport.

Post Border

- Surveillance as part of weed and African Big headed Ant surveys
- Response plan for Myrtle Rust
- Awareness training for residents and staff including kitchen staff
- Awareness for visitors
- Restricted areas
- Boot scrubs
- Enforcement of policies
- Power to seize and destroy.

6.6 Investment

The LHIB (with support of numerous funding bodies) has invested significant resource into biosecurity management including the following (Bower, 2015):

- \$6.5 million for the eradication of priority weeds since 2004 (Commonwealth Government - Natural Heritage Trust, Caring for Our Country, NSW Environmental Trust and LHIB)
- \$9 million for a proposed rodent eradication programme (\$4.5 million provided by both the New South Wales and Commonwealth governments). At the time of producing this Strategy, implementation of the proposed rodent eradication programme was subject to the outcomes of various planning approvals and on-going community consultation.
- \$80K per annum for rat control (LHIB)
- \$300K for African Big-headed Ant eradication (Commonwealth government - Caring for our Country, LHIB and North Coast Local Land Services)
- \$60K for Phytophthora & Myrtle Rust prevention, with an additional \$10K per annum for Phytophthora bay maintenance and treatment of the one known infestation on island. Commonwealth government - Caring for our Country and LHIB).

7.0 Stakeholder Consultation

During development of this strategy numerous stakeholders were consulted for input into the Strategy (see Figure 3). Consultation was undertaken via a combination of face to face meetings, an open workshop and town hall meeting on LHI, phone interviews and email.



Figure 3 Stakeholder Groups


Key elements in achieving informed and value adding input included:

- Identifying and targeting key stakeholders through a consultation process that facilitates a broad understanding of the project
- advising stakeholders of the project and providing consultation opportunities for stakeholders to identify issues and concerns
- using existing communication mechanisms where possible to encourage participation in the stakeholder consultation process from interested stakeholders
- establishing relationships with key stakeholders that encouraged direct contact with the project team



- managing stakeholder and community expectation about the level of influence over the Biosecurity Strategy outcomes
- promoting consistent key message delivery amongst stakeholders
- developing long term partnerships for biosecurity management.


A summary of consultation and outcomes by groups is provided below.

Table 4 Consultation summary


Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
LHIB				
<p>The Board and CEO</p>	<ul style="list-style-type: none"> - Overall responsibility for management of LHI values and community 	<ul style="list-style-type: none"> - Acknowledge biosecurity as very important to protect LHI values - Already invest significant resources into biosecurity particularly control and eradication - Have biosecurity concerns over <ul style="list-style-type: none"> • international vessel and aircraft movements • domestic mail - Have plans in place for increased biosecurity facilities at the airport (as part of refurbishment) - Have funds allocated via the proposed rodent eradication project for quarantine e.g. purchase of detector dogs and to build kennels etc. - Potential to fund other key quarantine measures related to proposed rodent eradication project 	<ul style="list-style-type: none"> - Need recommendations to be realistic and cost achievable without significant increase impost to residents and cost of living - Continue to seek funding for Biosecurity 	
<p>Environment and Community Development Unit</p>	<ul style="list-style-type: none"> - Biosecurity built into World Heritage and Environment Manager role - Eradication and control programs 	<ul style="list-style-type: none"> - Have some resources and capability in other roles i.e. Flora Manager, Ranger, Field staff - Previous risk items and detections 	<ul style="list-style-type: none"> - Improve Inspection, detection and response capability - Share biosecurity responsibility amongst staff 	


Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
	<ul style="list-style-type: none"> - Noxious weed inspections - Manage moorings bookings 	<ul style="list-style-type: none"> • Backup diesel generators • Used building materials • Plants • Cut flowers • Stockfeed • Live worms/ meal worms • Snakes (accidental and as pet) • Asian House Gecko • Green Tree Frog - Response based on what available (chemicals and equipment) 	<p>including Ranger, Flora Manager and field staff</p> <ul style="list-style-type: none"> - Invest in response equipment - Increase unloading inspection at wharf and airport - conduct awareness training every 2 years - provide quarantine awareness information with mooring booking 	
<p>Infrastructure and Engineering Services Unit</p>	<ul style="list-style-type: none"> - Managing infrastructure and engineering services on LHI - Importer of <ul style="list-style-type: none"> • road base • timber including jetty timbers • building materials • vehicles • diesel • unleaded • aviation fuel 	<ul style="list-style-type: none"> - Biosecurity built into contracts i.e. road base supply and major project such as airport reseal 	<ul style="list-style-type: none"> - Continue to build biosecurity best practice in to major contracts - conduct awareness training every 2 years 	


Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
Other LHI Stakeholders				
<p>Lord Howe Island Sea Freight (LHI Wharf)</p>	<ul style="list-style-type: none"> - Transport cargo via sea from Port Macquarie to LHI - Unload and deliver at LHI 	<ul style="list-style-type: none"> - Committed to support where reasonably practical and not overly onerous - Island Trader arrives at LHI and unloads over two days on a weekend once a fortnight. - Manifest provided in advance to LHIB - Stevedores are locals generally with other jobs - Will notify LHIB of biosecurity risks but not stevedores job to police LHIB policy - LHIB is 10% of business. Rest is LHI residents and other business - Occasional rats in waste returning to mainland - Receptive to NSW Department of Primary Industries inspection at Port Macquarie 	<ul style="list-style-type: none"> - Can add biosecurity requirements into management system - Awareness posters (what to look for and what to do) - Suggest that LHIB purchase response equipment such as tarps and fumigation gear - Improved inspection capability at LHI wharf - Require identification of biosecurity risk items on manifest (need to provide specific details of items) - Allocate funds for engaging NSW DPI officer to conduct inspections upon loading on mainland - Conduct awareness training every 2 years 	
<p>Macquarie Air (LHI Airport)</p>	<ul style="list-style-type: none"> - Transport of air freight to LHI and ground handling 	<ul style="list-style-type: none"> - Currently no manifest - Import of risk items by air 	<ul style="list-style-type: none"> - Provision of detailed manifest highlighting biosecurity risk items - Awareness training for staff 	

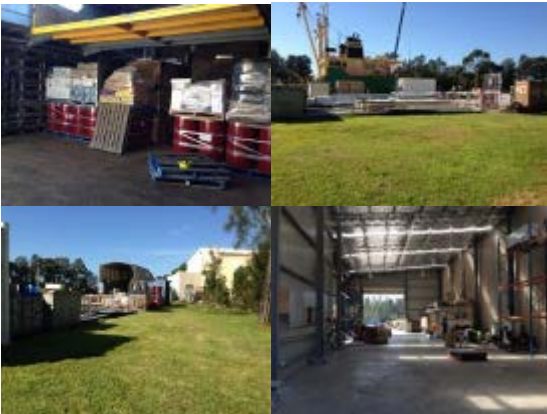
Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
<p>QantasLink (LHI Airport)</p>	<ul style="list-style-type: none"> - Transport of passengers and air freight to LHI and ground handling 	<ul style="list-style-type: none"> - Limited controls - Range of biosecurity issues - No cabin announcement or brochures currently 	<ul style="list-style-type: none"> - Include LHI requirements into the QantasLink training manual - Suggest targeting the travel wholesalers for biosecurity message into product - Suggest biosecurity could be written into tourism operator licenses 	
<p>NSW Police Service</p>	<ul style="list-style-type: none"> - Has a delegation of power as: <ul style="list-style-type: none"> • the Port Operations Manager • Officer under LHI Act 	<ul style="list-style-type: none"> - Willing to assist - No biosecurity training - 2-3 year tenure – new Police / Port Operations staff to receive quarantine training - Acknowledges gaps in: <ul style="list-style-type: none"> • international quarantine at present • domestic mail 	<ul style="list-style-type: none"> - Formalise procedural response to vessel and aircraft arrivals - Receive biosecurity training 	
<p>Australia Post (LHI)</p>	<ul style="list-style-type: none"> - Receipt and distribution of domestic mail on LHI 	<ul style="list-style-type: none"> - No manifests - Currently no biosecurity check on domestic mail - Very difficult to control 	<ul style="list-style-type: none"> - Suggest ongoing education of residents - Investigate power for police to open mail on behalf of LHIB for suspected breaches of importation policies - Consider use of penalties as a deterrent 	


Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
Australian Customs	<ul style="list-style-type: none"> - Responsibility of customs and immigration functions for international vessels and aircraft 	<ul style="list-style-type: none"> - Formerly undertaking international Quarantine functions on behalf of Commonwealth Dept. of Agriculture & Water Resources but not anymore (due to flight changes and funding) 	<ul style="list-style-type: none"> - Formalise procedural response to vessel and aircraft arrivals - Provide biosecurity training 	
NSW Department of Primary Industries Marine Parks (LHI)	<ul style="list-style-type: none"> - Management of the Marine Park including zoning development and operational plans - Enforcement of the <i>Marine Estate Management Act 2014</i> 	<ul style="list-style-type: none"> - Acknowledges marine pests as biggest risk to the marine park - Are undertaking a review of marine biosecurity separately including risk assessment and update to management plans - LHI receive about 130-150 yachts per year - Could improve notifications around arriving vessels - Need formalised procedure for refuelling / safety stops as this is currently the biggest risk - Need marine pest monitoring 	<ul style="list-style-type: none"> - Formalise procedural response to vessel arrival with LHIB, Commonwealth Department of Agriculture and Water Resources and NSW Police - Formalise marine risk assessment and mitigation through updated Marine Park / Biosecurity Plan - Undertake marine pest monitoring - Develop response protocols - Cross reference between this Strategy and Marine Parks documents - Develop partnerships with tourism operators for community based conservation (reef health / pest survey or eradication works) 	
Lord Howe Island Tourism Association	<ul style="list-style-type: none"> - Promotion of tourism - Early contact with visitors 	<ul style="list-style-type: none"> - Need biosecurity message (including iPad display) to be consistent and integrated with tourism message 	<ul style="list-style-type: none"> - Biosecurity advice on LHI tourism Association website and marketing material. 	

Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
			<p>Progress support for iPad Visitor Users Guide http://www.lhib.nsw.gov.au/sites/lordhowe/files/public/images/documents/lhib/Publications/Info%20Sheets/LHI-Userguide%20V%20Aug%202014.pdf</p> <ul style="list-style-type: none"> - Collaborative approach to branding and message 	
<p>Local Providers / Importers</p>	<ul style="list-style-type: none"> - Import of a range of goods 	<ul style="list-style-type: none"> - Differing levels of awareness - Generally supportive of biosecurity controls if doesn't add significantly to cost - Often encounter pests on delivery 	<ul style="list-style-type: none"> - Ongoing awareness - Influence mainland suppliers by requesting goods meet LHI requirements. Consider establishing preferred supplier list / compliance agreements - Provide simple guidelines - Voluntary 'pest free' warrant 	
<p>Accommodation providers Tourism Operators</p>	<ul style="list-style-type: none"> - Restaurants / cafes are major importers of fresh produce - Can find frogs, snails, lizards, insects - Major contact with visitors 	<ul style="list-style-type: none"> - Have had awareness training but need it ongoing due to staff turnover - Visitors generally have low level of awareness but high level of support for biosecurity - Some uptake of foot scrubs 	<ul style="list-style-type: none"> - Suggest influence visitors before they arrive via awareness, websites, brochures etc. - Ongoing awareness - Influence mainland suppliers by requesting goods meet LHI requirements - Training material be provided to new tourism based staff 	

Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
			<ul style="list-style-type: none"> - Provide simple guidelines 	
Tourism Operators	<ul style="list-style-type: none"> - Activities in the Permanent Park Reserve and Marine park that could potentially spread and detect biosecurity risks 	<ul style="list-style-type: none"> - Significant ability to educate and influence visitors - High familiarity with World Heritage values 	<ul style="list-style-type: none"> - Suggest influence visitors before they arrive via awareness, websites, brochures etc. - Assist in providing biosecurity detection, monitoring and eradication activities with visitors 	
Trades People	<ul style="list-style-type: none"> - Import various building materials 	<ul style="list-style-type: none"> - Materials may contain pests 	<ul style="list-style-type: none"> - Ongoing awareness - Influence mainland suppliers by requesting goods meet LHI requirements 	
Kentia Fresh Nursery	<ul style="list-style-type: none"> - Harvest and export kentia palms - Import growing media from The Netherlands via Sydney and already biosecurity cleared 	<ul style="list-style-type: none"> - Major impact to business from rats - Have some response capability i.e. horticultural staff - Looking to trial growing local produce for food security and reduced costs 	<ul style="list-style-type: none"> - Ongoing awareness - Influence mainland suppliers by requesting goods meet LHI requirements - Progress local food production 	
Friends of Lord Howe Island group	<ul style="list-style-type: none"> - Conservation Volunteering 	<ul style="list-style-type: none"> - Significant ability to educate and influence visitors - High familiarity with World Heritage values 	<ul style="list-style-type: none"> - Ongoing awareness - Increase conservation activities to include biosecurity surveillance and eradication 	
Residents	<ul style="list-style-type: none"> - Import of a range of goods 	<ul style="list-style-type: none"> - Generally aware of importance of biosecurity and supportive if mitigation is reasonable and does not add too much impost or cost of living - Already have a high cost of living 	<ul style="list-style-type: none"> - Streamline importation approvals process - Continue awareness training - Influence mainland suppliers by requesting goods using suppliers that meet LHI requirements 	

Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
		<ul style="list-style-type: none"> - Memories of impacts of previous incursion i.e. Whitefly, Queensland Fruit Fly, banana borer and onion smut - Aware of individuals bending the rules - Some frustration over prohibited list - Would like more local food supply / security 		
Port Macquarie Stakeholders				
<p>Lord Howe Island Sea Freight</p>	<p>Transport cargo via sea from Port Macquarie to LHI</p>	<ul style="list-style-type: none"> - Hardstand areas cleaned regularly - Rat bait stations in place - Perishable materials refrigerated / frozen within minutes of receipt at warehouse/wharf - Use of metal cages for transport of perishable goods – allows easy visual access to cargo - Majority of bulk cargo – building material, alcohol is wrapped using plastic sheeting and restricts access to vermin and other potential contaminants - Gravel, soil, concrete mix is transported in new bulka bags - Vessel treated with pesticide at least every 12 months - Vehicles are pressure washed prior to acceptance – receipt required 	<ul style="list-style-type: none"> - Consider risk of insects/animals being transported in base of pallets / gas bottles - Replace old pallets with new ones to reduce the risk of disease/insects in older timber - Consider the erection of a vermin barrier between the hardstand areas and the surrounding bush areas - Biosecurity signage at yard to alert suppliers of inherent risks - Ensure that food scraps and general rubbish from crew is collected and transported back to Port Macquarie 	

Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
		<ul style="list-style-type: none"> - Ballast water transferred in accordance with procedure as defined by AQIS 		
<p>Macquarie Air</p>	<ul style="list-style-type: none"> - One flight per week – predominantly cargo - Cargo mainly fresh fruit and vegetables and meat 	<ul style="list-style-type: none"> - Very little current understanding of biosecurity - All cargo is declared in terms of dangerous goods - Safety check of plane pre flight - Many residents on LHI have little or no understanding of the biosecurity issues and never mention this as a concern when ordering goods 	<ul style="list-style-type: none"> - Simple check list for staff when answering enquiries about suitability of cargo and awareness of passengers - At time of confirmation of bookings attach a brochure on biosecurity to the itinerary - Add to Standard Operating Procedure of pre-flight check, the need to check for insects /spider webs, also to ensure that shoes are clean for pilot - Conduct awareness training every 2 years - Erect signage/guidelines on approved and prohibited items and boot scrub station at hangar/airport - Random inspections at LHI 	

Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
<p>Port Macquarie Airport</p>	<p>Airport is base for transport of the following from Port Macquarie to LHI:</p> <ul style="list-style-type: none"> - Passengers – regular public transport - Cargo – as carry on, checked in luggage - Controls general aviation movements of commercial / private flights however does not undertake any check of any plane - Private planes refuel at airport as it is the closet to LHI - Air medical and Defence planes - Sydney and Brisbane flights are on occasion diverted to Port Macquarie should they need to refuel especially in inclement weather either over capital cities or LHI - Staging location for emergency 	<p>No active biosecurity measures in place</p>	<ul style="list-style-type: none"> - Signage at check in point alerting passengers of biosecurity issues to allow passengers to remove items / food substance of potential risk from checked in luggage - Bin and appropriate educational signage prior to security scan to allow passengers to remove items / food substance from hand luggage of potential risk prior to entering the departure lounge 	

Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
	response teams for LHI			
QantasLink (Port Macquarie)	Responsible for all check-in related matters	No active biosecurity measures in place	<ul style="list-style-type: none"> - Signage at check in point alerting passengers of biosecurity issues to allow passengers to remove items / food substance of potential risk from checked in luggage - Cabin announcement - LHI biosecurity brochure - Conduct awareness training every 2 years 	
Oxley Travel	Travel agent specialising exclusively in travel to LHI and Norfolk Island	No practical information provided on biosecurity / quarantine	<ul style="list-style-type: none"> - Provide link to LHIB iPad visitor user guide: http://www.lhib.nsw.gov.au/sites/lordhowe/files/public/images/documents/lhib/Publications/Info%20Sheets/LHI-Userguide%20V%20Aug%202014.pdf - Add to the "Travel Tips" link on the website a brochure style document about limiting the risk in terms of biosecurity e.g. clean your golf shoes - At each link to activities add a sentence / picture about practical tips to mitigate the risks 	

Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
			<ul style="list-style-type: none"> - At time of confirmation of bookings attach a brochure on biosecurity to the itinerary 	
Australia Post (Port Macquarie)	<ul style="list-style-type: none"> - Mail of wide range of materials to LHI 	<ul style="list-style-type: none"> - Currently no biosecurity control– goods accepted as sealed material - Ability for prohibited imports to be sent to LHI through post 	<ul style="list-style-type: none"> - No current ability for Australia Post to control biosecurity in mailed goods to LHI. Would need legislative change (Special Biosecurity Zone via <i>Biosecurity Act</i>) or Memorandum of Understanding with the LHIB. - Investigate possibility of biosecurity x ray or detector dog – (fee for service) at Port Macquarie - Ongoing awareness for residents of LHI about biosecurity concerns via mail (risks and penalties) 	
Tradelink hardware	Supplier for building materials	<ul style="list-style-type: none"> - Most products shrink wrapped at time of delivery to Island Trader - Goods supplied on new pallets - Paints are sealed 	<ul style="list-style-type: none"> - Awareness of LHI requirements - Provide guidelines / procedures and list approved/prohibited items 	
Local butcher	Meat products	<ul style="list-style-type: none"> - Goods received are frozen and packed in a range of cardboard boxes 	<ul style="list-style-type: none"> - Awareness of LHI requirements in the form of poster style approved/prohibited items 	

Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
Growers market	- Fresh fruit and produce	- Goods packed in boxes / trays and delivered to courier	- Awareness of LHI requirements in the form of poster style approved/prohibited items - Information about packaging / wrapping of goods in terms of limiting access to vermin	
NSW Government				
Department of Primary Industries representatives	- Biosecurity NSW wide	- Currently progressing the Biosecurity Act. Will have ability to declare Biosecurity Zone for individual or multiple risks - LHI Strategy need to link to NSW Biosecurity Strategy - Have engaged provider to train detector dogs for <i>Hieracium</i> sp, a noxious weeds - Can provide inspection / certification services at fee for service \$130/hr - Suggested Compliance Agreement with Lord Howe Island Sea Freight - Happy to be included in Working Group	- Progress Declaration of LHI as a Special Biosecurity Zone under <i>Biosecurity Act 2014</i> - Active involvement in LHI biosecurity working group (to be established) - Investigate funding support from NSW DPI for biosecurity management including inspections, access to detector dogs - Fee for service inspection by NSW DPI staff at Port Macquarie - Ongoing support , mentoring, identification	
Australian Government				
Commonwealth Department of Agriculture & Water Resources representatives	- International Biosecurity at the Australian border - International vessels and aircraft to LHI	- Recognise the current gap in internal biosecurity on LHI and will seek to progress - Current changes to Norfolk Island status will reduce international flights to LHI	- Formalise procedures for international vessels and aircraft with LHI agencies - Active involvement in working group	

Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
			<ul style="list-style-type: none"> - Investigate support for biosecurity management including access to detector dogs and fee for service inspection at Port Macquarie - Ongoing support, mentoring, identification 	
Department of the Environment representatives Natural Heritage Section and Environmental Biosecurity Section	<ul style="list-style-type: none"> - Management of World Heritage Properties - Environmental Biosecurity 	<ul style="list-style-type: none"> - Biosecurity is important for the conservation of World Heritage values - Have rodent detector dog (fee for service) - Liaison with Commonwealth Dept. of Agriculture & Water Resources - Current review of some relevant Threat Abatement Plans - Currently represented on the Lord Howe Island Rodent Eradication Project Steering Committee 	<ul style="list-style-type: none"> - Active involvement in working group 	

Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
Other Islands				
<p>NZ Tasmania Barrow Island Pacific Islands Cocos Islands Christmas Island Macquarie Island</p>	<ul style="list-style-type: none"> - Best practice and lessons learnt 	<ul style="list-style-type: none"> - Island best practice focussed on eradication and prevention of reinfestation / new infestation - Strong focus on detection - Incursions need immediate response. - Barrow Island as platinum standard but above and beyond for LHI - Macquarie Island eradication included infrastructure upgrades at loading port i.e. hardstand, treatment facilities and redesign of cargo bins to eliminate hiding places - Awareness messages need to be targeted at what matters to individual groups. Behavioural research ongoing. - Biosecurity branding is important. NZ have it everywhere for island biosecurity. - Resident complacency is an ongoing issue. NZ strive for absolute protection and are not concerned about mathematical probabilities - NZ use detector dogs pre (almost always) and post border (6 monthly) 	<ul style="list-style-type: none"> - Active involvement in working group 	

Stakeholder	Activities Relevant to Biosecurity	Risks, Issues and Input	Recommendations for improvement	Plates
		- NZ use 'pest- free' warrant system for suppliers. Voluntary but gives commercial advantage.		

Part 3 – Providing the Framework



8.0 Biosecurity in Australia

8.1 Biosecurity Reforms

Since the development of the LHI Quarantine Strategy in 2003, Australia (and its States and Territories) has undergone a significant reform of its biosecurity framework to deliver a modern system that is responsive and targeted, in a changing global trading environment. A major driver of the reform has been the 2008 independent review of Australia's quarantine and biosecurity arrangements – *One biosecurity: a working partnership* (the Beale review) and the Federal Government's in principle agreement to the Beale review recommendations.

The reform program being implemented nationally and across the States and Territories is consistent with the themes outlined in the Beale review, informed by previous reviews and stakeholder needs; and underpinned by five key principles (DAFF, 2012):

- implementing a risk-based approach to biosecurity management
- managing biosecurity risk across the continuum – offshore, at the border and onshore
- strengthening partnerships with stakeholders
- being intelligence-led and evidence-based
- supported by modern legislation, technology, funding and business systems.

At a national level, the Australian Government has passed the *Biosecurity Bill 2014* and supporting legislation into Parliament on 14 May 2015. The new legislation will come into effect on June 2016, 12 months after receiving royal assent from the Governor General. Until commencement date of the new legislation, the *Quarantine Act 1908* remains the primary piece of biosecurity legislation in Australia. The *Biosecurity Act 2015* will then replace the *Quarantine Act 1908*.

In NSW, the Department of Primary Industries has released the *NSW Biosecurity Strategy 2013 – 2021* (NSW DPI, 2013) which presents a new vision for a more streamlined, effective and integrated biosecurity system, in which:

- Biosecurity is a shared responsibility;
- Biosecurity contributes to sustainable economic growth;
- Biosecurity protects the environment and the community; and
- Biosecurity is underpinned by a responsive and consistent legislative framework.

It is noted that the NSW Biosecurity Strategy makes no reference to island biosecurity.

The supporting framework for the NSW Biosecurity Strategy, the *NSW Biosecurity Act 2014*, would replace 14 other pieces of legislation. It is anticipated that the final regulations, as part of the *NSW Biosecurity Act 2014*, will be implemented in 2016.

9.0 Legislation

9.1 International Obligations

World Heritage Convention

The World Heritage Convention, concerning the protection of the World Cultural and Natural Heritage which was adopted in 1972 by the United Nations Educational, Scientific and Cultural Organization (UNESCO), provides for the declaration of heritage of outstanding universal cultural and natural value as part of the World Heritage List. The Convention and the associated Operational Guidelines provide guidance for the protection and conservation of World Heritage properties.

As a signatory to the World Heritage Convention, Australia has obligations under Article 5, including:

- to protect, conserve and present the World Heritage values of the property
- to integrate the protection of the area into a comprehensive planning program
- to give the property a function in the life of the Australian community
- to conduct scientific and technical research and develop operating methods to counteract threats to World Heritage values; and
- to take appropriate scientific, technical, legal, administrative and financial measures necessary for achieving the foregoing objectives.

International Conventions on Migratory Species

Several agreements provide protection for migratory species and their habitat in Australia; these agreements are:

- The Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA), which came into force in 1981
- The Agreement between the Peoples Republic of China and the Government of Australia for the Protection of Migratory Birds and their Environment (CAMBA), which came into force in 1988; and
- The 1979 Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention), which came into force for Australia in 1991 and under which the 2004 Agreement on the Conservation of Albatrosses and Petrels (ACAP) was established.

CAMBA and JAMBA require appropriate measures be taken to preserve and enhance the environment of migratory birds. ACAP also requires active protection of important breeding habitat of albatrosses and petrels and control of non-native species detrimental to albatrosses and petrels.

9.2 Commonwealth Legislation

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places (matters of national environmental significance) including the values of declared World Heritage properties such as the LHIG.

