

Evaluating Management Effectiveness of Private Forest Reserve Sites within the NRM South Region of Tasmania

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A thesis submitted in partial fulfillment of the requirements for a Masters Degree in Environmental Management at the School of Geography and Environmental Studies,
University of Tasmania

June 2006.

I hereby declare that this thesis contains no material, which has been accepted for the award of any other degree or diploma in any tertiary institution, and to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference is made in the text of this thesis.

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9th June 2006

Abstract

Compared to the other Australian states, Tasmania has a high proportion of land reserved in protected areas. Despite this, many ecosystems are poorly represented in the public reserve system, due to the fact that they were some of the first areas to be come under private ownership and utilized for grazing and agricultural purposes. In order to meet Comprehensive, Adequate and Representative (CAR) reservation targets in Tasmania, protection of land within these privately owned areas is vital. There are many Private Forest Reserve Program (PFRP) sites throughout Tasmania that were established to help address this issue. However, little research evaluating management effectiveness within the program has been done up to this point.

This research evaluates management effectiveness for IUCN (The World Conservation Union) category VI sites within the PFRP. It attempts to assess how well IUCN category VI objectives are being met within the program. It also evaluates whether land uses within PFRP sites are consistent with IUCN category VI management prescriptions. In addition to this, suggestions are made as to how management could be improved within the program.

Four techniques were utilized to collect data for the evaluation. Firstly, a review of the operations plans and terms of covenant documents was done to assess how well plans accounted for specific management issues. Next, a questionnaire was distributed to landowners with questions focusing on ecosystem management and sustainable production. Interviews were then carried out with landowners. The interview questions were also related to ecosystem conservation and sustainable production. However, landowners were given an opportunity to go into more depth than the questionnaires. Site visits were also conducted in order to gain first hand knowledge about management issues and practice.

Overall, the study found that the sites included in this investigation were managed effectively, according to IUCN management objectives. Highlights include extensive management documents and long-term protection for each site. Many landowners within the program also seemed to be fairly knowledgeable about techniques for maintaining healthy native bush. However, there were areas where improvements could be made. There were areas where management prescriptions in operations plans could have contained more detail. Additional support from DPIW could also improve management capacity in some areas, most notable exotic plant and feral animal management. Better communication between landowners and DPIW could help to ensure that management and production activities are conducted in a way that maintains natural values within each reserve.

Acknowledgements

First, I would like to thank my supervisor, Dr. Michael Lockwood, for the support that he provided since my arrival in Tasmania. Thank you for your guidance throughout both the coursework and research portions of my Master's degree.

I would also like to thank the staff from DPIW, especially Dean Vincent and Steve Smith. Your input proved to be invaluable throughout the research process. I also appreciate the access that you helped me get to documents, which proved to be vital for this research project.

A big thanks goes out to all the people who found time to participate in this research project. To those who took the time to complete my questionnaires, be interviewed and let me visit their reserves, I am very grateful. Despite the short time frame in which to work with, they were very helpful in accommodating me when it came time to gather data from them.

Thank you to Mom, Dad, Kelsey and Alisha. Even though you were back in Canada during the time that this thesis was written, the phone conversations and emails helped to make sure I didn't become too homesick. Also, thank you for the extensive support that you have all given me throughout life, which allowed to me to get to this point.

And lastly, thanks to all the Dynnyrne guys and the friends who spend time at the Dynnyrne house. You kept reminding me that fun times are still important, even when busy schedules make it difficult. Thanks for helping me to keep my stress levels in check.

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Commonly Used Acronyms

ANZECC	Australia & New Zealand Environment and Conservation Council
CAR	Comprehensive, Adequate and Representative
CARSAG	Comprehensive, Adequate and Representative Scientific Advisory Group
CMO	Conservation Management Officer
CBD	Convention of Biological Diversity
DPIW	Department of Primary Industries and Water
IBRA	Interim Biogeographic Regionalization of Australia
IUCN	The World Conservation Union
NFPS	National Forest Policy Statement
NGO	Non-Government Organization
NHT	National Heritage Trust
NRM	Natural Resource Management
NRS	National Reserve System
PFRP	Private Forest Reserve Program
PTR	Private Timber Reserve
RFA	Regional Forest Agreement
THP	Timber Harvesting Plan
TPWS	Tasmania Parks and Wildlife Service
WCPA	World Commission of Protected Areas

Chapter 1

Introduction

1.1 Problem Statement

The first modern day protected areas were set aside in North America during the second half of the nineteenth century, with the establishment of Yellowstone (1872) and Banff (1885) National Parks. Objectives of these reserves tended to focus on tourism and the provision of recreation opportunities for the public. Many protected area categories still allow recreational activities. However, the primary management objectives have since shifted from recreation and tourism towards nature conservation (McNamee 2002).

The shift in primary management objectives is reflected in The World Conservation Union (IUCN)(1994, p.7) definition of protected area as “an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.” For land to be included in the Australian National Reserve System (NRS) it must meet the IUCN definition of a protected area and be classified into one of the seven IUCN protected area categories. Protected area categories are assigned based on degree of human intervention, with category I sites being reserved for strict nature protection and category VI sites permitting the sustainable use of resources (Worboys, Lockwood & De Lacy 2005).

All signatories to the National Forest Policy Statement, including Tasmania, are required to help contribute to the development of a Comprehensive, Adequate and Representative (CAR) reserve system (section 2.3.2). The purpose of a CAR reserve system is to ensure the maintenance of ecological processes, genetic diversity and viable forest ecosystems throughout their natural ranges. (Commonwealth of Australia 1995). This requires Tasmania’s reserve system to protect sufficient examples of forest and other vegetation communities found across all bioregions throughout the state (section 2.3.3).

Even though Tasmania has a higher proportion of protected land than any other state, a variety of species, communities and habitats are poorly represented. This is due to the fact that flat, fertile and productive areas were chosen for settlement when European settlers were first colonizing the island. They used this land for grazing and agricultural purposes. Mountainous landscapes located in the west were considered to have little agricultural value and left in their natural condition, later to be reserved for conservation purposes. The result has been poor representation of species and communities that are predominantly found on land that attracted settlement, such as native grassland, grassy woodland and coastal heath (ABHF, DPIWE, TFGA 2003).

The fact that many poorly represented ecosystems are found only on private land, means that private landowners can play an important role in conservation. The establishment of land covenant programs within Tasmania, such as the Private Forest Reserve Program (PFRP), now provide landowners with options that allow them to protect conservation values on their land in perpetuity. Participation often requires little or no changes to current land use practices and can benefit the landowner in a variety of ways (ABHF, DPIWE, TFGA 2003).

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1.2 Aim and scope

The aim of this thesis is to determine the effectiveness of management provisions, which are put in place for IUCN category VI sites within the PFRP in Tasmania. This research will address the following questions:

1. Are objectives for IUCN category VI sites being met on PFRP reserves?
2. Are land uses consistent with IUCN category VI management prescriptions?
3. How could management be improved within the Tasmania PFRP?

