Rottnest Island Research Strategy

2008 – 2011

Rottnest Island has greatly benefited from numerous research projects investigating the weird, wonderful and even the mundane occurring on the Island. In the past this has occurred on a fairly adhoc basis without clear strategic direction from the Rottnest Island Authority (RIA).

The RIA wants to actively engage with researchers and institutions to develop research programs, projects and partnerships that will provide the RIA with meaningful and prioritised advice and information, which can be used to make informed decision about management of the Island.

A lot of research has been conducted on the biological and physical aspects of the Island however there is a lack of broader ecosystem and social investigations with a management focus. For example what are the impacts of planting within the ground water recharge area? How will it affect water abstraction, freshwater seeps, flora and fauna?

This document is designed as a guide to advise researchers of what research outcomes the RIA sees as a priority over the next three years. This is not an exhaustive list nor does the RIA wish to discourage researchers to think laterally and come up with their own creative ideas.

The RIA wants to encourage projects that will aid the Island in making informed decisions about its management and is willing to consider supporting appropriate projects with both financial and in-kind support.

Within the strategy research projects are categorised to ensure that directed research is linked to an appropriate work program ensuring that any results and recommendations agreed with are actioned. The last page of the strategy further classifies the projects to identify if they are expected to result in physical, social or scientific outcomes, as well as a classification of the expected level of research we envision each project to require.

Given the high level of research attention the Island receives and its level of protection as an A-class reserve, the RIA will not approve extractive or damaging research unless the management benefits outweigh the negative impacts. This is particularly important for the marine sanctuary areas.

Research Questions and Projects

ENVIRONMENTAL PLANNING

Rottnest Island is a popular destination for many international and local visitors, offering a variety of tourism attractions. What are the impacts of this increasing demand and how can any adverse impacts be mitigated?

Projects:

1. Investigate and develop methods to identify, classify, prioritise and minimise the impact of visitors and facilities, and predict the cumulative effects of increased volume and diversity of recreation and tourism in both the terrestrial and marine environment.
2. Further develop, adapt and combine systems for contamination and hazard response, in both the marine and terrestrial environments. Predict and model likelihood and impact of additional incidences and minimise potential risks.
3. Establish realistic, sustainable carrying capacities for the marine and terrestrial reserves in relation to vessel, people, cyclist, vehicle and mooring numbers.
4. Ascertain the carbon carrying capacity from established and projected vegetation communities, as a result of implementing the 20 year Woodland Restoration strategy. In addition, investigate the revenue and business opportunities for the RIA within the proposed carbon credit economy.
5. Investigate how the RIA can become a model for sustainability. To include further research into product and management development and provision of education and training services.

ECOTOURISM

Projects:

1. Investigate the current status and opportunities for Ecotourism on Rottnest Island.
2. Identify appropriate terrestrial and marine Ecotourism products for Rottnest Island that have:
    a. the potential to generate revenue
    b. provide greater user appreciation for the biotic and biotic environments
    c. provide greater appreciation of impacts and management issues
    d. provide island specific education and interpretation opportunities.

GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

Projects:

Investigate, map, classify and provide recommendations for the appropriate management of all tracks and trails within the Rottnest Island Terrestrial reserve taking into account existing and planned environmental management programs/plans, recreational and commercial activities.

PARK SERVICES

Does Rottnest Island provide adequate visitor facilities? What experience are the varied visitors to the Island seeking?

Projects:

1. Increase understanding of the diversity of user and stakeholder groups and develop methods to identify and minimise conflicts between user groups.
2. Review and audit access and facility requirements in bays with a high concentration of moorings.
3. Develop an ecological asset management and works system that automates and predicts future budget considerations for desired management performance indicators. The system should be able to track investment into the various areas of ecological management and assess the outcomes resulting from the investment, as well as predict future budget considerations to achieve a variety of ecological states/condition. The system should be developed to work in conjunction with GIS programs.

HABITAT PROTECTION

How do our terrestrial and marine ecosystems function and interrelate?