In relation to Biosecurity under the *EPBC Act 1999*, the Commonwealth can among other things:

- List key threatening processes. These processes threaten, or may threaten, the survival, abundance or evolutionary development of a native species or ecological community. Examples of invasive species key threatening processes that cover individual threats include rabbits, foxes, cats, pigs, unmanaged goats, rodents on islands, red imported fire ants, *Phytophthora cinnamomi*, Psittacine beak and feather disease, and chytrid fungus. Examples of key threatening processes that cover multiple or broad threats are 'Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants', 'land clearance' and 'Novel biota and their impact on biodiversity'. Some individually listed key threatening processes for invasive species are considered to be covered by the 'Novel biota and their impact on biodiversity' key threatening process. These separate listings are considered warranted by the

Threatened Species Scientific Committee. Listed Key Threatening processes can be found at <http://www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl>

- Develop and implement Threat Abatement Plans (TAPs). These Plans outline the research, management and other actions necessary to reduce the impacts of a listed key threatening process on affected listed threatened species and ecological communities. TAPs can be found at <http://www.environment.gov.au/biodiversity/threatened/threat-abatement-plans/approved>
- Develop and implement Recovery Plans for threatened species. Recovery Plans can be found at <http://www.environment.gov.au/cgi-bin/sprat/public/publicshowallrps.pl>

Commonwealth Biosecurity Act 2015

Commonwealth biosecurity legislation consists of the *Biosecurity Act 2015* (Biosecurity Act) and supporting acts. *The Biosecurity Act 2015* will commence on 16 June 2016, 12 months after receiving royal assent, replacing the *Quarantine Act 1908* (*Quarantine Act 1908*). The *Biosecurity Act 2015* will provide the primary legislative means and a modern regulatory framework for the Australian Government to manage the risk of pests and diseases entering Australian territory and causing harm to animal, plant and human health, the environment and the economy. The *Biosecurity Act 2015* is the principal instrument for managing human, animal and plant quarantine activities at the Australian border. It declares first ports of landing for vessels and aircraft, powers of officers to enter, inspect, seize and destroy, offences and penalties, notifiable pests and diseases.

Just as with the Quarantine Act, the Biosecurity Act will be co-administered by the Ministers responsible for Agriculture and Water Resources and Health.

The Bill is designed to manage biosecurity risks—including the risk of listed human diseases—entering Australian territories, or emerging, establishing themselves or spreading in Australian territories or a part of Australian territories.

Intergovernmental Agreement on Biosecurity 2012

The Intergovernmental Agreement on Biosecurity (IGAB), which came into effect in January 2012, is an agreement between the Commonwealth, State and Territory governments, with the exception of Tasmania. This Agreement was developed to improve the national biosecurity system by identifying the roles and responsibilities of governments and outlines the priority areas for collaboration to minimise the impact of pests and disease on Australia's economy, environment and the community.

9.3 NSW Legislation

The Lord Howe Island Act 1953 and Regulation 2014

The *Lord Howe Island Act 1953 No 39* makes provision for the care, control and management of Lord Howe Island via establishment of the Lord Howe Island Board. It defines the LHIB respective powers, authorities, duties and functions.

In relation to biosecurity it defines the LHIB charter, functions and regulations including:

- to manage, protect, restore, enhance and conserve the Island's environment
- manage, protect, restore, enhance and conserve vacant Crown lands, and lands reserved or dedicated under section 19 or 19A (including, in particular, the Lord Howe Island Permanent Park Preserve) in a manner that recognises the World Heritage values
- take all practicable measures to protect and conserve the fisheries, fauna and flora of the Island
- prohibiting the introduction of any species of fauna or flora to the Island or prescribing conditions in relation to the introduction of any species of fauna or flora
- the destruction of plants declared by the regulations to be noxious
- regulation, control or prohibition of exotic plants on the land
- the preservation or protection of any animal or bird on the land

- powers and duties of any officer of the Board in relation to the land

The *Lord Howe Island Regulation 2014* regulates and defines activities including

- importation of seeds, plant, animals and other things including motor vehicles
- the LHIBs powers of seizure and destruction regarding illegally imported seeds, plant or animals
- power of entry to perform duties.

Natural Resources Commission Act 2003

This Act operates in conjunction with the *Native Vegetation Act 2003* and *Local Land Services Act 2013*. The Act establishes the Natural Resources Commission (NRC) and confers functions on the NRC with respect to natural resource managements.

The NRC will recommend state-wide targets and standards, and replaces a number of existing advisory councils such as the Coastal Council, the Water Advisory Council, the Native Vegetation Advisory Council and the Fisheries Advisory Council.

National Parks and Wildlife Act 1974

This Act sets aside land in National Parks for the purpose of conservation. It protects certain native flora and fauna and "Aboriginal objects" and "Aboriginal places" under Part 6.

All fauna in NSW is protected, unless it is listed in Schedule 11 as unprotected fauna.

It is an offence to pick or possess a protected native plant. Protected native plants are named in Schedule 13, which was updated during 2009. The amendments were primarily of a minor nature, and some species were removed from the list.

Protection of threatened species, populations or ecological communities is provided for under Part 8A. Part 8A includes offences for damage to critical habitat, habitat of threatened species populations or ecological communities.

Local Land Services Act 2013

Local Land Services (LLS) brings together agricultural production advice, biosecurity, natural resource management and emergency management into a single organisation. The *Local Land Services Act 2013* established LLS, repealed the *Rural Lands Protection Act 1998*, the *Rural Lands Protection Amendment Act 2008* and the *Catchment Management Authorities Act 2003*. The Act became fully operational in January 2014.

LLS have now replaced all previous Catchment Management Authorities (CMAs) as statutory authorities in newly defined regions. CMAs, Livestock Health and Pest Authorities and some advisory services of the Department of Primary Industries, which previously operated separately, form the integrated LLS.

In this Act, local land services means programs and advisory services associated with agricultural production, biosecurity, natural resource management and emergency management, including programs and advisory services associated with the following:

- a) agricultural production
- b) biosecurity, including animal pest and disease and plant pest and disease prevention, management, control and eradication
- c) preparedness, response and recovery for animal pest and disease and plant pest and disease emergencies and other emergencies impacting on primary production or animal health and safety
- d) animal welfare
- e) chemical residue prevention, management and control
- f) natural resource management and planning
- g) travelling stock reserves and stock watering places
- h) control and movement of stock
- i) related services and programs.

Part 10 provides for the control on public and private land in the State of animals, birds, insects and other members of the animal kingdom that are pests.

Fisheries Management Act 1994

The *Fisheries Management Act 1994* regulates the management of fish and marine vegetation, described as all species of fish, including sharks and rays, aquatic invertebrate animals, such as worms, snails, mussels, corals, sponges, sea urchins, barnacles, crabs, crayfish, aquatic insects and prawns, and all seaweeds, seagrasses and marine algae (s5).

Part 7A includes provisions for threatened species conservation for fish and marine vegetation. Part 7A lists endangered and vulnerable species, endangered populations, endangered ecological communities and species presumed extinct.

Key threatening processes listed in Schedule 6 include:

- Introduction of fish to waters within a river catchment outside their natural range
- Introduction of non-indigenous fish and marine vegetation to the coastal waters of New South Wales.

Marine Estate Management Act 2014

The *Marine Estate Management Act 2014* and supporting regulations, including the *Marine Estate Management Regulation 2009* provides for strategic and integrated declaration and management of the whole NSW marine estate –marine waters, coasts and estuaries including marine parks and aquatic reserves and includes management of threats such as biosecurity to conserve biological diversity, and maintain ecosystem integrity and function.

In particular Part 3 of the Regulation refers to removal of heavily fouled vessels from Marine Parks.

Noxious Weeds Act 1993 (NSW)

The purpose of the *Noxious Weeds Act 1993* is as follows:

- a) to reduce the negative impact of weeds on the economy, community and environment of this State by establishing control mechanisms to:
 - i) prevent the establishment in this State of significant new weeds, and
 - ii) prevent, eliminate or restrict the spread in this State of existing significant weeds, and
 - iii) effectively manage widespread significant weeds in this State,
- b) to provide for the monitoring of and reporting on the effectiveness of the management of weeds in this State.

This Act applies to plants that have been declared as noxious weeds by an order under section 7. Under section 8 the weed control classes applicable for noxious weeds include the following:

- a) Class 1, State Prohibited Weeds
- b) Class 2, Regionally Prohibited Weeds
- c) Class 3, Regionally Controlled Weeds
- d) Class 4, Locally Controlled Weeds
- e) Class 5, Restricted Plants.

A noxious weed classified as Class 1, 2 or 5 is referred to as a “notifiable weed”.

Noxious Weeds are declared on Local Government Area basis. Weed Control Orders made to declare that a plant is a noxious weed must specify the control measures that are to be, or may be, used to control the plant in general or particular circumstances.

Occupiers must notify local Council of the presence of any “notifiable weeds”. Councils can issue weed control notices to occupiers who have not controlled noxious weeds. Noxious weed inspectors also have to power to enter property and investigate noxious weed sources (s43-47A).

Pesticides Act 1999 (NSW)

The *Pesticides Act 1999* controls and regulates the use of pesticides in New South Wales. The key objectives of the Act are to promote the protection of human health, the environment, property and trade in relation to pesticide use, having regard to the principles of ecologically sustainable development. Regulations and other measures support the Act's objectives.

The Act regulates pesticides storage, use, disposal, labels and containers. "Pesticide" is defined by s5 to include herbicides, insecticides, defoliants and fungicides, but not fertilisers.

Registered pesticides must be used in accordance with the label and a permit is required to use an unregistered pesticide.

Threatened Species Conservation Act 1995 (NSW)

The purpose of the *Threatened Species Conservation Act 1995* (NSW) (TSC Act) is:

- To conserve biological diversity and promote ecologically sustainable development
- To prevent the extinction and promote the recovery of threatened species, populations and ecological communities
- To protect the critical habitat of these threatened species, populations and ecological communities that are endangered
- To eliminate or manage certain processes that threatened the survival or evolutionary development of threatened species, populations and ecological communities
- To ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed; and
- To encourage the conservation of threatened species, populations and ecological communities by the adoption of measures involving co-operative management.

Of most interest in the Act are the lists of threatened species, populations and ecological communities and key threatening processes. The key threatening processes listed in Schedule 3 that may be applicable are:

- Competition and habitat degradation by Feral Goats, *Capra hircus* Linnaeus 1758
- Competition from feral honey bees, *Apis mellifera* L
- Importation of Red Imported Fire Ants *Solenopsis invicta* Buren 1972
- Infection by *Psittacine Circoviral* (beak and feather) Disease affecting endangered psittacine species and populations
- Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae
- Infection of native plants by *Phytophthora cinnamomi*
- Introduction of the Large Earth Bumblebee *Bombus terrestris* (L.)
- Invasion and establishment of exotic vines and scramblers
- Invasion and establishment of Scotch Broom (*Cytisus scoparius*)
- Invasion and establishment of the Cane Toad (*Bufo marinus*)
- Invasion, establishment and spread of Lantana (*Lantana camara* L. *sens. lat*)
- Invasion of native plant communities by *Chrysanthemoides monilifera*
- Invasion of native plant communities by exotic perennial grasses
- Invasion of the Yellow Crazy Ant, *Anoplolepis gracilipes* (Fr. Smith) into NSW
- Invasion of native plant communities by African Olive *Olea europaea* L. Subsp. *cuspidata*
- Predation by *Gambusia holbrooki* Girard, 1859 (Plague Minnow or Mosquito Fish) (as described in the final determination of the Scientific Committee to list the threatening process)

- Predation by the Feral Cat *Felis catus* (Linnaeus, 1758)
- Predation by the Ship Rat *Rattus rattus* on Lord Howe Island
- Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus scrofa* Linnaeus 1758
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
- Anthropogenic climate change
- Removal of dead wood and dead trees

Part 4, Division 1 deals with the preparation, contents, publication and adoption of recovery plans. Part 4, Division 2 deals with the implementation of recovery plans, and includes procedures for public authorities to report on their implementation of, or on proposed departures from, measures specified to be taken in recovery plans.

9.4 Potential Legislative Changes

NSW Biosecurity Act 2014

The *NSW Biosecurity Act 2014* (**not yet in force**) aims to provide a flexible and responsive statutory framework to help identify and manage biosecurity risks for the benefit of the NSW economy, environment and community.

Specifically, the *NSW Biosecurity Act 2014* aims to introduce controls to manage:

- animal and plant pests (including invasive species), diseases, weeds and contaminants, that are economically significant for primary production industries
- threats to terrestrial and aquatic environments arising from animal and plant pests and diseases
- public health and safety risks from contaminants, non-indigenous animals, nuisance bees and weed species known to contribute to human health problems
- animal and plant pests and diseases, and contaminants that may have an adverse effect on community activities, infrastructure, health and wellbeing.

Importantly, the Act will introduce a general biosecurity obligation on persons to whom it applies to take all reasonable and practical measures to prevent, eliminate or minimise the biosecurity risks associated with all biosecurity matter. It will also include the ability to declare Biosecurity Zones (for areas free from particular pest and diseases).

It is expected to be in force in within the next 18 months.

10.0 Evaluation and Gap Analysis of the 2003 Strategy

Evaluation of the 2003 Quarantine Strategy (Landos, 2003) was undertaken in two stages:

- Evaluation of implementation, successes and failures of the recommendations made in the 2003 Quarantine Strategy and the 2011 recommendations
- Evaluation of the 2003 Quarantine Strategy compared to modern biosecurity lead practice to identify gaps.

Results are detailed in the sections below

10.1 Evaluation of the Previous Strategy

The following Table provides assessment of consolidated recommendations from the 2003 Strategy and the 2011 recommendations (in *italics*). Although some specific actions have not been progressed, it should be noted that a dramatic improvement in biosecurity was observed compared to pre – 2003 Strategy.