There are a number of protected areas on private land programs throughout Australia. However, the scope of this research will be limited to PFRP sites with a category VI IUCN designation. Due to time constraints, all sites included in the analysis are located in the NRM South region of Tasmania in order to allow for site visits to be conducted.

1.3 Significance of the study

Findings presented in this study may prove to be quite useful for the PFRP managers and landowners who contribute to the program. The identification of strengths and weaknesses within the program will allow managers and landholders to build upon and refine current practices. Ideally this will improve the effectiveness in which category VI PFRP reserves are managed, resulting in an increase in the achievement of management objectives.

The benefits of this research have the potential to extend beyond the immediate study locations. There are various covenanting programs that operate in each region of Tasmania. Lessons learned in this study can potentially be applied in other regions of the state. Covenanting programs are also used in the rest of Australia and throughout the world. This study could potentially provide insights into the improvement of management effectiveness in covenanting programs beyond Australia.

1.4 Limitations of the study

Unfortunately limited time resulted in the constrained scope of this thesis. Even though there are various covenanting programs in operation throughout Tasmania, the focus of this research is on the PFRP program. In the interest of producing the most meaningful results, sample sites were from those classified as category VI under the IUCN system and taken from the NRM South region of Tasmania. Due to time constraints, not all category VI PFRP sites within this region could be assessed. Therefore, a set of 10 sample sites was selected for the analysis. There are a total of forty-five category VI PFRP sites within the NRM South region of Tasmania.

Limited time also meant that a number of factors relating to ecosystem management and sustainable production could not be addressed. Therefore, the main components chosen for this investigation were considered to be the most relevant to category VI PFRP sites within the NRM South region of Tasmania. These include elements of fire management, weed management, feral animal management, threatened species management, grazing, wood collection, harvest of native animals and economic benefit.

1.5 Thesis structure

Chapter two sets out the policy and institutional context of the PFRP from an international, national and state perspective. An explanation of the IUCN protected area category system is found in chapter three along with a description of management prescriptions for category VI reserves. Specifics of the PFRP are covered in chapter four. This includes program objectives, the covenanting process, reservation options and management provisions. Chapter five outlines the main principles associated with management effectiveness theory.

Chapter six provides an explanation of the methodological framework and techniques used to conduct this research. A presentation of the results follows in chapter seven. The results, implications of the study and recommendations are discussed in chapter eight. This is followed by the conclusion in chapter nine.

Chapter 2

Policy and Institutional Context

2.1 Introduction

It is important to understand the relevant legislation and governing organizations in order to understand where the PFRP fits with international, national and regional conservation objectives.

2.2 International

2.2.1 The World Conservation Union (IUCN)

The IUCN was established in 1947 (Worboys et al. 2005) and is the largest conservation organization in the world. It brings together 82 states, 112 government agencies, 869 non-government organizations and more than 10 000 scientists and specialists from 181 nations (IUCN No Date p. 3). The IUCN develops innovations in conservation science and applies this research in projects around the world (IUCN 2006). This unique partnership allows scientists and practitioners to share their experiences from around the world enabling decision makers to address conservation issues in a coordinated manner (IUCN No Date).

The IUCN has been divided into six commissions, with each one focusing on a specific set of conservation issues. They consist of a volunteer network of scientists and experts who are the main influence's of knowledge, policy and technical advice and are responsible for implementing many parts of the IUCN program. Every four years at the World Conservation Congress the main priorities and work of the commissions are set (IUCN 2006). The six commissions are:

- Ecosystem Management
- Education and Communication
- Environmental, Economic and Social Policy
- Environmental Law
- Protected Areas
- Species Survival (IUCN 2006)

The commission that has the most relevance to the PFRP is Protected Areas, which is also known as World Commission of Protected Areas (WCPA).

2.2.2 The World Commission of Protected Areas (WCPA)

Protected areas is one of the main program areas of the IUCN and is the primary responsibility of the WCPA. The WCPA Steering Committee governs the commission. It is responsible for ensuring that adequate planning, implementation and evaluation are carried out for the strategic plan. The WCPA features four strategic directions:

- i. **Conservation and sustainable use of biodiversity** – priorities include biodiversity conservation through the completion of protected area and ecological networks and where appropriate, sustainable use of biodiversity.
- ii. **Knowledge, science and management of protected areas** – focus on knowledge generation in areas such as conservation science, management effectiveness, protected area management categories and standards.
- iii. **Capacity building and awareness raising** – priorities include building awareness, improving practitioner skills and developing sustainable finance strategies.
- iv. **Governance, equity and livelihoods** – priorities include improved protected area governance, promotion of various types of protected area governance and the increased participation of local communities and indigenous groups (IUCN 2005).

It is the IUCN who developed the protected area category system. The WCPA drives the international protected area agenda and influences how governments implement protected area programs. Private reserves can contribute to the achievement of management objectives stated in each of the WCPA strategic directions.

2.2.3 Convention on Biological Diversity (CBD)

Australia is a signatory to the Convention on Biodiversity (CBD). Signatories are expected to establish a protected area system that facilitates the protection of biodiversity, develop protected area selection, establishment and management

guidelines and promote species, habitat and ecosystem protection. The target objective that was agreed upon at the 6th Conference of the Parties to the CBD in 2002 is to significantly reduce the current rate of biodiversity loss by the year 2010. At the 2004 Conference of the Parties to the CBD a protected area work plan was agreed upon that would ensure the development of a comprehensive, adequate and representative (CAR) reserve system (section 2.3.2) to achieve conservation objectives (DEH 2005). By protecting forest communities that are underrepresented in the public reserve system, the PFRP has the potential to significantly contribute to Australia's CAR reserve system.

2.3 National

2.3.1 National Reserve System (NRS)

The NRS is the product of collaborative efforts between the States, Territories, Australian Government, NGO's and Indigenous landowners, and is managed by the Department of Environment and Heritage (DEH). It consists of nine protected area systems. Its purpose is to develop and maintain a terrestrial system of Australian protected areas, which contributes to the conservation of biodiversity and add underrepresented environments to the system (DEH 2005). The NRS aims to:

- contain samples of each ecosystem identified at a regional scale.
- contain areas that act as refuge's or centers of endemism or species richness;
and
- consider requirements of rare or threatened species and ecosystems (DEH No Date).

Many rare or threatened species and ecosystems occur mainly on private land. Because of this, private reserves have the potential to contribute significantly to the NRS. Management objectives for each reserve must meet the IUCN definition of a protected area and reserves must be assigned to one of the IUCN protected area categories to be included in the NRS. Each reserve must also be managed by legal or other effective means and in a manner that is open to public scrutiny. In addition to this, reserves must also contribute to comprehensiveness, adequacy and representativeness (section 2.3.2) of the NRS (DEH No Date). Types of reserves that are part of the NRS include national parks, strict nature reserves, wilderness parks,

forest reserves, game reserves, private protected areas and indigenous owned reserves (DEH 2005).