TERRESTRIAL

Projects:

1. What are the impacts of planting within the ground water recharge area? How will it effect water abstraction, freshwater seeps, wetlands, flora and fauna?
2. Determine the character and distribution of native vegetation and weed communities across Rottnest Island. Assess, predict and model future distributions and evaluate processes that make native communities vulnerable to invasion.
3. Investigate techniques and methods into ensuring the re-establishment of damaged ecological processes in a variety of vegetation communities where these processes are damaged.

INLAND AQUATIC

Projects:

1. Assess existing efforts to rehabilitate swamps, and provide advice on techniques to continue and expand the restoration and management of wetlands and lakes.
2. Investigate the effects of climate change on inland aquatic systems. What impact(s) will this have on flora and fauna?
3. Fauna and inland aquatic dynamics and relationships.

MARINE

Projects:

1. What are the impacts of the new marine sanctuary zones? Are they achieving their objectives?
    a. Develop long term marine monitoring programs that will determine temporal changes in biodiversity and abundance through comparisons within sanctuary zones, and also the wider marine reserve.

   b. Baseline data collection – benthic flora / fauna.
   c. How have recreational and commercial fishing practices changed with the implementation of the new marine sanctuary zones?
   d. Investigate and establish biological evidence which either supports, discourages, or identifies the need to extend Rottnest Island Sanctuary Zones.
2. Investigate visitor impacts at popular snorkel sites and provide management recommendations.
3. Investigate effects of the hypersaline discharge from the desalination plant on the marine environment.
4. Devising methods for the monitoring and assessment of Rottnest Island seagrass (particularly *Amphibolus* genus and *Halophila ovalis*)
5. Undertake ongoing assessment of the current and historical impacts of moorings on seagrass. Is this changing with mooring type?
6. What are the usage patterns of popular dive site locations within the marine reserve? Has this changed with the implementation of sanctuary zones? What impacts is recreational use having on the marine habitat? How can any negative impacts be mitigated?
7. Investigate the benefits of using GIS for marine park management for a variety of ecological, recreational and management attributes.

WILDLIFE MANAGEMENT

Rottnest Island has unique biodiversity, how can it best be managed?

Projects:

1. Undertake a desktop study collating all research undertaken about quokkas and develop a long term population and health monitoring program.
2. Review and assess current techniques for monitoring key species, ecosystem health and trends. Develop new techniques where there are no appropriate methods.
3. Investigate the impacts of pest species on native flora / fauna. What controls need to be implemented? Focus on the impacts of pest bird species.
4. Identify and measure the current and potential impact of visitor recreational activities on marine mammals.

VOLUNTEER AND COMMUNITY CONTRIBUTION

Rottnest Island volunteers make a significant and diverse contribution to the Island and its visitors each year – how can this benefit be quantified?

Projects:

1. Value volunteer contributions, assessing and developing mechanisms to quantify these contributions. Identify evaluation tools for assessing effectiveness of volunteer opportunities for learning.

HISTORIC & CULTURAL HERITAGE CONSERVATION

The responsible long-term management of the built and non-built heritage assets of Rottnest Island – there is much to discover.

Projects:

1. Create statements of significance for sites and places identified on the Rottnest Island Authority Heritage Asset Register.
2. Investigate the effects of climate change on cultural heritage. Focus on the effect of increased storm occurrence on heritage buildings and structures.

Research Topic	Project directive	Expected Research Level
Scientific		
What are the impacts of planting within the ground water recharge area? How will it effect water abstraction, freshwater seeps, wetlands, flora and fauna?	Habitat Protection - Terrestrial	Honours
Investigate techniques and methods into ensuring the re-establishment of damaged ecological processes in a variety of vegetation communities where these processes are damaged. Compare the results with the Woodland Restoration Strategy and where necessary include these methods into the plan to ensure that all revegetation works are aimed at repair and reinstating ecological processes.	Habitat Protection - Terrestrial	PhD
Investigate the effects of climate change on inland aquatic systems. What impact(s) will this have on flora and fauna?	Habitat Protection – Inland Aquatic	Honours
What are the impacts of the new marine sanctuary zones? Are they achieving their objectives? a. Develop long term marine monitoring programs to determine biodiversity and abundance both within sanctuary zones and the wider marine reserve. b. How have recreational and commercial fishing practises changed with the implementation of the new marine sanctuary zones? c. Investigate and establish biological evidence that either supports, discourages, or identifies the need to extend, Rottnest Island Sanctuary Zones.	Habitat Protection - Marine	PhD
Undertake ongoing assessment of the current and historical impacts of moorings on seagrass. Is this changing with mooring type?	Habitat Protection - Marine	University groups
What are the usage patterns of popular dive site locations within the Marine Reserve? Has this changed with the implementation of sanctuary zones? What impacts is this recreational use having on the marine habitat? How can any negative impacts be mitigated?	Habitat Protection - Marine	Internship / Work experience