Table 5 Evaluation of the Previous Strategy

#	Recommendation (from Landos 2003 and Thorp 2011)	AECOM Assessment (2015)
	Structural	
1.1	<i>Review the LHIB Quarantine Strategy</i>	In Progress
1.2	<i>Implement LHIB Quarantine Strategy (details below are key components from current Quarantine Strategy and presentation to the Board in Nov 2011)</i>	Partially Achieved See below
1	That any approach to extending quarantine arrangements on Lord Howe Island should be based on a partnership approach with all stakeholders.	Partially Achieved Significant achievement has been made in partnering with some stakeholder i.e. Lord Howe Island Sea Freight and island lodges. However there is little to no ongoing partnership with other stakeholders including state and commonwealth agencies.
2	That a meeting is convened on the Island in the context of moving this report forward that includes as participants, the Executive Managers of Biosecurity Australia and AQIS, key policy oriented EA executives and key Executives of NSW NPWS and NSW Agriculture.	Unknown It appears the 2003 Strategy was adopted by the LHIB. A meeting may have been achieved initially however no ongoing intergovernmental steering committee/ working group or such has been established and maintained.
3	That the new position of Environment/World Heritage Officer should have specific quarantine responsibilities and these should be reflected in the Corporate and Operational plans of the Board.	Achieved The Manager World Heritage and Environment has specific responsibilities for and commitment to improving biosecurity outcomes.
4	That the new position of Environment/World Heritage Officer should establish and Chair a Quarantine Working Group that meets quarterly and includes appropriate stakeholder representation.	Not Achieved The Manager World Heritage and Environment appears to have a good networks of contact on which to draw but no ongoing intergovernmental working group or such has been established and maintained. However the Biodiversity Management Plan Implementation Group is used as working group to review implementation of BMP, which includes actions for implementation of quarantine.

#	Recommendation (from Landos 2003 and Thorp 2011)	AECOM Assessment (2015)
		It is recommended a biosecurity working group is established
5	That the Board should continue to press for balance in terms of the recognition of the value of Australia's biodiversity in terms of national and State quarantine arrangements and related risk analysis activities	Partially Achieved The LHIB appears successful in receiving ongoing funding and grants to protect LHI biodiversity values, however many items remain outstanding.
6	That in conjunction with a broadly based quarantine strategy that a priority list of pests and diseases be established for the Island	Partially Achieved The development of numerous importation policies has identified some priority pests, weeds and diseases for the island. In particular the Weed Risk Assessment and prohibited species lists as part of the Plant Importation Policy are good lists however this is not consistent across other areas like invertebrates or marine pests.
7	That Australian Quarantine Inspection Services (AQIS) be asked to consider whether mentoring arrangements currently provided might be better provided by an officer located in Brisbane	Unknown Mentoring relationships with the Commonwealth Department of Agriculture & Water Resources were not observed. Previous meetings have not proved overly beneficial.
Legislation and Contractual		
8	That the following legislative changes be considered: <ul style="list-style-type: none"> - Providing the Board with the power to enter into formal compliance arrangements with individuals or businesses which have the effect of delegating the power to undertake specific inspection (and related) functions; - Providing the Board with the power to appoint "Authorised Officers" who would not necessarily be LHIB staff who might for example be crew members of the Island Trader with the power to inspect goods (as best as they are able) at Goodwood Island wharf and to refuse to load any goods found to be carrying an unwanted pest or disease; - Provide for a permit system to be introduced on a cost recovery (to users) basis and inter alia to provide for all imports of plants to be labelled accurately; - Having an offence provision in respect of any false or misleading declaration. 	Not Achieved It is unclear whether these legislative changes have been made. If they have, they do not appear to have been implemented through delegation of powers.
9	That future contractual arrangements for the movement of goods to the Island include: <ul style="list-style-type: none"> - Quarantine related standards for both the vessel and the departing (and arriving) wharf; - Appropriate surveillance, fumigation (possibly in transit, depending on 	Not Achieved It is not clear whether these are embedded contractually. Quarantine standards and refusal to load appear to be based on good will and subjective assessment rather than contractual requirements. Rodent baiting is believed to be included in the contract

#	Recommendation (from Landos 2003 and Thorp 2011)	AECOM Assessment (2015)
	<p>specialist advice being received as to the effectiveness and safety of such operations) and baiting/trapping provisions;</p> <ul style="list-style-type: none"> - The power for goods to be refused boarding at the ports of departure and arrival in the event that an infestation is found. 	
2011-05	<i>List LHI as quarantine destination for post</i>	Not Achieved No implementation observed. Australia Post has been approached with no reply.
2001-06	<i>Require mandatory quarantine checks for all incoming flights, vessels etc.</i>	Not Achieved No mandatory implementation observed. Inspections undertaken based on manifest or request.
Training and Mentoring		
10	<p>That training be provided to LHIB staff (on a train the trainer basis) in the following areas:</p> <ul style="list-style-type: none"> - Threat identification, assessment and management in the context of biodiversity and potential threats to the Kentia palm industry; - Deratting and rat inspection and baiting trapping activity; - Inspection techniques that can be used with cargo. 	Partially Achieved John Thorp has delivered two training sessions. LHIB staff were observed to have a working knowledge in these areas with the exception of de-ratting inspections. This is an ongoing requirement.
11	That suitable surveillance training be developed and delivered to all LHIB staff and contractors	Partially Achieved The Manager World Heritage and Environment has surveillance knowledge but training to key LHIB staff has not been delivered. This should include the Flora Manager, Ranger and field staff. Quarantine training was delivered widely to LHI residents in 2011. This is an ongoing requirement.
12	That suitable training be developed and delivered to all participants in the tourist and transport to the Island industries for example owners/managers of accommodation places, tour operators, pilots and captains.	Achieved Quarantine training was delivered widely to LHI residents in 2011. This is an ongoing requirement.
13	That the Board explore with the appropriate authorities the establishment of a specialised biodiversity related email based mentoring service	Partially Achieved Whilst not formally established, the Manager World Heritage and Environment appears have an established informal mentoring network including membership of specialist biosecurity email networks
Surveillance / Contingency Planning		
14	No unloading of cargo from the Island Trader to take place after dark	Achieved

#	Recommendation (from Landos 2003 and Thorp 2011)	AECOM Assessment (2015)
15	That a central repository for digital information be established to facilitate the reviewing and addition of key information	Partially Achieved Advances in technology have facilitated information storage and sharing within LHIB and more broadly across the biosecurity networks.
16	That formal risk analysis be undertaken where any new plant or animal is to be introduced to the Island	Achieved The development of numerous importation policies has formalised board approval and risk assessment of new plants or animals. Weed Risk Assessment process implemented.
17	That baseline surveys be undertaken as is possible for priority pests and diseases	Partially Achieved The existing regime of inspection and surveillance during noxious weed inspections and weed control undertaken on leases as part of the weed management program and African Big Headed Ant program cover this to some extent, although not specifically targeting surveys for new pests and weeds.
2011-02	<i>Rapid response protocols. Early intervention before establishment</i>	Unknown This was not observed but is believed to be occurring, examples include response to alerts raised by community e.g. Green tree frog heard at lodge was captured, Asian House Gecko heard at restaurant was captured. Guidelines within the iPad user guide include procedures for containment etc.
2011-03	<i>Sniffer detector dog trained for mammals, reptiles, frogs etc.</i>	Not Achieved Maybe implemented as part of proposed Rodent eradication
2011-04	<i>Develop checklist of quarantine requirements / measurements</i>	Not Achieved No implementation observed, however the iPad user guide includes checklists.
2011-05	<i>Employ full time quarantine / biosecurity officer</i>	Not Achieved The Manager World Heritage and Environment has specific responsibilities for and commitment to improving biosecurity outcomes, but amongst other duties
18	That visiting scientists be encouraged to communicate specific findings to a nominated Officer	Unknown This was not observed but is believed to be occurring. Research approvals require all researchers to report to Ranger at commencement of work.
Inspection and Treatments		
19	That the NSW Agriculture Regulatory Officer be used for specific inspection activity related to Goodwood Island wharf	Not Achieved This may have been initially implemented but not carried on.
20	That LHIB staff be encouraged to conduct regular random intuitive inspections of cargo arriving at the LHI wharf	Achieved The Manager World Heritage and Environment has specific responsibilities for and commitment to improving biosecurity outcomes and initiates random intuitive checks and mandatory checks on high risk goods. This should be ongoing,

#	Recommendation (from Landos 2003 and Thorp 2011)	AECOM Assessment (2015)
		however inspections should be more frequent and distributed between relevant staff including Flora Manager, Ranger and field staff.
21	That the capacity be developed of the existing Island Trader crew and wharf staff and labourers at Goodwood Island wharf to undertake inspection of product (and shipping pallets) as it is loaded without unduly lengthening the loading process.	Partially Achieved The Lord Howe Island Sea Freight / Island Trader Crew were found to be aware of biosecurity requirements, have previously reported risks and had received training. This should be ongoing. However they did not see it as their job to inspect cargo.
22	That key personnel who are at Goodwood Island wharf at the time of loading be appointed as "Authorised Officers" and a Senior person at the wharf be provided with the power to refuse to load any goods that show obvious evidence of unwanted pests and diseases.	Not Achieved This did not appear to have been implemented through delegation of powers.
23	That the Island Trader be asked to advise in advance of any high quarantine cargo observed during loading, with the intention of this cargo being inspected on arrival either at Lord Howe Island wharf or at the point where the cargo is broken down.	Partially Achieved The Lord Howe Island Sea Freight / Island Trader Crew have reported biosecurity items in advance on an ad hoc basis. In addition a simple manifest is provided.
24	That specialist advice (from Australian Department of Agriculture, Fisheries & Forestry - AFFA now Department of Agriculture and Water Resources - DAWR) be sought as to whether it is advisable to treat regular arriving vessels and aircraft with a residual insecticide	Not Achieved This was not observed. Advice may have been sought initially but not implemented.
25	That specialist advice be sought on the safety and practicality of in transit fumigation of the cargo hold of the Island Trader	Not Achieved This was not observed. Advice may have been sought initially but not implemented.
26	That LHI residents (particularly those who receive cargo direct to their residences) be encouraged to observe, treat and notify any signs of unwanted pests or diseases.	Partially Achieved Residents were generally, but not always found to be aware of biosecurity requirements and had received training in 2011. This should be ongoing. the iPad user guide includes useful information.
27	That Goodwood Island and Lord Howe Island wharfs, the airport and associated buildings and surrounds be made as inhospitable as is practical for pests	Partially Achieved The wharves at both Port Macquarie and LHI are maintained with good hygiene standards however they still have surrounding hospitable elements
28	That sealed "Amnesty" bins be provided at the airport and seaport and labelled accordingly	Partially Achieved Usage could be improved with implementation of proposed signage and labelled bins. Historically has resulted in dumping of permitted food stuffs.
29	That disposal procedures be developed for any seized or confiscated goods	Unknown Not observed but appeared to be informal i.e. some items sent back to mainland, some pests

#	Recommendation (from Landos 2003 and Thorp 2011)	AECOM Assessment (2015)
		ethanised, some plants, items sprayed items and held for clearance
	Public Awareness	
30	That public awareness be based on a partnership approach and have a specific theme adopted for LHI. That to the extent possible assistance be sought from established organisations such as State and Federal agencies and groups like the Interstate Quarantine Publicity Committee	Partially Achieved Some level of public awareness was observed in island residents, very little was observed in visitors / tourists. No consistent messaging observed. The iPad guide could help with awareness.
31	That the QF link laminated seat pocket brochure be replaced with a take away brochure that incorporates quarantine and waste messages as well as general visitor information. This brochure could also incorporate the current widely used "red" island map and information sheet.	Not Achieved This may have been implemented originally but was not continued. Brochures have been sent but appear not to be used by Qantas regularly. Discussions required at higher level i.e. LHIB CEO
32	That either a specific "top of descent" quarantine message be broadcast on all incoming QF Link flights or a brief quarantine message be added to the current arrival boarding message.	Not Achieved This was sent to Qantas but not approved or implemented. Could also be applied to Qantas "Destinations" website
2011-01	<i>Improve awareness, through interpretation and educational material</i>	Partially Achieved Low levels of signage etc. observed. This could be addressed through proposed signage and iPad displays.
33	The LHIB arrange the production of a short "first nighters" video that encapsulates key tourist features of the Island and key quarantine messages. Copies of this video to be made available to the visitor's centre and accommodation houses that have TV/Video facilities.	Not Achieved This may have been implemented originally but was not continued. The proposed iPad display could be used for this purpose along with the message on various websites.
34	That a range of posters be produced suitable for display at the visitors centre, Sydney, Port Macquarie and Brisbane airports and accommodation houses	Partially Achieved Some older posters were observed at various locations. Proposed signage could be used for this purpose.
35	That specific high quality brochures to be developed for General tourists; Hikers; Visiting scientists	Partially Achieved This may have been implemented originally but was not continued. Quarantine brochures were prepared and disseminated but during rodent consultation all brochures relating to Board environmental programs were withdrawn. The proposed iPad display could be used for this purpose along with the message on various websites.
36	That the LHIB school be encouraged to draw on existing AQIS schools program resources	Partially Achieved An education kit has been prepared in partnership between the LHIB and the School. Ongoing /- additional modules could be included to increase awareness of biosecurity