2.3.2 Comprehensive, Adequate and Representative (CAR) Reserve System

The Nationally Agreed Criteria for the Establishment of a CAR Reserve System (commonly known as JANIS criteria) are the key principles that are used for the development of the NRS (DEH 2005). CAR targets include:

- i. **Comprehensiveness** – reserve comprehensiveness needs to be given the highest priority. This is measured by representation within the NRS of each regional ecosystem. It is desirable that 100% of the IBRA bioregions (section 2.3.3) are represented. However, this is not likely to be achievable, so 80% has been chosen as the minimum target (DEH 2005).
- ii. **Adequacy** – Reservation of each ecosystem to the level required in order to promote ecological viability and integrity is known as adequacy. Important concepts when assessing adequacy include gaps in the protection of conservation values in established reserves; measures needed to maintain or improve biodiversity; and threatening processes such as fragmentation (DEH 2005).
- iii. **Representativeness** – The diversity within each reserve should reflect the diversity found within the ecosystem in which it is located. When assessing representativeness it may be useful to use information about species distribution and genetic variation. Other important information may include the occurrence of vegetation types in relation to soil types and current variations of vegetation structure (ANZECC & MCFFA 1997).

The main goal in developing a CAR Reserve System is to ensure that protected area planning and establishment considers ecological requirements of species and communities of concern (DEH 2005). Private reserves can contribute to a CAR reserve system by protecting land that contains species or communities, which are poorly represented in the public reserve system.

2.3.3 Interim Biogeographic Regionalization of Australia (IBRA)

A bioregional planning framework called the Interim Biogeographic Regionalization of Australia (IBRA) has been developed to assist in the establishment of a CAR Reserve System. Each biogeographic region is composed of a land area that is similar across the landscape. Factors considered in IBRA include climate, lithology, geology, landforms and vegetation. Maps are then produced based on these factors to assist in conservation strategies and improve natural resource management capability. It is these bioregions that are used to determine the comprehensiveness of the CAR Reserve System. When establishing the NRS, it is desirable to have representation from as many bioregions as possible (Pullar, Low Choy & Rochester 2005).

2.3.4 National Forest Policy Statement (NFPS)

In order to improve the sustainability of forest management in Australia and achieve the full benefits that forests can provide, the Commonwealth, State and Territory governments have developed a forest management strategy known as the National Forest Policy Statement (NFPS) (Commonwealth of Australia 1995). The main objectives of the NFPS include:

- Development and establishment of ecologically sustainable forest management and use.
- Contribute to the establishment of a CAR Reserve System.
- Facilitation in the development of an internationally competitive wood production and wood products industry.
- Conservation and management of the Private Forest Estate (Commonwealth of Australia 1995).

In the NFPS private forest reserves are identified as an important component of a CAR reserve system. The main objectives identified in the NFPS that relate to private reserves include the maintenance of existing private native forest cover and ecologically sustainable management of these forests (Commonwealth of Australia 1995).

2.3.5 National Strategy for the Conservation of Australia's Biological Diversity

The Australian, State and Territory Governments are all signatories to the National Strategy for Conservation of Australia's Biological Diversity 1996. Its main aim is to bridge the gap between current practices and effective conservation and management of biodiversity in Australia. The strategy was prepared by the Australia and New Zealand Environment and Conservation Council (ANZECC) in consultation with other government agencies, business, industries and conservation professionals. Provisions found in the CBD (section 2.2.3) were taken into account during preparation of the strategy (DEH 1996). By protecting forest communities that are underrepresented in the public reserve system, the PFRP plays an important role in biodiversity protection.

2.4 State

2.4.1 Department of Primary Industries and Water (DPIW)

Responsibility for delivery of the PFRP lies in the hands of the Private Forest Reserves Unit in the Division of Resource Management and Conservation, Department of Primary Industries and Water (DPIW). This involves registering covenants on land titles, giving approval for certain activities not covered in operation plans and the establishment of the best Private Forest Reserve System possible. They are also responsible for the ongoing management of reserves within the system. DPIW also contributes staff to the Comprehensive, Adequate and Representative Scientific Advisory Group (CARSAG) (section 4.6.2.) (DPIWE 2004).

2.4.2 Tasmania Parks and Wildlife Service (TPWS)

Ongoing management of the reserves within the PFRP is the responsibility of the Tasmania Parks and Wildlife Service (TPWS). They maintain information on the reserve system and report to the public, CARSAG and the minister. They also provide management advice to landholders, arrange for research projects to be conducted and assist landowners with the development of annual reports (DPIWE 1998).

2.4.3 Regional Forest Agreement (RFA)

The *Tasmanian Regional Forest Agreement* focuses on forest ecosystems and addresses the issue of comprehensiveness, adequacy and representativeness at a regional scale (DEH 2005). It was signed by the Tasmanian and Australian

Governments on 8 November, 1995 and is a 20 year agreement with the purpose of providing long term stability to forests and related industries. According to the *Tasmanian Regional Forest Agreement*, the state is committed to ensuring that owners of private forests comply with the Forest Practices Code for timber harvesting and mechanisms are developed to protect conservation and catchment values on private land. It also sets out various principles for preserving CAR values on private land, including the development of adequate measures for nature conservation on private land.

Chapter 3

IUCN Category System

3.1 Introduction

The IUCN completed the development of a Protected Area Category System in 1994 (Bishop, Dudley, Phillips & Stolton 2004) to help provide international consistency in the definition of protected areas. Seven categories have been established, each with between four and six management objectives, which have been designated as primary, secondary, potentially applicable and not applicable (Prato & Fagre 2005). Categories are generally assigned based on primary management objectives (Bishop et al. 2004). These management objectives will be used in this thesis to help provide an indication as to whether or not reserves in the PFRP are being managed in accordance with IUCN standards. To be recognized as a protected area by the IUCN a reserve should be capable of being assigned to one of the categories. The IUCN Protected Area Categories are as follows:

- 1a) Strict Nature Reserve** – Managed mainly for science.
- 1b) Wilderness Area** – Managed mainly for wilderness protection.
- 2) National Park** – Managed mainly for ecosystem protection and recreation.
- 3) Natural Monument** – Managed mainly for conservation of specific natural features.
- 4) Habitat/Species Management Area** – Managed mainly for conservation through human intervention.
- 5) Protected Landscape/Seascape** – Managed mainly for landscape/seascape conservation and recreation.
- 6) Managed Resource Protected Area** – Managed mainly for the sustainable use of natural ecosystems.

(Bishop et al. 2004)

It is important to remember that protected area category numbers do not reflect its importance in terms of conservation. Each category is important to conservation and sustainable development and fills a particular niche within conservation management.

However, the IUCN protected area category numbers do represent varying degrees of human intervention. Categories I to III are mainly concerned with protection of areas where past human intervention and modification has been limited. Categories IV to VI contain land where more significant intervention has occurred in the past (IUCN 1994).