Research Topic	Project directive	Expected Research Level
Review and assess current techniques for monitoring key species, ecosystem health and trends. Develop new techniques where there are no appropriate methods.	Wildlife Management	Honours
Investigate the impacts of exotic populations on the natural flora and fauna. What controls need to be implemented? Focus on the impacts of peafowl and pheasants.	Wildlife Management	Honours
Investigate the effect of climate change on cultural heritage. Focus on the effect of increased storm occurrence on heritage buildings and structures.	Historic and Cultural Heritage Protection	Honours
Physical		
Further develop, adapt and combine systems for contamination and hazard response, in both the marine and terrestrial environments. Predict and model likelihood and impact of additional incidences and minimise potential risks.	Sustainable Development	Honours
Establish realistic, sustainable carrying capacities for the marine and terrestrial reserves in relation to vessel, people, cyclist, vehicle and mooring numbers.	Sustainable Development	Honours
Ascertain the carbon carrying capacity from established and projected vegetation communities, as a result of implementing the 20 year Woodland Restoration strategy. In addition, investigate the revenue and business opportunities for the RIA within the proposed carbon credit economy.	Sustainable Development	Honours
Investigate how the RIA can become a model for sustainability. To include further research into product and management development and provision of education and training services.	Sustainable Development	Honours
Review and audit access and facility requirements in bays with a high concentration of moorings.	Park services	Internship / Work experience
Develop an ecological asset management and works system that automates and predicts future budget considerations for desired management performance indicators. The system should be able to track investment into the various areas of ecological management and assess the outcomes resulting from the	Park services	Honours

Research Topic	Project directive	Expected Research Level
investment, as well as predict future budget considerations to achieve a variety of ecological states/condition. The system should be developed to work in conjunction with GIS programs.		
Investigate effects of the hypersaline discharge from the desalination plant on the marine environment.	Habitat Protection - Marine	Internship / Work experience
Investigate the benefits of using GIS for marine park management for a variety of ecological, recreational and management attributes.	Habitat Protection - Marine	Internship / Work experience
Assess existing efforts to rehabilitate swamps, and provide advice on techniques to continue and expand the restoration and management of wetlands and lakes.	Habitat Protection – Inland Aquatic	Honours
Determine the character and distribution of native vegetation and weed communities across Rottnest Island. Assess, predict and model future distributions and evaluate processes that make native communities vulnerable to invasion.	Habitat Protection - Terrestrial	Honours
Undertake a desktop study collating all research undertaken about quokkas and develop a long term population and health monitoring program.	Wildlife Management	Internship / Work experience
Create statements of significance for sites and places identified on the Rottnest Island Authority Heritage Asset Register.	Historic and Cultural Heritage Protection	Internship / Work experience
Social		
Investigate and develop methods to identify, classify, prioritise and minimise the impact of visitors and facilities, and predict the cumulative effects of increased volume and diversity of recreation and tourism in both the terrestrial and marine environment.	Sustainable Development	Honours
Increase understanding of the diversity of user and stakeholder groups and develop methods to identify and minimise conflicts between user groups.	Park services	Honours
Value volunteer contributions, assessing and developing mechanisms to quantify these contributions. Identify evaluation tools for assessing	Volunteer and Community Contribution	Honours

Research Topic	Project directive	Expected Research Level
effectiveness of volunteer opportunities for learning		