#	Recommendation (from Landos 2003 and Thorp 2011)	AECOM Assessment (2015)
37	That the LHI radio broadcast and newspaper be utilised on a regular basis to deliver and update quarantine awareness messages	Partially Achieved Ongoing
38	That an annual quarantine award be introduced that recognises an outstanding contribution to protecting the biodiversity of LHI	Unknown Not observed
39	That the LHI tourism web site include a "Quarantine Page"	Not Achieved Not observed
40	That the producers of glossy LHI package holiday brochures be approached with a view to incorporating an appropriate quarantine message in future brochures	Not Achieved This may have been implemented originally but was not continued. This could be incorporated on various websites and take on a wider focus of biosecurity
Specific Issues		
Rats		
41	That regular structured baiting and trapping will need to be maintained at key areas such as: <ul style="list-style-type: none"> - On board all vessels and planes; - Around the wharf and airport; - Around accommodation houses and residences. 	Partially Achieved Ongoing baiting occurs as part of the Rodent Control program. Not specifically vessels and planes although it is believed to be part of the shipping contract.
42	That measures be introduced for moored vessels that minimise the chances of any rats finding their way ashore.	Unknown Not observed
43	That all vessels visiting LHI have current deratting certificates	Not Achieved Not implemented.
44	That with regular vessels and planes that specific tailored programs be developed according to the need	Partially Achieved Biosecurity improvements to Island Trader observed.
45	That all wharf and airport areas including buildings be maintained in a clean state	Achieved The wharves at both Port Macquarie and LHI are maintained with good hygiene standards. This is ongoing.
2011-06	<i>Improve screening facilities at airport and jetty</i>	Not Achieved Not observed as implemented.
2011-07	<i>Develop and implement a strategy to control spread of P. cinnamomi</i>	Partially Achieved Ongoing treatment of known infestation. Implementation of footbaths and signage. Not yet full uptake at lodges.
46	That measures be taken to ensure that any waste being returned to the mainland is in sealed rat and vermin proof containers	Not Achieved Lord Howe Island Sea Freight reported numerous rats in waste to mainland.
Reptiles		
47	That specialist advice be sought on the availability of baiting and trapping for specific threats.	Unknown Not observed as implemented.
Animals Generally		

#	Recommendation (from Landos 2003 and Thorp 2011)	AECOM Assessment (2015)
48	That all introductions of animals not presently found on the Island be subject to risk analysis from animal and plant health (weeds), and biodiversity impact perspectives. This risk analysis should be over and above any NSW NPWS licensing provisions.	Achieved The development of numerous importation policies has formalised board approval and risk assessment of new animals. Animals are held at jetty for inspection by MEWH. All waste/fodder etc. from cage is bagged and shipped back to mainland. Animals are moved to their paddock after clearance as there is no holding facility near jetty.
49	That the LHIB seek advice on a specific case basis for the safe and humane transport of animals to the Island.	Unknown Not observed as implemented.
50	No straw, hay or green feed be imported to LHI	Partially Achieved LHIB approval required for importation of stock feed / hay. Straw & hay used in animal cages during transit is bagged with manure and shipped back to mainland. No straw, hay or green feed is imported for use on island.
51	That NSW Agriculture (and Fisheries as appropriate) be asked to examine the issue of animal feedstuffs imported to the Island and controls that should be applied to such goods	Partially Achieved LHIB approval required for importation of animal feedstuffs. NSW Agriculture input as required.
52	All animals to be imported in containers using clean sawdust and all waste to be appropriately destroyed on arrival	Achieved The development of numerous importation policies has formalised board requirements. All waste/fodder etc. from cage is bagged and shipped back to mainland.
Cattle		
53	That NSW Agriculture be requested to draw up a general set of health conditions for the importation to LHI and that this be supplemented by advice from the NSW Agriculture District Veterinarian and any market assurance programs that are relevant	Achieved The development of numerous importation policies has formalised board requirements regarding health checks.
Plants		
54	All plants be required to be imported bare rooted or in soil less medium or from an accredited supplier.	Achieved The development of numerous importation policies has formalised board requirements.
55	All plants to have identification labels	Achieved The development of numerous importation policies has formalised board requirements.
56	A holding compound to be built at the airport and seaport and all plants be held in this area until cleared by LHIB staff	Partially Achieved Quarantine Room at Wharf available Quarantine Room at airport proposed and designed. Plant holding area currently available.
57	All plant imports be subject to permit	Achieved The development of numerous importation policies has formalised board requirements.

#	Recommendation (from Landos 2003 and Thorp 2011)	AECOM Assessment (2015)
2011-07	<i>Develop protocols for the management of myrtle rust, and other plant pathogens</i>	Achieved The development of numerous importation policies has formalised board requirements
Weeds		
58	That specialist advice be sought on the survivability of weed seeds in the Vertical Compost Unit (VCU) and that current compost distribution be amended as appropriate	Achieved The development of numerous importation policies has formalised board requirements.
Timber and building materials		
59	All second-hand and untreated timber be prohibited unless accompanied by a current fumigation certificate	Achieved The development of numerous importation policies has formalised board requirements.
60	No bark on timber to be imported to LHI	Achieved The development of numerous importation policies has formalised board requirements.
61	If at all practical pallets used for Norfolk Island and LHI should be segregated.	Unknown Not observed as implemented. Ships no longer service both islands.
62	Hardwood pallets and other dunnage should be the subject of regular inspection both at Goodwood Island and Lord Howe wharf.	Partially Achieved Subject to random intuitive inspections at LHI Worn timber pallets still in use and pose risk
63	All pavers and the like are subject to inspection prior to boarding at Goodwood Island.	Unknown Not observed as implemented. Inspected upon arrival at LHI. Pavers & bricks etc. should be a notifiable item on manifest.
Gas bottles		
64	That gas depots be requested to inspect and only supply bottles with clean undersides to LHI	Not Achieved Gas bottle cleanliness is ongoing issue despite provision of quarantine training.
65	That inspection and knock down treatment be encouraged at each point in the delivery chain.	Not Achieved Not observed as implemented.
Waste		
66	That the LHIB consider the use of oil fired incinerator	Not Achieved Not observed as implemented. Current practice is for waste to either be held for burning in fire pile or frozen and held for burning in fire pile.
Road base		
67	That contractual specifications include quarantine related considerations such as the inclusion of soil and extraneous matter. In addition consideration be given to the use of local materials where appropriate given broader environmental considerations.	Achieved Road base procured has Virgin Extracted Natural Material (VENM) contractual requirement. May need to be enforced.

10.2 Gaps Analysis of 2003 Strategy

The following Table analyses the 2003 Strategy compared to current biosecurity reforms in Australia and best practice. Broad modern standards and requirements and gaps in the 2003 Strategy Gaps are detailed below. Gaps are identified in **bold**. Recommendations to address the gaps are detailed in **Section 13**. It should be noted that the 2003 Strategy was quite progressive for its time.

Table 6 Gap Analysis

Modern Standard / Requirement	AECOM Assessment (2015) of Gaps in 2003 Strategy
Biosecurity is managed across the continuum of : <ul style="list-style-type: none"> - Prevention - Preparedness and Emergency Response - Ongoing management of established risks 	The 2003 Strategy focussed heavily on prevention with little focus on preparedness and response . There was also little integration with ongoing management activities such as eradication and control programs .
Biosecurity is managed: <ul style="list-style-type: none"> - Pre border - At the border - Post border 	The 2003 Strategy identified improvement across the three elements and was quite progressive for its time. Better focus could be given to detection pre and post border .
Biosecurity is managed by effectively identifying risks and targeting mitigation to things that matter most i.e. implementing a risk based approach.	The 2003 Strategy was based on intuitive assessment of risks rather than formal risk assessment . Supporting policies developed since the 2003 Strategy have a more formalised approach to risk assessment.
Biosecurity effort is supported by effective legislation and policy	The 2003 Strategy recommended legislative changes in regards to the LHI Act, particularly around delegation of power to “accredited” stakeholders, however this was not implemented. Changes to NSW legislation in regards to LHI as a Special Quarantine Zone were not considered.
Generally the most cost effective use of resources is prevention of incursions in the first place and mitigation should increasingly focus on pre border activities Indicative Cost Benefits of Quarantine (\$-spent : \$-benefit) Prevention - 1:100 Eradication - 1:25 Containment - 1:5-10 Asset Based Protection - 1:1-5	The 2003 Strategy detailed costs of prevention mitigation but not in comparison to ongoing management costs
Capability and capacity to proactively anticipate, detect and respond to emerging pests and disease threats should be built.	The 2003 Strategy recommended building capability and capacity particularly pre border and at the border particularly in regards to awareness. Greater focus could be placed on ability to respond to detections at the border and post border .
Effective partnerships are established with stakeholders. Biosecurity is a shared responsibility between stakeholders and those that create the risk or benefit the most should accept a primary responsibility.	The 2003 Strategy identified partnerships across the continuum but these could be strengthened through formalising partnerships with stakeholders, including agencies .
Environmental biosecurity is equally as important as agricultural biosecurity	The 2003 Strategy was heavily focussed on environmental biosecurity.

Modern Standard / Requirement	AECOM Assessment (2015) of Gaps in 2003 Strategy
Island biosecurity offers unique opportunities for prevention and eradication	The 2003 Strategy focused on prevention at but did not integrate with eradication efforts
Impacts of climate change including localised temperatures changes and more severe weather events	The 2003 Strategy did not include potential biosecurity impacts on climate change.

Part 4 – Defining the Risk



11.0 Biosecurity Threat Analysis

A Potential Threat Analysis determines which pest and diseases could potentially impact on LHI by identifying:

- 1) how pests and diseases could potentially spread to LHI (pathways)
- 2) what pests and diseases could be spread to LHI (risk species)
- 3) which of those species could establish at LHI based on environmental factors (ability to establish).

The end result of the Potential Threat Analysis is a list of species that occur at the point of origin (or during transit), that have a recognised pathway for spread to LHI and that are likely to be able to establish at LHI. This list then forms the basis of species considered during the Risk Assessment.

11.1 Identifying Pathways

Essential to determining what pests and diseases could affect LHI is to understand the potential pathways for spread. Both natural pathways (such as bird migration) and man-made pathways (such as importing cargo) can exist as a result of an activity.

The pathways that are identified vary in their likelihood of spreading pests and diseases. This will depend on the level of use of each individual pathway and the ability of the pathway to spread pests. There will definitely be higher level of use of some pathways than others and there are certain pathways (e.g. containers and soil) that are well known for spreading a variety of pests. The main pathways of concern (higher likelihood) for activities will therefore be those that have a high volume and are known vectors for spreading pests.

Pathways for spread of biosecurity risk species to LHI were identified as part of this review and are represented graphically in Figure 4. Further detail of the pest and diseases associated with each pathway is presented in Table 7.