3.2 Category VI Protected Areas

As this thesis is focusing on Category VI properties within the PRPF program, it is important to understand the definition, management objectives, and organizational responsibilities for reserves listed as Category VI under the IUCN system.

3.2.1 Category VI Definition

According to the IUCN (1994) a Category VI Protected Area is a reserve that predominantly contains unmodified natural systems, which are managed to provide long-term protection and maintenance of biodiversity, while allowing for sustainable flow of natural products and services to meet community needs.

3.2.2 Category VI Management Objectives

The IUCN has developed four management objectives for Category VI Protected Areas:

- i. “To protect and maintain the biological diversity and other natural values of the area in the long-term.
- ii. To promote sound management practices for sustainable production purposes.
- iii. To protect the natural resource base from being alienated for other land use purposes, that would be detrimental to the area’s biological diversity.
- iv. Contribute to regional and national development” (IUCN 1994 p. 23).

3.2.3 Organizational Responsibility

Management should be the responsibility of a public conservation organization. It should be carried out in partnership with the local community. Owners may include government agencies, community groups, individuals or any combination of these. Conservation agreements or covenants are sufficient, provided that they have appropriate legal backing (IUCN 1994).

Chapter 4

Private Forest Reserve Program

4.1 Introduction

In 1997 the Australian Government committed \$30 million to establish a private forest reserve system in Tasmania (CARSAG 2004). The PFRP is a voluntary program that was developed to provide landowners in Tasmania with incentives to conserve native forests on their property. It is part of a larger plan to protect examples of each of Tasmania's forest types. In order to protect forest types that occur mainly on private land the PFRP works with landowners to establish a private reserve system (DPIWE No Date).

4.2 Program Objectives

The program's main objectives include:

- Protect private properties with native forest types that are poorly represented on public land.
- Protect private forests that provide habitat for rare or threatened species.
- Protect old growth vegetation communities on private land.
- Preserve Tasmania's biodiversity (DPIWE No Date).

In order to achieve its objectives, the PFRP offers landowner's financial incentives and management support in exchange for long-term protection of conservation values. There are twenty-two forest types found on private land that are the focus of this program, which are listed in Table 4.1 (DPIWE No Date).

Table 4.1: Forest types that are the focus of PFPR (DPIWE No Date)

Scientific Name	Forest Type
<i>Acacia melanoxylon</i>	Blackwood forest on flats
<i>Allocasuarina verticillata</i>	She Oak forest
<i>Banksia serrata</i>	Saw-tooth banksia woodland
<i>Callitris rhomboidea</i>	Oyster bay pine forest
<i>Eucalyptus amygdalina</i>	Black peppermint inland forest on tertiary sands, gravel & sandstone
<i>Eucalyptus brookeriana</i>	Brooker's gum wet forest
<i>Eucalyptus globulus</i>	Blue gum grassy forest
<i>Eucalyptus globulus, Eucalyptus brookeriana, Eucalyptus viminalis</i>	King Island blue gum, Brookers gum & White gum forest
<i>Eucalyptus morrisbyi</i>	Morrisby's gum forest
<i>Eucalyptus ovata, Eucalyptus viminalis</i>	Black gum shrubby forest
<i>Eucalyptus pauciflora</i>	Cabbage gum on dolerite or sediments (old-growth)
<i>Eucalyptus pulchella, Eucalyptus globulus, Eucalyptus viminalis</i>	White peppermint, blue gum, white gum grassy/shrubby forest (old-growth)
<i>Eucalyptus risdonii</i>	Risdon peppermint forest
<i>Eucalyptus rodwayi</i>	Swamp peppermint forest
<i>Eucalyptus sieberi</i>	Tasmanian ironbark forest (old-growth)
<i>Eucalyptus tenuiramis</i>	Silver peppermint inland forest
<i>Eucalyptus viminalis</i>	White gum dry grassy forest and wet forest
<i>Eucalyptus viminalis</i>	Furneaux Group white gum forest
<i>Eucalyptus viminalis, Eucalyptus globulus</i>	White gum or Blue gum coastal forest
<i>Eucalyptus viminalis, Eucalyptus ovata, Eucalyptus obliqua</i>	Damp sclerophyll forest
<i>Melaleuca ericifolia</i>	Swamp paper bark forest
<i>Notelaea ligustrina, Pomaderris apetala</i>	Native olive and/or dogwood closed forest

4.3 Land Reservation Process

A map of candidate areas for the private land CAR reserve system has been developed on the basis of bioregionalization of the JANIS reservation targets. Candidate areas are selected according to the following rules in order of importance:

- i. Land that contains forest communities of which 100% is required to fulfill JANIS criteria on private land.
- ii. Land that contains other below target forest communities or priority species.
- iii. Land without priority forest communities, but significant priority species values as judged by individual experts.
- iv. Land with below target old growth vegetation communities.
- v. Land that has significant geological heritage values.

- vi. Land that contains non-priority communities, but is considered to have high conservation value for biodiversity as judged by individual experts. (DPIWE 1998)

Most landowners, who have land with the potential to contribute to the CAR reserve system, are approached by the Department of Primary Industries and Water (DPIW). This may occur as a result of independent work carried out by CARSAG, other scientific studies or one of the following processes:

- Landowner enquiry regarding a Timber Harvesting Plan (THP) or Private Timber Reserve (PTR).
- Submission of a development application by a landowner, which involves the clearing of vegetation that has potential to contribute to the CAR reserve system.
- Information given to staff of government agencies through local knowledge or interactions with landowners.
- An enquiry to DPIW by a landowner.
- An enquiry to DPIW on behalf of a landowner, by a Bushcare or National Heritage Trust (NHT) program officer.
- An enquiry by a government representative, non-government organization representative or any other organization.
- Any other approach, which DPIW or other identified stakeholder may initiate (DPIWE, 1998).

Once contact has been made between DPIW and a landowner, the area's conservation values are assessed. Assessments generally consider natural, scientific, landscape and cultural values (ABHF, DPIWE, TFGA 2003). This will include an assessment of ecological viability, which considers a number of factors including:

- Condition of Forest – factors considered when assessing forest condition include abundance and diversity of exotic species, presence of plant disease, extent of disturbance, diversity and richness of native species, diversity of understory structure, range of habitats, evidence of degradation and biophysical naturalness.

- Size of Area – large continuous forest areas tend to be more resistant to disturbance, are more likely to contain a high diversity of habitats and have higher species richness than small isolated reserves.
- Presence of a Range of Habitats – areas with more localized environments are more likely to have higher species diversity and be more resistant to local disturbance and extinction.
- Shape – A narrow reserve with a large perimeter area is highly susceptible to edge effects.
- Position in Catchment – areas that are located higher in catchments tend to be less disturbed.
- Adjacent Land Use – areas located near existing reserves are considered to be better candidates than those that are isolated from other reserves.
- Presence of Priority Species – Areas with priority species (e.g. threatened or rare) are given priority over those without priority species for reservation (DPIWE, 1998).