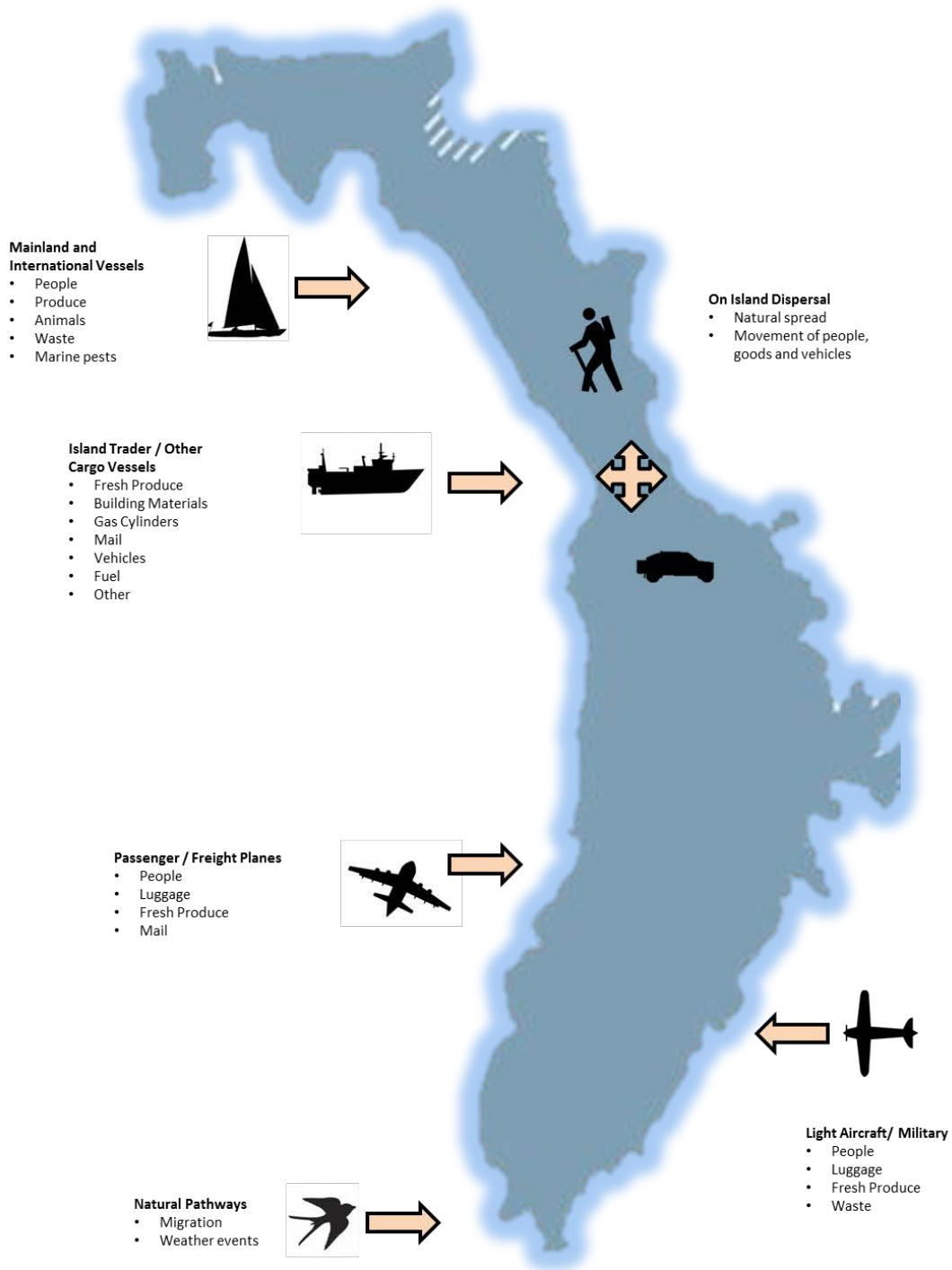









Figure 4 LHI Potential Biosecurity Pathways

Table 7 Potential Biosecurity Pathways

Pathway Type	Origins	Biosecurity Risk Items	Types of Biosecurity Risk Species
Sea			
Sea Freight Island Trader  (courtesy LHITA)	Port Macquarie Region	Hull Fouling Ballast water Fresh Produce Other Foods Road Base Building Materials / Fencing Jetty Timbers Gas Cylinders Domestic Mail Vehicles and machinery Plants and seeds Fuel (Drums and IBCs) General Cargo including personal effects Animal Feed Mulch / Growing medium Timber packing and Dunnage Live animals (with LHIB approval i.e. cattle, day old chicks)	Marine Pests and disease Hitchhiker species including: <ul style="list-style-type: none"> - Rodents - Reptiles – Snakes, geckos and lizards - Frogs and toads - Tramp ants - Other insects and spiders - Weeds / seeds - Pathogens - Animal Diseases
Project Specific Vessels barges etc. 	Mainland Australia	Hull Fouling Ballast water Waste Road Base Building Materials / Fencing Containers Vehicles, Plant and Equipment General Cargo	Marine Pests and disease Hitchhiker pests including: <ul style="list-style-type: none"> - Reptiles – Snakes, geckos and lizards - Frogs and toads - Tramp ants - Other insects and spiders - Weeds / seeds - Pathogens - Animal Diseases
Yachts and Other Vessels  (courtesy LHITA)	Mainland Australia (may include international that have cleared quarantine)	Hull Fouling Ballast water Waste People Fresh produce Pets / Animals Plants/Soil	Marine Pests Hitchhiker pests including: <ul style="list-style-type: none"> - Rodents - Reptiles – Snakes, geckos and lizards - Frogs and toads - Tramp ants - Other insects and spiders - Weeds / seeds - Soil - Pathogens - Animal Diseases
	International seeking harbour or refuge	Hull Fouling Ballast water Waste People Fresh produce Pets / Animals Plants/Soil	Marine Pests Hitchhiker pests including: <ul style="list-style-type: none"> - Rodents - Reptiles – Snakes, geckos and lizards - Frogs and toads - Tramp ants - Other insects and spiders

Pathway Type	Origins	Biosecurity Risk Items	Types of Biosecurity Risk Species
			<ul style="list-style-type: none"> - Weeds / seeds - Pathogens - Animal Diseases
Military Vessels 		Hull Fouling Ballast water Cargo Vehicles and Equipment Luggage Food items Waste	Marine Pests Hitchhiker pests including: <ul style="list-style-type: none"> - Rodents - Reptiles – Snakes, geckos and lizards - Frogs and toads - Tramp ants - Other insects and spiders - Snails and slugs - Weeds / seeds - Pathogens Animal Diseases Soil Plant material Animal material i.e. faeces
Natural Pathways	Ocean currents Weather events Animal Migration/ Dispersion	Water Wind Marine debris	Marine pests and pathogens Plant material – weeds and seeds
Air			
Regular Passenger Flights 	Brisbane, Sydney and Port Macquarie (actual traveller origins various)	Luggage Shoes and hiking equipment Golf equipment Personal Effects Food items Mail Fresh produce Pets (dogs)	Hitchhiker pests including: <ul style="list-style-type: none"> - Rodents - Reptiles – Snakes, geckos and lizards - Frogs and toads - Tramp ants - Other insects and spiders - Snails and slugs - Weeds / seeds - Pathogens / spores i.e. myrtle rust - Animal Diseases Soil Plant material Animal material i.e. faeces
Mac Air Freight Plane	Port Macquarie Region	Fresh produce Other food items Cut flowers Personal Effects Mail Pets (dogs) Live animals (with LHIB approval i.e. day old chicks)	Hitchhiker pests including: <ul style="list-style-type: none"> - Rodents - Reptiles – Snakes, geckos and lizards - Frogs and toads - Tramp ants - Other insects and spiders - Snails and slugs - Weeds / seeds - Pathogens/ spores i.e. myrtle rust Soil Plant material Animal material i.e. faeces Accidental imports
Light Aircraft	International seeking fuel or refuge	Waste Fresh produce Personal Effects	Hitchhiker pests including: <ul style="list-style-type: none"> - Rodents - Reptiles – Snakes, geckos and lizards - Frogs and toads

Pathway Type	Origins	Biosecurity Risk Items	Types of Biosecurity Risk Species
			<ul style="list-style-type: none"> - Tramp ants - Other insects and spiders - Snails and slugs - Weeds / seeds - Pathogens Soil Plant material Animal material i.e. faeces
Light Aircraft	Mainland Norfolk Island (to be classed as domestic from July 1)	Waste Fresh produce Personal Effects	Hitchhiker pests including: <ul style="list-style-type: none"> - Rodents - Reptiles – Snakes, geckos and lizards - Frogs and toads - Tramp ants - Other insects and spiders - Snails and slugs - Weeds / seeds - Pathogen Soil Plant material Animal material i.e. faeces
Military Aircraft	International or domestic	Cargo Luggage Food items Waste	Hitchhiker pests including: <ul style="list-style-type: none"> - Rodents - Reptiles – Snakes, geckos and lizards - Frogs and toads - Tramp ants - Other insects and spiders - Snails and slugs - Weeds / seeds - Pathogens
Natural Pathways  (courtesy LHITA)	Animal Migration / Dispersion Climate change events	Migratory Birds	<ul style="list-style-type: none"> - Weeds / seeds - Pathogens - Animal Disease
On Island Dispersal			
Movement of people, vehicles and goods 	Pests and weeds already on island or recently introduced to the island	Movement of people, vehicles, goods and waste	Hitchhiker pests including: <ul style="list-style-type: none"> - Rodents - Reptiles – Snakes, geckos and lizards - Frogs and toads - Tramp ants - Other insects and spiders - Snails and slugs - Weeds / seeds - Pathogens Soil Plant material including seed Animal material i.e. faeces

Pathway Type	Origins	Biosecurity Risk Items	Types of Biosecurity Risk Species
Natural dispersal	Pests and weeds already on island	Wind Water Birds / droppings Animal dispersal	Animals Pathogens Weeds / seeds

11.2 Risk Species

Whilst it is recognised that a range of species could potentially reach LHI via the pathways above, for the purpose of this Strategy, species have been grouped into where the pathways, risk and mitigation are similar. These groups are detailed in Section 12.2

11.3 Ability to Establish

Once Biosecurity risks that are most likely to be spread have been identified, the last step in the Potential Threat Analysis is to consider the ability of the species to establish at LHI. This requires an understanding of the species biology and ecology and will consider:

- invasive attributes of the species:
 - invasive characteristics / ecology and biology
 - invasion / colonisation history
 - origins / current distribution (international / intrastate / interstate)
- recipient community attributes:
 - climate / habitat matching
 - presence of predators / competition
 - level of disturbance.

Ability to establish for the species groups is assessed in Section 12.2.

A summary of risk assessment to allow prioritisation of management actions is provided in Table 11 below.

12.0 Risk Assessment

Biosecurity is principally about risk management. A formal Risk Assessment was undertaken to assess the likelihood and consequence of potential impacts arising from known and potential biosecurity risks to LHI. The framework for the risk assessment is described below. Risk Assessments will be undertaken periodically and in response to changes in the likelihood or consequence of threats. Where new biosecurity threats or potential threats are identified, Risk Assessments will be undertaken in relation to each threat identified.

12.1 Framework

The Risk Assessment framework was based on standard risk assessment methodology using a Likelihood and Consequence matrix as below in Table 8. Standardised likelihood (Table 9) and consequence (Table 10) descriptors have been developed to ensure consistency of assessment. Likelihood and consequence ratings are given a value that are added together to give a mechanism for prioritisation within the risk bands. The basis for prioritisation is risk with a low score presents the greatest risk whilst high scores present a lower risk. Risks were assessed for the base case and mitigated case (residual risk) and considering environmental, economic and reputational risks.

Table 8 Risk Matrix

Likelihood Rating	Consequence Rating				
	Severe 1	Major 6	Moderate 11	Minor 16	Negligible 21
Almost Certain 1	Very High 2	Very High 7	High 12	Medium 17	Low 22
Likely 3	Very High 4	High 9	Medium 14	Medium 19	Low 24
Possible 5	Very High 6	High 11	Medium 16	Medium 21	Low 26
Unlikely 7	High 8	Medium 13	Medium 18	Low 23	Low 28
Rare 9	High 10	Medium 15	Low 20	Low 25	Low 30

Table 9 Likelihood Descriptors

Likelihood of entry, establishment and spread	
Rating	Description
Almost Certain	Very high probability of the consequences occurring during the funding period.
	Has happened several times in the past year and in each of the previous 5 years OR has a > 90% chance of occurring in the next funding period if the risk is not mitigated
Likely	High probability of the consequences occurring during the funding period.
	Has happened at least once in the past year and in each of the previous 5 years OR has a 60-90% chance of occurring in the next funding period if the risk is not mitigated.
Possible	Even probability of consequences occurring during the funding period.
	Has happened during the past 5 years but not in every year OR has a 40-60% chance of occurring in the next funding period if the risk is not mitigated.
Unlikely	Low probability of occurrence during the funding period but not negligible.
	May have occurred once in the last 5 years OR has a 10-30% chance of occurring in the future if the risk is not mitigated.

Likelihood of entry, establishment and spread	
Rare	Very low probability of the consequences occurrence during the funding period but not impossible.
	Has not occurred in the past 5 years OR may occur in exceptional circumstances, i.e. less than 10% chance of occurring in the next funding period if the risk is not mitigated.

Table 10 Consequence Guidance

Consequence of entry, establishment and spread		
Consequence	Description	Example
Severe	Significant or permanent impact to World Heritage values or conservation significant species Detrimental international media campaign and severe reputational damage	Local extinction of a protected species through lack of management of introduced predators
Major	Adverse impact to World Heritage values or conservation significant species. Will require an emergency commitment of substantial resources (time and /or money) to remediate. Will take more than 10 years to recover through natural processes. Sustained detrimental national or state media reports. Sustained community protest	Major reduction in population of protected native plants due to encroachment of weeds into protected habitat area Cost to control large weed infestation in several years time compared to cost to control small infestation now
Moderate	Reversible impact to World Heritage values or conservation significant species. Will require a programmed commitment of substantial resources (time and /or money) to remediate. Will take between 2-10 years for the viability of ecosystems, or their constituent parts to recover. Limited detrimental national or state media reports Organised community concerns and complaints.	Minor reduction in local population of a protected species as a result of introduction of Phytophthora (dieback) into an area Cost of eradication of a wide spread weeds species compared to cost of inspection/ wash down to prevent infestation in the first place
Minor	Reversible small scale impact to common native species or values. Will require a programmed commitment of resources (time and/or money) to remediate. Will take less than 2 years for the viability of the ecosystems, or their constituent parts to recover. High profile detrimental local media reports. Random substantiated complaints from the community.	Localised reduction in biodiversity due to incursion of tramp ants
Negligible	Minor and localised impact to common native species or values. Will require minor repair that will be rectified during routine maintenance Will take less than 6 months for the viability of the ecosystems, or their constituent parts to recover. Low profile detrimental local media reports. Trivial substantiated complaints from the community.	Loss of landscape amenity due to large area of weed infestation

12.2 Risk Assessment Results

A summary of risk assessment to allow prioritisation of management actions is provided in Table 11 below.

Table 11 Risk Assessment Summary

Species Group	Potential Impacts	Ability to establish	Potential Pathways	Likelihood	Consequence	Unmitigated Risk Rating	Mitigation (includes current Mitigation)	Mitigated Risk Rating
Weeds								
Hitchhiker Weeds currently established within the Port Macquarie / Sydney / Brisbane region	Depletion of native species through competition, hybridisation, and the alteration of ecosystem structure and function i.e. establishment of monocultures, limiting burrow access for animals Colonisation of bare areas Inhibit regeneration and native recruitment Amenity impacts	Likely - established in similar climate on mainland	On goods and cargo	Unlikely	Moderate	Medium	Increased inspection at Port Macquarie Wharf and LHI Continue biosecurity requirements in contracts for major projects Continued weeds surveillance effort at LHI Develop response protocols for new weed incursion Formalise protocols for on island hygiene for work crews Consider trial use of weed detector dogs at Port Macquarie and LHI Habitat modification at Port Macquarie i.e. weed control, wash-down or hardstand	Low
			On Used Vehicles and Machinery	Unlikely	Moderate	Medium	Continue requirement for cleaning of vehicles and extend to used machinery Continue biosecurity requirements in contracts for major projects Continued weeds surveillance effort at LHI Formalise protocols for on island hygiene for work crews Develop response protocols for new weed incursion	Low
			In stock feed	Possible	Moderate	Medium	Continue requirements for stock feed import Continued weeds surveillance effort at LHI	Low
			With stock	Unlikely	Moderate	Medium	Continue requirements for stock import Continued weeds surveillance effort at LHI	Low
			On boots and personal equipment	Possible	Moderate	Medium	Increase awareness of visitors through travel / tourism website, brochure, cabin announcements and signage Increase awareness of residents and lodges Continue use of foot scrubs Continued weeds surveillance effort at LHI Develop response protocols for new weed incursion	Medium
Hitchhiker weeds established in Australia		Assume likely	On goods and cargo	Unlikely	Moderate	Medium	Continue biosecurity requirements in contracts for major projects Continued weeds surveillance effort at LHI	Low
			On Used Vehicles and Machinery	Unlikely	Moderate	Medium	Continue biosecurity requirements in contracts for major projects Continued weeds surveillance effort at LHI	Low
			In stock feed	Rare	Moderate	Low	Continue requirements for stock feed import Continued weeds surveillance effort at LHI	Low
			With stock	Rare	Moderate	Low	Continue requirements for stock feed import Continued weeds surveillance effort at LHI	Low
			On boots, personal and sporting equipment	Unlikely	Moderate	Medium	Increase awareness of visitors through travel / tourism website, brochure, cabin announcements and signage Increase awareness of residents and lodges	Low

Species Group	Potential Impacts	Ability to establish	Potential Pathways	Likelihood	Consequence	Unmitigated Risk Rating	Mitigation (includes current Mitigation)	Mitigated Risk Rating
							Continue use of foot scrubs Continued weeds surveillance effort at LHI	
Weeds not in Australia but on the Watch List		Assume possible	On international yachts and aircraft, in goods, live plants, waste, food	Rare	Major	Medium	Formalise controls for international movements with Dept. of Agriculture and local stakeholders Nothing allowed off vessels or aircraft except persons	Medium
Weeds - Ornamental		Assume likely	Deliberate introduction - sea cargo air or mail	Likely	Moderate	Medium	Increase awareness of residents and lodges Continue current restriction and WRA Continued weeds surveillance effort at LHI Develop response protocols for new weed incursion Enforce compliance with penalties for noncompliance if necessary	Medium
Weeds -various		Assume likely	Wave or storm event dispersion	Rare	Minor	Low	Continued weeds surveillance effort at LHI	Low
Weeds already on island		Yes	Human assisted and natural dispersion	Likely	Moderate	Medium	Formalise protocols for on island hygiene for work crews	Medium
Mammals								
Mammals – rodents and mice	Depletion of native species through competition and predation	Yes	In goods and on cargo or on board Islander Trader or regular aircraft	Likely	Major	High	<i>If proposed Rodent eradication proceeds:</i> Implement and enforce contractual de ratting/ baiting on board Island Trader and at Port Macquarie wharf Trial use of rodent detector dogs at Port Macquarie and LHI Habitat modification at Port Macquarie i.e. construction of barrier fencing between areas of hardstand and surrounding bushland Increased inspection at Port Macquarie Wharf and LHI Baiting at LHI wharf and airport	Medium
			In goods and on cargo or on board other vessels Mainland	Unlikely	Major	Medium	Implement and enforce contractual de ratting/ baiting for major project vessels	Medium
			In goods and on cargo or on board International vessels aircraft	Possible	Major	High	Outer Mooring only for international vessels unless Ships Sanitary Certificate in place Formalise controls for international movements with Dept. of Agriculture and local stakeholders Nothing allowed off vessels or aircraft except persons	Medium
			In goods and on cargo or on board International aircraft	Rare	Major	Medium	Formalise controls for international movements with Dept. of Agriculture and local stakeholders Nothing allowed off vessels or aircraft except persons	Medium
			Deliberate introduction - sea cargo air or mail	Unlikely	Major	Medium	Increase awareness of residents Continue current \ restriction Enforce compliance with penalties for noncompliance if necessary	Medium
Mammals – rodents and mice already on island		Yes	Human assisted and natural dispersion	Likely	Major	High	Continue current level of control	Medium
Mammals – Prohibited Livestock	Degradation of species and ecosystems though grazing and trampling	Yes	Deliberate import	Rare	Negligible	Low	Continue current restrictions	Low
Mammals – Other prohibited including cats, pigs and goats	Degradation of species and ecosystems though grazing,	Yes	Deliberate import	Rare	Minor	Low	Continue current restrictions	

Species Group	Potential Impacts	Ability to establish	Potential Pathways	Likelihood	Consequence	Unmitigated Risk Rating	Mitigation (includes current Mitigation)	Mitigated Risk Rating
	predation, trampling and wallowing							

Species Group	Potential Impacts	Ability to establish	Potential Pathways	Likelihood	Consequence	Unmitigated Risk Rating	Mitigation (includes current Mitigation)	Mitigated Risk Rating
Birds								
Non-native birds	Spread of fleshy fruited weeds such as cherry guava	Yes	Deliberate introduction - sea cargo air or mail	Unlikely	Minor	Low	Increase awareness of residents Continue current restrictions Increased inspection at LHI Enforce compliance with penalties for noncompliance if necessary	Low
	Competition for food, shelter and nest sites		Hitchhiker pest on vessel domestic	Unlikely	Minor	Low	Increase awareness of stevedores and crew Increased inspection at Port Macquarie Wharf and LHI	Low
	Predation on invertebrates, reptiles and other birds		Hitchhiker pest or pet on International	Unlikely	Minor	Low	Formalise controls for international movements with Dept. of Agriculture and local stakeholders Outer Mooring only for international vessels Nothing allowed off vessels or aircraft except persons	Low
	Predation on seeds		Natural migration	Rare	Minor	Low	Continue surveillance as part of ongoing biodiversity monitoring	Low
Reptiles and Amphibians								
Snakes, lizards, geckos, frogs and toads including Cane toads	Likely to compete with, and prey upon, native invertebrates.	Yes	Hitchhiker pests in cargo and food from mainland	Likely	Major	High	Increased inspection at Port Macquarie Wharf Increased inspection at LHI Wharf and airport Increase awareness of stevedores and crew Increase awareness of residents, lodges and suppliers Habitat modification at Port Macquarie i.e. construction of barrier fencing between areas of hardstand and surrounding bushland or wash down Continue biosecurity requirements in contracts for major projects Consider trial use of reptile detector dogs at Port Macquarie and LHI Develop response protocols	Medium
			Hitchhiker pests in cargo and food from International	Possible	Major	High	Formalise controls for international movements with Dept. of Agriculture and local stakeholders Outer Mooring only for international vessels Nothing allowed off vessels or aircraft except persons Increase awareness of residents, lodges and suppliers	Medium
			Deliberate introduction as pets	Unlikely	Major	Medium	Increase awareness of residents Continue current restrictions	Medium
Invertebrates								
Tramps Ants, Spiders and other Invertebrates	Predation on natives Depletion of native species through competition Damage to local produce and inability to grow crops	Assume Yes	Hitchhiker pests in cargo such as building material and food from Mainland vessels and aircraft	Likely	Severe	Very High	Increased inspection at Port Macquarie Wharf Increased inspection at LHI Wharf and airport Increase awareness of stevedores and crew Increase awareness of residents, lodges and suppliers Habitat modification at Port Macquarie i.e. hardstand, wash down and pest control / insecticide treatment Continue biosecurity requirements and awareness in contracts for major projects Continued ant surveillance effort	High

Species Group	Potential Impacts	Ability to establish	Potential Pathways	Likelihood	Consequence	Unmitigated Risk Rating	Mitigation (includes current Mitigation)	Mitigated Risk Rating
Tramps Ants, Spiders and other Invertebrates already on island							Disinsection for mainland aircraft and potentially the Island Trader Develop response protocols Consider trial use of ant detector dogs at Port Macquarie and LHI	
			Hitchhiker pests in cargo such and food from international vessels and aircraft	Rare	Major	Medium	Formalise controls for international movements with Dept. of Agriculture and local stakeholders Outer Mooring only for international vessels Nothing allowed off vessels or aircraft except persons Disinsection for international aircraft	Medium
		Yes	Human assisted and natural dispersion	Likely	Major	High	Continue current eradication	Medium
Pathogens								
<i>Phytophthora cinnamomi</i>	Root rot causing dieback of a range of plants Soil	Yes	Soil and vehicles	Possible	Major	High	Continue current restrictions on soil and vehicle cleaning conditions Continued weeds surveillance effort at LHI Formalise protocols for on island hygiene for work crews	Medium
			Hitchhiker on visitor boots and personal equipment	Likely	Major	High	Continue foots scrubs Increase awareness of visitors through travel / tourism website, brochure, cabin announcements and signage Increase awareness of residents	Medium
<i>Phytophthora cinnamomi</i> already on island		Yes	Human assisted and natural dispersion	Possible	Major	High	Continue current eradication Formalise protocols for on island hygiene for work crews	Medium
Myrtle Rust	LHI endemic Myrtaceae species are considered at risk. Myrtle rust poses a risk to LHI critically endangered ecological communities and species, including the LHI Phasmid which feeds on <i>Melaleuca howeana</i> , and the endangered ecological community <i>Gnarled Mossy Cloud Forest</i> which has a number of canopy trees from the Myrtaceae family.	Yes	Spread through spores on visitors boots, clothing and equipment	Likely	Severe	Very High	Progress Gazettal of LHI as Special biosecurity Zone i.e. Myrtle Rust free zone Increase awareness of visitors through travel / tourism website, brochure, cabin announcements and signage Regular survey of high risk areas Continue and expand foots scrubs to all lodges and erect at airport and jetty. Supplement with personal decontamination sprays e.g. with 70% methylated spirits at all walking trail heads Increase inspection at airport Finalise response protocols Consider restricting access to high risk areas	High
Marine Pests								
Hull Fouling organisms	Globally, marine ecosystems have been dramatically altered by the spread of invasive and exotic species including reduced densities of native species through competition and predation, habitat alteration, changes in trophic dynamics and community composition, fisheries declines, fouling of marine structures and loss of aesthetic	Assume yes although not for all species	On hulls of vessels domestic vessels	Possible	Major	High	Collaborate with Marine Parks on development of marine pest plan Formalise arrangements with LHI stakeholders regarding vessel arrival and mooring Recent antifouling certificates in place or dive inspection for all vessels coming into lagoon Implement Marine Pest Survey biennially (every two years) Develop response protocols Utilise new slipway facilities once constructed Engage local dive companies in terms of feedback on changes to the marine environment	Medium

Species Group	Potential Impacts	Ability to establish	Potential Pathways	Likelihood	Consequence	Unmitigated Risk Rating	Mitigation (includes current Mitigation)	Mitigated Risk Rating
	and amenity values (Aquenal 2006b).		On hulls of international vessels	Likely	Major	High	<p>Collaborate with Marine Parks on development of marine pest plan</p> <p>Formalise controls for international movements with Dept. of Agriculture and local stakeholders regarding vessel arrival and mooring</p> <p>Recent antifouling certificates in place or dive inspection for all vessels coming into lagoon</p> <p>Outer Mooring only for international vessels</p> <p>Implement Marine Pest Survey biennially</p> <p>Investigate use and purchase of emergency "Boat Condom" i.e. Invasive Marine Pest Protector which is designed to wrap around the hull of boats and kills off marine growth attached to the hull, containing potentially invasive species.</p> <p>Develop response protocols</p>	High
Ballast Water organisms			Ballast water all vessels	Likely	Major	High	<p>Collaborate with Marine Parks on development of marine pest plan</p> <p>Formalise controls for international movements with Dept. of Agriculture, and local stakeholders (MPA, Police and LHIB) regarding vessel arrival and mooring</p> <p>Outer Mooring only for international vessels</p> <p>No discharge of Ballast within the Marine park unless proof of deep ocean exchange</p> <p>Implement Marine Pest Survey biennially</p> <p>Engage local dive companies in terms of feedback on changes to the marine environment</p> <p>Develop response protocols</p> <p>Formalise Marine Parks risk assessment and mitigation through updated Marine Park / Biosecurity Plan</p>	Medium
Marine pest - wave / storm dispersal				Rare	Moderate	Low	<p>Implement Marine Pest Survey biennially</p> <p>Engage local dive companies in terms of feedback on changes to the marine environment</p>	Low

Part 5 – The Way Forward



13.0 Recommendations

The following section summarises recommended actions with priority ratings for each recommendation. It should be noted that mitigation options with low priority were not recommended.