If the assessment reveals that the land is suitable for the program DPIW will attempt to negotiate a conservation covenant, management agreement or in some cases a purchase with the landowner. When negotiating DPIW will consider reservation priority, degree of threat to the property, cost effectiveness and practicability. Once an area has been reserved it is then assigned to an IUCN Protected Area Category according to the provisions set out in the proposed management agreements (DPIWE 1998).

4.4 Conservation Options

There are a number of options available to land managers and landowners when trying to achieve conservation objectives on their land.

4.4.1 Conservation Covenant

A conservation covenant is a voluntary agreement between a private landowner and the Tasmanian Government. Its purpose is to provide permanent protection to land that is considered to be important for conservation. They may be used to protect wetland, rivers, trees, bushland, grasslands, geological formations or any other

features that are considered to have conservation value. Covenants are often accompanied by a management agreement, which outlines how conservation values should be managed. Implemented under the *Nature Conservation Act 2002*, covenants are legally binding to both current and future landowners. They may only be modified or revoked with an agreement between the landowner and the relevant minister.

Participation in a conservation covenant is voluntary. Specific details of the covenant and management agreement are negotiated with consent of the landowner. Any cost that may be associated with the program is paid for by the government, apart from landowners who decide to seek their own legal advice (ABHF, DPIWE & TFGA 2003).

4.4.2 Management Agreement

Management agreements are voluntary contracts between a land manager and another party that governs land use and management in an area. They may be stand alone agreements or act in conjunction with a conservation covenant or private reserve. Management agreements are intended to guide a management regime that protects an area's conservation values.

Like conservation covenants, management agreements are legally binding. However, they are less secure due to the fact that they are not registered onto the land title, and therefore do not provide ongoing protection if the land changes hands (ABHF, DPIWE & TFGA 2003).

4.4.3 Private Reserves

The Tasmanian Government may proclaim a Private Reserve over private freehold land or land vested in authorities, such as local government. They are recorded on the land title and travel with the title to future owners. Private reserves may also be used in conjunction with conservation covenants and/or management agreements. By specifying management responsibilities that are binding to current and future landowners, conservation covenants and management agreements provide extra protection and detailed management guidance for the reserve. There are two types of reserve that can be declared over private land.

Private nature reserves are for areas that have specific values that are considered to be unique, important, representative or contribute to biological or geological diversity. Land is managed primarily to protect conservation values in private nature reserves.

Private sanctuaries are generally declared over land that has some significant cultural and/or natural values. Like private nature reserves, sanctuaries are reserved primarily to maintain conservation values, but allow activities that are consistent with protecting such values. For example, sustainable agricultural activities would likely be considered to be acceptable in many cases (ABHF, DPIWE & TFGA 2003).

4.4.4 Land for Wildlife Property Register

Land for Wildlife is a whole property, voluntary conservation program for landowners. Its aim is to assist and encourage landowners to maintain wildlife habitat on their properties. Upon registering their property with Land for Wildlife, landowners are provided with information regarding management issues, such as pests, native pasture and remnant vegetation. Participating landowners are also provided with a sign, newsletters and access to field days (ABHF, DPIWE & TFGA 2003).

4.4.5 Purchase

In some cases private land may be purchased through the Strategic Initiatives Legislative Review Section of DPIW, the RFA PFRP and the NRS Program. However, limited government funds are available for such purchases and only the highest priority sites are considered (ABHF, DPIWE & TFGA 2003).

4.4.6 Revolving Funds

Revolving funds offers an alternative to land purchase and continuing management. In some situations land may be purchased and then have a covenant placed on it. It can then be sold to sympathetic buyers, with the money from the sale being returned to the revolving fund, less any costs that may be incurred (ABHF, DPIWE & TFGA 2003).

4.5 Landowner Incentives

There are a number of incentives for landowners to participate in the PFRP. Natural resource inventories are carried out on land with covenants and landowners are

provided with information that is relevant to conserving natural values on their property (DPIWE 1998).

Financial incentives are also available to landowners who wish to participate. An upfront payment and regular payments to assist with management costs are available if a covenant is placed on a land title and it is managed in accordance with a management agreement. If no covenant is placed on land, but it is managed in accordance with a management agreement, payments to assist with management costs may be available but no upfront payment will be offered (DPIWE No Date).

Landowners who enter into a conservation covenant are exempt from paying state land tax on covenanted land and may also be eligible for some income tax concessions. Various local councils also offer landowners a rate rebate for land that has a covenant placed on its title. Such rebates tend to differ between councils.

The protection of natural values that results from participating in the PFRP can also benefit landowners by maintaining the condition of their land. Management provisions that are put in place can help to prevent land degradation, erosion and salinity, as well as provide shade for livestock. The protection of wetlands and catchment areas can also help to preserve water quality (ABHF, DPIWE & TFGA 2003).

4.6 Management Provisions

The PFRP has a lower budget and fewer staff dedicated to conservation management than the Tasmania Parks & Wildlife Service. Because of this, cooperation between a number of stakeholders is essential for effective management.

4.6.1 Department of Primary Industries and Water

DPIW contributes to the program in a variety of ways. A majority of the administration for the program is carried out by DPIW staff. This includes the establishment and maintenance of a financial reporting system and the distribution of upfront and regular management payments. DPIW is also responsible for arranging valuations, acquisitions, placing titles on land to secure conservation values, auditing and reporting. CARSAG, which is partly composed of DPIW staff identifies priority

areas, develops management guidelines and provide technical advice for management plans (DPIWE 1998).

4.6.2 Comprehensive, Adequate and Representative Scientific Advisory Group

CARSAG is responsible for a number of important tasks associated with the program. They are in charge of listing priority species and determining reservation targets needed to meet JANIS reserve criteria for the private land CAR reserve system. They also identify and map candidate areas where important conservation values occur. CARSAG also plays a primary role in the development of management guidelines for the CAR reserve system (DPIWE 1998).

4.6.3 Tasmania Parks and Wildlife Service

TPWS is responsible for the ongoing management of reserves within the system. They maintain information on the reserve system and provide information to the public, Advisory Council and Minister. TPWS must also arrange for research to be conducted, which is later used in the improvement of management effectiveness. They are also responsible for providing advice to landowners and assisting them in the development of annual reports (DPIWE 1998).

4.6.4 Conservation Programs

There are a number of programs that play an important role in assisting landowners with nature conservation.

- Landcare – consists of over 4000 groups who aim to improve natural resource management in Australia. The program encourages landowners to adopt sustainable management practices that improve productivity and the condition of natural values, through the provision of technical and financial support (DAFF 2003).
- Greening Australia – manages three Weeds of National Significance programs in the NRM South region of Tasmania, which provide landowners with funds to undertake on ground weed control. The focus of these programs is gorse, blackberry and willow.
- Envirofund – provides grants to community groups of up to \$50 000 to tackle environmental problems at their source. There are generally two rounds of funding per year that landowners can apply for.

- Volunteer Organizations – various volunteer organizations have been established, which assist private landowners with conservation. Green Corps is a youth development program that undertakes a variety of conservation projects. Conservation Volunteers Australia is a non-profit organization that attracts and manages volunteers to provide labor for environmental projects. Wildcare is an environmental action group that assists in natural and cultural heritage projects throughout Tasmania (ABHF, DPIWE & TFGA 2003).

4.6.5 Landowner

Landowners also play an important role in preserving natural values on their land. Some duties that may be performed are site specific and others are performed on most reserves. Almost all landowners who have reserves within the PFRP conduct regular monitoring and report on any factors that may threaten or impact on conservation values. From this knowledge they provide the Crown with information that can then be used in the development of management plans. Landowners are also responsible for submitting an annual report on any works that are undertaken and the outcomes of site inspections.

Landowners may also be responsible for various active management tasks. The control of feral plants and animals are the sole responsibility of the landowner, except in cases where infestations are beyond the landowner's capacity and threaten CAR values. The maintenance of firebreaks to protect life and property and fences to protect CAR values are also the prime responsibility of the landholder. In circumstances where sustainable production activities are carried out, the landowner must ensure that such activities do not impact on the reserve's natural values (DPIWE August, 2002; DPIWE May 2002; DPIWE April, 2002; DPIWE March, 2002; DPIWE February, 2002; DPIWE January, 2002; DPIWE December, 2001; DPIWE November, 2001; DPIWE August, 2001; DPIWE July, 2001).

Chapter 5

Management Effectiveness

5.1 Introduction

With approximately ten percent of the earth's land surface designated as some form of protected area, it is clear that many governments consider biodiversity protection to be an important issue. However, many of these reserves face a variety of threats and some are in danger of losing the natural features that they were designed to protect. Because of this, land managers should ensure that they are able to implement effective management practices (Hockings 2000).

There are a number of benefits associated with being able to demonstrate that management actions are achieving the desired objectives. It allows managers to gain an understanding of where improvements should be made to management systems. It also helps them to make better informed decisions regarding ongoing management practices, prioritisation of efforts and the allocation of resources. Another important benefit associated with being able to demonstrate results is the accountability that it provides to the public and those who fund management (Jones 2000).

5.2 Components

There are three main components that can be analyzed when evaluating management effectiveness.

5.2.1 Design Issues

Design issues can include individual sites, as well as protected area systems. There are a number of elements that need to be considered in the design of protected areas. Important considerations for planners include size and shape of individual reserves, linkages between sites and ecological representation. If protected areas are not designed well they may be unable to achieve management of their conservation goals (Hockings 2000).

5.2.2 Appropriateness of Management Systems

Appropriateness looks at how well management is carried out and how well manager's respond to challenges. This may include aspects of planning, training, capacity building and implementation. Components that are measured here include whether or not there are enough resources being devoted to management and appropriateness of management actions. Lessons learned here are extremely useful and can often be applied later in similar situations (Hockings 2000).

5.2.3 Delivery of Management Objectives

This is considered by many to be the most important element of management effectiveness. This component determines whether or not protected areas are achieving their stated management objectives. This may be done by measuring biological elements, such as the presence and abundance of key species. However, it is also important to include social elements such as attitudes of visitors or the local community (Hockings 2000).

5.3 Indicators

Before an evaluation is conducted, a set of performance indicators must be developed. Indicators are forms of feedback that deliver qualitative or quantitative information, which is used to assess the achievement of goals and objectives. The use of indicators provides a framework for monitoring, benchmarking and enhancing management performance (Worboys et al. 2005). Since it is difficult to evaluate all aspects of management, it is important to set priorities for the assessment to ensure that resources are being used as effectively as possible. This may be done with the assistance of managers and those with in depth knowledge of the reserve or protected area system (Jones 2005).

Before indicators are selected and the evaluation commences, it is important to decide which components of the management cycle to focus on. Indicators can be divided into six main elements.

5.3.1 Context

Putting protected areas into context can help to provide a background against which evaluations can be interpreted. It is useful to consider context before the main

assessment to help determine the level and direction of the evaluation. Four main areas have been identified which can help determine context indicators.

- **Significance** – should be considered from a biological and cultural perspective.
- **Threats** – to reserves through inappropriate use. Should include both internal and external threats.
- **Vulnerability** – degree to which a protected area can withstand the impacts of threats.
- **National context** – considers factors such as a nation's wealth, the resources dedicated to protection and degree of support for conservation measures from public and policy makers (Hockings 2000).

5.3.2 Planning

The effectiveness of protected area planning can also be assessed. This can help to ensure that individual reserves and reserve systems are planned in a way that is consistent with conservation requirements. Four themes have been identified that can help guide evaluators in the development of planning indicators.

- **Legislation and policy** - analyzing the adequacy of protected area legislation and policy usually consists of a review of literature relating to relevant legislation. This can be particularly useful if more than one region is being surveyed.
- **Design of protected area systems** – this usually involves an assessment of the number, extent and distribution of protected areas. This helps to ensure that key features are represented within the network.
- **Design of individual reserves** – assessment of reserve design may include factors such as size, shape, connectivity and ecological integrity.
- **Management planning** – this involves an assessment of objectives, which are supported by a management plan and adequate resources (Hockings 2000).

5.3.3 Input

Even a well planned protected area system will have difficulties achieving management objectives if management capability is lacking. Three main themes have been identified that can help guide in the development of input indicators.

- **Adequacy of resources** – when assessing adequacy of resources important factors to focus on include available funds, staffing, equipment and infrastructure.
- **Application of resources** – staffing and funding data is especially useful when information is made available by management purpose.
- **Partners** – resources are often put into management from organizations or individuals other than the managing agency. If these contributions are significant they should be assessed (Hockings 2000).

5.3.4 Process

When assessing management process the evaluator focuses on a protected area's management standards. The implementation of a well planned management process does not guarantee that management will be effective. However, it is an essential component if one hopes to achieve management objectives. Determining the effectiveness of process can be done by choosing indicators from three main themes.

- **Best management practice** – usually depends on a number of factors including region, available resources, threats, usage and management objectives.
- **Management standards** – this can be done by evaluating whether or not management is performing up to the minimum standards.
- **Improving management capacity** – this involves making an assessment of how well managers have used past evaluations to improve management capacity (Hockings 2000).

5.3.5 Output

A common approach to evaluating management effectiveness is to assess the outputs derived from management actions. It is most useful when pre-existing plans, targets or standards already exist. This approach often looks at two main aspects.

- **Delivery of products and services** – this may be measured by number of users, volume of work output, such as patrols undertaken and volume of physical output, such as number of projects completed.
- **Achievement of planned work program** – measures that can be used to assess achievement of a work program include actual versus planned work

program and expenditure or the extent to which a management plan has been implemented (Hockings 2000). For this research, management actions were compared with operations plans to assess output (section 6.4 & 6.5).

5.3.6 Outcome

Outcomes measure the impacts of management actions and evaluate the extent to which management objectives have been achieved. Therefore, it is important to understand what management aims to accomplish. Management outcome indicators can be based upon three main factors.