High priority actions are those that have either:

- Highly favourable cost / benefit ratio
- Major point of influence / major risk reduction
- Ability to be implemented relatively quickly
- Recommended for short term (1-2 years) action.

Medium priority actions are those have either:

- Favourable cost / benefit ratio
- Actions that require significant investment or are outside of LHIB direct control
- Recommended for mid-term (2-5 years) action.

Table 12 Recommendations

Aspect	Action	Approximate Cost	Priority
Pre Border			
Education and Awareness	- Undertake research on what matters to stakeholders to develop targeted biosecurity branding and messages and drive behavioural change “Community Based Social Marketing”	- Can be done by LHIB	Medium
	- Investigate using social research initiatives such as Community Based Social Marketing to give effective behaviour-change tools	- Seek external funds - \$25K	Medium
	- Continue awareness for Stevedores/freight handlers at Port Macquarie wharf and Port Macquarie Airport <ul style="list-style-type: none"> • Erection of specific stevedore signage at Port Macquarie • Ongoing awareness training – biennially • Focus on highest risks such as weeds, plant pathogens (e.g. Myrtle Rust), reptiles/amphibians and invertebrates • Investigate options for passenger and crew awareness information at Sydney, Brisbane & Port Macquarie airports 	- Signs - \$1,000 one off - Training - \$2,000 biennially	High
	- Continue awareness of residents, lodges, restaurants and operators, travel agents and suppliers about LHI requirements, what to look for and what to do <ul style="list-style-type: none"> • Develop poster series for distribution • Focus on highest risks such as plant pathogens e.g. myrtle rust, weeds, reptiles/amphibians and ants/insects 	- Posters - \$2,500 one off	High
	- Increase awareness for visitors (air and sea) through - Wider distribution of the established iPad guide	- Signs - \$1,000 one off - Web sites - Minimal Time only -	High

Aspect	Action	Approximate Cost	Priority
	http://www.naturetourismservices.com.au/LHI-Userguide/LHI-Userguide.pdf <ul style="list-style-type: none"> Erection of previously developed signs at LHI airport and Jetty Upgraded biosecurity message and branding through LHIB and LHI Tourism Association and travel agents website Brochures for airlines, travel agents Biosecurity in-flight announcement Focus on highest risks such as myrtle rust, weeds and marine pests 	<ul style="list-style-type: none"> Brochures - \$5,000 annually In flight announcements- negligible 	
	<ul style="list-style-type: none"> Increased reporting of goods arriving i.e. better manifests and identification <ul style="list-style-type: none"> Air and sea freight Identification of mandatory reported items on manifest and physically via sticker or paint on goods 	<ul style="list-style-type: none"> Negligible 	High
Regulatory / Contracts	<ul style="list-style-type: none"> Pursue legislative declaration of "Special Biosecurity Zone" (i.e. Myrtle Rust, rodents (post eradication) or tramp ant free zone) under the <i>Biosecurity Act</i> and potentially the <i>Marine Estate Management Act</i>. This is critical during early stages of the legislative rollout. This should include consideration of mailed items and focus on highest risks such as plant pathogens e.g. myrtle rust, reptiles/amphibians toads and tramp ants/insects. 	<ul style="list-style-type: none"> Minimal Time only 	High
	<ul style="list-style-type: none"> Ensure LHI regulations match current risk profile 	<ul style="list-style-type: none"> Minimal Time only 	Medium
	<ul style="list-style-type: none"> Consider further use of penalties for noncompliance for residents especially for repeat offenders 	<ul style="list-style-type: none"> Minimal Time only 	High
	<ul style="list-style-type: none"> Ensure all contractual or other agreements on biosecurity include unequivocal rules on what vessel and aircraft operators must do if they detect or suspect an unwanted organism on board or transit to LHI 	<ul style="list-style-type: none"> Minimal Time only 	Medium
	<ul style="list-style-type: none"> Establish biosecurity Compliance Agreement or contractual obligations with LHISF, Qantas and Macquarie Air 	<ul style="list-style-type: none"> Minimal Time only to establish Will require on going auditing approx. \$5,00 per annum 	Medium
	<ul style="list-style-type: none"> Establish preferred supplier scheme / compliance agreement / pest free warrant with suppliers 	<ul style="list-style-type: none"> Minimal Time only 	Medium
	<ul style="list-style-type: none"> Build biosecurity requirements into all major LHIB contracts including major projects 	<ul style="list-style-type: none"> Will be passed onto LHIB through tendering but likely less than 0.01% of capital value 	High

Aspect	Action	Approximate Cost	Priority
	- Formalise arrangements with other agencies, re incoming vessels and aircraft including international and Defence	- Minimal Time only	High
	- Establish formal biosecurity working group with Govt. stakeholders. Annual meetings	- \$2,000 annually	High
	- Investigate options for mail screening / declaration at Port Macquarie i.e. x-ray and random detector dogs	- Time only and undertaken in liaison with Australia post	Medium
	- Progress options with gas bottle supplier for supply of clean rimmed bottles	- Time only - Research into sealing / capping of base of cylinders to limit access to pest species	Medium
Point of Departure	- Progress with LHISF for options to reduce risk at LHISF via habitat modification. Options include combination of: <ul style="list-style-type: none"> • Ongoing baiting, weed or insect treatment • Fencing based on 500mm solid lower section, mowing strip / footing for length, HD Galva 3 rail fence approx. 2100h + 3 strand cranked barbed wire top. Assume 500m to be fenced (extra over for double vehicle gate = \$4500) • Additional Hardstand - heavy duty concrete • Inspection pallet stand • Mobile wash-down including trailer, pumps, multi sprays, filter and water recycle • Increase vessel hygiene (de-ratting/ hull maintenance) • Permanent Wash-down Bay 	- Baiting, herbicide, pest spraying \$5,000 annually - Fencing \$450/m for 500m = \$225,000 - Hardstands \$180 /m ² (maybe 1,000m ²) = \$180,000 - Pallet stand - \$15,000 - Mobile wash-down \$25,000 - Vessel hygiene \$5,000 annually - Permanent Wash down - \$450,000	Medium
	- Establish biosecurity Compliance Agreement or contractual obligations with LHISF and Macquarie Air	- Minimal Time only to establish - Will require on going auditing approx. \$5,00 per annum	Medium
	- Trial paid inspection of high risk cargo at LHISF (NSW DPI or LHIB board) assume \$130/ hr for two days load inspection + travel expense - Trial use of detector dogs for various risks at Port Macquarie. Suggest fee for service "hire" from other sources initially	- Approx. \$3,000-5,000 per voyage	Medium
At the Border			
Education and Awareness	- Increase capability and capacity for key LHIB staff via inspection, containment and response training on island. This should include Manager Environment/World	- Attend training sessions one off \$1,000-\$2,000	High

Aspect	Action	Approximate Cost	Priority
	Heritage, Flora Management Officer and Ranger.		
	<ul style="list-style-type: none"> - Continue awareness for Stevedores at LHI through: <ul style="list-style-type: none"> • Erection of previously developed signs • Ongoing awareness training – biennially 	<ul style="list-style-type: none"> - Signs – already have - Training - \$2000 biennially (every two years) 	High
	<ul style="list-style-type: none"> - Increase awareness for visitors (air and sea) through airport signage and foot scrubs. This could include information on high risk myrtle rust areas on the mainland and steps to limit the spread - Supplement foot scrubs with personal decontamination sprays e.g. with 70% methylated spirits/Quatsan at all walking trail heads - Continue and expand foots scrubs to all lodges and erect at airport and jetty. - Increase inspection at airport - Finalise response protocols - Consider restricting visitor access to high risk areas for myrtle rust 	<ul style="list-style-type: none"> - Signs – already have - 	High
Detection and Response	<ul style="list-style-type: none"> - Increase current LHI wharf and airport inspection regime including dedicated biosecurity staff and trained LHIB staff - Include disinsection of aircraft on arrival through negotiation with airlines 	<ul style="list-style-type: none"> - No significant increase if workload spread 	High
	<ul style="list-style-type: none"> - Undertake pathway management planning 	<ul style="list-style-type: none"> - Minimal Time only 	Medium
	<ul style="list-style-type: none"> - Plan for emergency shipments to LHI 	<ul style="list-style-type: none"> - Minimal Time only 	High
	<ul style="list-style-type: none"> - Develop Incident Management System in case of breach of quarantine 	<ul style="list-style-type: none"> - Minimal Time only 	Medium
	<ul style="list-style-type: none"> - Develop protocol to have NSW Police open suspicious mail on behalf of the LHIB - Enforce compliance with penalties for noncompliance 	<ul style="list-style-type: none"> - Minimal Time only 	High
	<ul style="list-style-type: none"> - Increase inspection / containment infrastructure and equipment at Jetty and Airport <ul style="list-style-type: none"> • pallet inspection stand, • bunded cleaning area, • Quarantine room at Airport, • response equipment (tarps, chemical sprayers, wash down equipment and biosecurity kits • Boot scrub stations at airport and jetty 	<ul style="list-style-type: none"> - Pallet stand \$18,000 - Quarantine room at airport – costed in refurbishment - Response equipment \$5,000 - 	Medium
	<ul style="list-style-type: none"> - Trial use of detector dogs for various risks at LHI. - Suggest fee for service “hire” from other sources initially. - Then undertake Detailed Business Case for Feasibility of Detector Dogs 	<ul style="list-style-type: none"> - Dogs indicative cost \$40,000 for kennel and \$200,000 annually for FT dog and handler 	Medium

Aspect	Action	Approximate Cost	Priority
	<ul style="list-style-type: none"> - Develop targeted surveillance programs for high risk species such as weeds, reptiles/amphibians, tramp ants/insects, and plant pathogens e.g. myrtle rust - Implement marine pest surveys with Marine Parks 	<ul style="list-style-type: none"> - Build into existing surveillance regime 	Medium
	<ul style="list-style-type: none"> - Formalise arrangement for vessels with LHI govt. Stakeholders 	<ul style="list-style-type: none"> - Minor time only 	Medium
Aspect	Action	Approximate Cost	Priority
Post Border			
Education and Awareness	<ul style="list-style-type: none"> - Increase biosecurity awareness for residents, tourism operators, tradies and visitors. "What to look for, What to do" <ul style="list-style-type: none"> • Poster and brochure series / iPad guide 	<ul style="list-style-type: none"> - \$3,000 one off 	High
Limit the spread	<ul style="list-style-type: none"> - Formalise protocols for working in infested areas etc. Wash-down, area closures - Increase boots scrub - Supplement boot scrubs with personal decontamination sprays e.g. with 70% methylated spirits at all walking trail heads - Consider restricting access to high risk areas - Continue eradication programs wherever realistic and achievable 	<ul style="list-style-type: none"> - as per current eradication and foot scrub costs 	High
New infestations	<ul style="list-style-type: none"> - Continue surveillance and monitoring particularly for high risks such as plant pathogens e.g. myrtle rust, weeds, reptiles/amphibians, tramp ants/insects and marine pests - Develop response plans for high risks species - Prepare for inevitable breaches of quarantine through development of a Co-ordinated Incident Management System - Formalise protocols with other agencies (i.e. Marine Parks) - Formalise pest surveys at high risk areas such as LHI wharf and airport - Continue engagement and incursion reporting through Friends of Lord Howe Island and dive visitors - Trial use of detector dogs for detection at LHI Suggest fee for service "hire" from other sources initially 	<ul style="list-style-type: none"> - as per current surveillance - As part of current duties - Minimal Time only - Marine pest survey is Marine Parks responsibility 	Medium

14.0 Conclusion

The review and evaluation of the 2003 Quarantine Strategy produced the following findings.

- The environmental and economic values of LHI are significant and important and need ongoing protection from biosecurity risks.
- Previous incursions have had significant impacts to environmental and economic values. Significant resources have been invested on control and eradication, however eradication of some things not possible i.e. Whitefly and Queensland Fruit Fly.
- Significant improvement has been made in the biosecurity system and associated risks reduction since 2003.
- Stakeholders generally understand the need of biosecurity and are happy with a level of mitigation as long as it is not too onerous or impacts dramatically on cost of living.
- Current biosecurity best practice is risk based, a shared responsibility and across the continuum or prevention, preparedness and response and ongoing management before the border, at the border and post border.
- The 2003 Strategy was quite progressive for its time and many recommendations have been achieved.
- A range of pathways exist for spread of biosecurity risk to LHI.
- New incursions of weeds, animals, invertebrates, pathogens and marine pest could have significant impacts to LHI environmental and economic values.
- Highest risks currently include rodents, snakes, lizards, geckos, frogs and toads, phytophthora and myrtle rust
- Current operational controls should continue and new recommendations have been made to mitigate higher and medium risks.
- Best value for money recommendations focus on
 - Increasing inspection regime for all pathways
 - reducing risk at the Port Macquarie wharf
 - increasing education and for visitors pre arrival
 - increasing awareness for residents both before and after import
 - being prepared to react quickly to new incursions through early detection and rapid response
 - Recommendations should be considered in the context of current spend for ongoing management and eradication programs (including proposed eradications) or potential spend on eradication for new introductions i.e. a myrtle rust incursion.

15.0 References

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