- **Management plan** – this measures the degree to which a management plan has been followed.
- **Threats** – this assessment determines the degree to which threats have been addressed and minimized.
- **IUCN categories** – this is based on how well a reserve meets the objectives for its specific IUCN designation (Hocking 2000). The IUCN category VI management objectives will be used in the development of indicators for this analysis (section 3.2.2).

5.4 Gathering Data

When evaluating management effectiveness there are a number of ways that data can be obtained by evaluators who are either internal or external to the managing agency. It is important to choose an evaluator that is best suited to the particular situation and conduct the evaluation in a way that will produce the most meaningful results.

5.4.1 Choosing an evaluator

When choosing an evaluator, a decision must be made as to whether or not an internal or external source will be used. If an internal source is chosen they are more likely to understand the management context, main issues and constraints. Another advantage associated with an internal evaluation is the availability of information through professional and technical support from those within the managing organization. However, evaluations that are conducted from within the organization may be considered to be less credible than if they had used an external source to carry out the assessment (Jones 2003).

The alternative to using an internal source for evaluation is to use an external source. This can improve the credibility of the assessment. An external source is more likely to be critical in its evaluation than an internal source, especially if the results are poor. It may also be desirable to use an external evaluator due to the fact that they can bring new expertise into the organization from past experiences. If a combination of internal and external sources are used it is likely to produce the most desirable results. The managing agency can draw on their expertise of the particular situation and the external source can help to ensure that the findings are reported in an objective manner (Jones 2003).

5.4.2 Conducting the assessment

Once a decision has been made about which elements are going to be evaluated, the assessment can begin. There are a number of guidelines that should be followed in order to help ensure that the assessment is as accurate as possible. Evaluations should focus on the most important issues, such as threats or opportunities that may affect the achievement of objectives. However, they should also attempt to consider a range of factors influencing the management process, such as social, environmental, economic and management aspects (Hockings, Stolton & Dudley 2002).

Ideally the assessment should be voluntary throughout. It should also involve all relevant organizations and individuals that have an interest in the site or can provide important information about it. This may include landholders, government agencies, members of the local community and private consulting firms. The assessment should also be based upon a well planned and logical evaluation system (Hockings et al. 2002).

When reporting results, there are a number of considerations that should be taken into account. It is very difficult to conduct an assessment without limitations. Therefore, any limitations that may be present in the evaluation must be clearly identified in the report. Management strengths and weaknesses should also be identified and divided between those that are within and outside of the manager's control. Once strengths and weaknesses become known, recommendations for improving management performance can be developed, prioritized and included with the report (Hockings et al. 2002).

Chapter 6

Research Design and Methods

6.1 Introduction

The purpose of this study was to assess the effectiveness of current practices and learn how management within the PFRP can be improved. To achieve this, it was decided that a combination of quantitative and qualitative methods measuring the process, output and outcome elements of the management cycle (section 5.3) would be most appropriate. In an attempt to gather the most accurate results, a number of techniques were employed. It has been suggested that a combination of research techniques combines the advantages of each method used, while overcoming their disadvantages (IISD 2003). Secondary data was obtained by reviewing relevant literature, program documents operations plans and terms of covenant documents. Primary data was gathered through the distribution of a questionnaire and interviews conducted with landowners who participate in the PFRP. A site visit was also conducted at some reserves that were included in the analysis.

6.2 Reserve Selection

A sample of ten sites was used for this analysis. The sample sites that were selected were all designated as category VI protected areas and located in the NRM South region of Tasmania. This region was chosen because it allowed for site visits to be conducted in the limited time available, due to the fact that this is the region in which the University of Tasmania Sandy Bay Campus is located. There are a total of forty-five category VI PFRP sites within this region. Landowners with category VI PFRP sites located in the NRM South region of Tasmania were contacted and asked whether or not they would be willing to participate in the study. A random sample of ten sites was then chosen from those landowners who indicated that they were willing to participate. This number was chosen in attempt to get a representative sample in the short time frame provided.

Grassy Eucalypt Forest was found in all ten (100%) reserves and was the most common vegetation type considered in this investigation. The next most common vegetation type was heathy Eucalypt woodland and forest, which was found on six

(60%) of the sites. Areas of Shrubby Eucalypt forest was found on three (30%) of the sites and one (10%) site contained She Oak forest.

6.3 Literature and Document Review

The use of documentary evidence may play a relatively minor or quite significant role, depending on the research project. It can be used to supplement information obtained by other methods or as the central research technique (Bell 2005). Literature and document review played a relatively significant role in this assessment of management effectiveness within the PFRP.

The first step of the research process was to review the relevant documents and literature regarding the PFRP, policies and institutions that are relevant to the program, management effectiveness and the IUCN category system. The purpose of this was to provide a framework of the program objectives, conservation options and institutional context. The literature review also assisted in the identification of IUCN category VI management objectives, which was then used in the development of indicators (section 5.3) A review of the terms of covenant documents and operations plans that were produced for each of the individual sites was used to assess the process element of management (section 5.3.4). Operation plans and terms of covenant documents have been prepared for each site (DPIWE August, 2002; DPIWE May 2002; DPIWE April, 2002; DPIWE March, 2002; DPIWE February, 2002; DPIWE January, 2002; DPIWE December, 2001; DPIWE November, 2001; DPIWE August, 2001; DPIWE July, 2001).

Elements that were considered in the operations plans relating to ecosystem management include the management of fire, exotic plants, feral animals, and threatened species. Sustainable production elements that were analyzed include grazing of livestock, wood collection, as well as, the harvesting of native plants and animals.

6.3.1 Data Analysis

A set of criteria was developed to assess how well operations plans account for various aspects of ecosystem management and sustainable production. Each operations plan was then measured against the criteria. Percentages were then calculated to assess the effectiveness of each operations plan. Appropriate grazing and fire regimes may differ according to vegetation type (Kirkpatrick & Gilfedder, 1999). To account for this, appropriate grazing and fire regimes were assessed according to whether or not they contained important management prescriptions relating to each individual vegetation type identified in the operations plan.

6.4 Distribution of Questionnaire

Questionnaires are one of the most common survey research instruments used. They are generally composed of a series of questions, in which subjects are asked to respond. Questionnaires are basically a set of concepts that have been operationalized. Concepts are first defined at an abstract level and then measured so that meaningful data can be gathered (Kraus & Allen 1990). Methods for questionnaire selection, adaptation and development seem to be determined mostly by context. The validity of questionnaire results depends largely on the knowledge of the respondent (Wynekoop & Russo 1997).

6.4.1 Design of Questionnaire

The purpose of the questionnaire (appendix A) was to measure the output element of the management process (section 5.3.4). The questions for the survey were developed by using the WCPA (2000) category VI criteria management guidelines, reviewing protected area management literature and through informed discussion with three professionals who specialize in protected area management. Questions regarding ecosystem management and sustainable production activities were then generated, since these were the two major management objective themes. Many management issues that are present in state owned protected areas are of little concern in PFRP sites. Therefore, only questions that were considered to be relevant to PFRP sites were included in the questionnaire.

6.4.1.1 Ecosystem Management

The most important objective for IUCN category VI reserves is the protection of biodiversity and other natural values in the long term (WCPA 2000). This is why ecosystem management was chosen as one of the central themes for the questionnaire. Questions were developed to give an indication of how much effort is dedicated towards ecosystem management by landowners.

The review of relevant literature identified various concerns relating to ecosystem management in Australian protected areas. Because it is of little concern to landowners who participate in the PFRP, issues relating to visitor management were omitted from the questionnaire. The main ecosystem management areas that were addressed by the questionnaire include:

- Fire Management
- Weed Management
- Feral Pest Management

For the first question landowners were asked to indicate the degree of effort that they dedicate towards various aspects of fire, weed and feral pest management. An opportunity was also provided for landowners to mention any other type of ecosystem management activities that they may conduct, but was not covered by the questionnaire. Boxes were provided and respondents were given the option of choosing between extensive, moderate, some and none. This was done to get a basic understanding of the nature of threats and the amount of landowner dedication required to manage sites within the PFRP.

To account for any threats or ecosystem management activities that may have been overlooked in the first question, additional questions were asked. Landowners were asked whether or not there were any threats present that do not relate to fire, weed or feral pest management. They were also asked whether or not there were any threats to their land that were not yet being addressed. The final question asked whether or not the respondents were aware of any specific threats that may pose a threat to conservation values in their reserve within the next five years. The purpose of these questions was to gain a better understanding of the nature of threats that may not have

been addressed in question one and future threats that may become issues in the future.

6.4.1.2 Sustainable Production

The second most important objective for IUCN category VI reserves is the promotion of sound management practices for sustainable production activities (WCPA 2000). This is why sustainable production was chosen as the other central theme for the questionnaire. Questions were developed to get an indication of the degree to which production practices were conducted and the nature of those practices.

Through the review of relevant literature and informed discussions with three professionals who specialize in protected area management, questions were developed relating to the nature of sustainable production practices on PFRP sites. The main sustainable production uses that were addressed by the questionnaire include:

- Grazing
- Harvesting of firewood
- Harvesting of wild plants
- Harvesting of wild animals

For the first question landowners were asked the degree to which they utilize specific resources within their reserve. An opportunity was also provided for respondents to mention any other sustainable production activities that they may conduct, but were not covered by the survey. Boxes were provided and landowners were given the option of choosing between extensive, moderate, some and none. This was done to get a basic understanding of the nature and extent of sustainable production activities conducted on IUCN category VI sites within the PFRP.

The fourth objective mentioned for IUCN category VI sites is the contribution of sustainable production practices to regional and national development. However, the importance of resource use should be judged by its impact on natural values rather than its economic significance (WCPA 2000). In order to address this objective, landowners were asked whether the resources utilized on their reserve were mainly used for personal purposes (e.g. firewood) or economic benefit (e.g. grazing). The purpose of this question was to get an indication as to whether or not resources that

are utilized within IUCN category VI reserves within the PFRP contribute to local, regional and national economies.

6.4.2 Participant Selection

Participants were selected based on their involvement in the PFRP. All participants had an established PFRP IUCN category VI reserve located on their property. All properties included in the study were located within the NRM South region of Tasmania. A number of landowners that met these criteria were contacted by the Conservation Management Officer (CMO) for the PFRP and asked whether or not they would be willing to participate in the study. Of the willing participants, a random sample of ten landowners was then selected for the analysis. This was done in the hope of generating a particularly high response rate. In addition to this, gathering data from a relatively small number of knowledgeable participants can often provide the most significant insights (Bradshaw & Stratford 2000).

6.4.3 Administration and Implementation Procedures

One of the problems associated with the use of questionnaires is a low response rate. This may be due to a lack of understanding or interest in the questions being asked. Questionnaires may also be viewed as an inconvenience, causing some people with busy schedules to disregard them (Krauss & Allen 1990). Various measures were taken to help ensure a high response rate amongst participants.

Participants were selected based on the fact that they had PFRP sites on their land. This helped to ensure that all respondents had a detailed understanding of questions regarding management issues and activities on their land. Because all respondents are actively involved with the PFRP, it is likely that most of them had at least some interest in contributing to this study.

Participants were also asked if they would be interested in participating in this research, before questionnaires were distributed. Questionnaires were only sent to landowners who indicated that they were interested. The length of the questionnaire was limited to three pages and the questions asked were kept relatively basic. All of these measures were taken to help ensure a high response rate in a relatively short

timeframe, amongst participants. A total of six landowners returned questionnaires and were therefore included in this part of the investigation.

6.4.4 Data Analysis

Each questionnaire response was compared with the corresponding operations plan prescriptions and terms of covenant document. Questionnaire and interview responses were checked against one another to identify any areas where a landowner may have misinterpreted the survey question. In such cases, the response given in the interview was used for this part of the analysis. A determination was then made as to how well landowners are following each management prescription. Some activities were permitted within reserves only with written approval from the Director. Unfortunately, approval documents were not included in this analysis due to confidentiality reasons and time restrictions.

Management prescriptions used for this part of the analysis included various aspects of fire management, weed management, feral pest management and sustainable production. Because no established model was used to help in the design of the questionnaire, it was later decided that data relating to degree of effort was not relevant. Therefore, this data was interpreted as presence or absence of management actions or sustainable production activities.

6.5 Landowner Interviews

The purpose of conducting interviews with landowners was to explore some of the issues identified in the questionnaires in more detail. The interviews related to management issues and practice identified by landowners who participate in the PFRP. Statements made do not reflect the official position of DPIW.

6.5.1 Design of Interviews

The main purpose of the interviews was to assess the output (section 5.3.5) and outcome (section 5.3.6) elements of the management process. A semi-structured interview technique was utilized to get more detailed information about management practices and issues that were identified in the questionnaire (appendix B). This technique involves the identification of a predetermined list of topics or questions. Open-ended questions are asked and the respondent is expected to reply in their own

words. This method allows for the exploration of any unexpected issues that may be raised by the participant (Krauss & Allen 1990).

By basing my interview guide on ecosystem management and sustainable production issues identified in the questionnaire, I was able to triangulate my responses. Combining various methodological techniques helps to overcome any possible weaknesses that may be present with an individual data gathering method, adding credibility to the findings (Krauss & Allen 1990). Triangulation also allows the researcher to see things from multiple perspectives and challenge findings from one method with those of another (Bell 2005).

To ensure anonymity of participants no identifying characteristics were reported. However, they were informed that the PFRP would be identified in the report and that it is possible that responses could be indirectly identifiable to them through inference. This was unavoidable due to the limited number of landowners in the NRM South region of Tasmania who have category VI sites within the PFRP.

To account for any concerns that landowners may have had about their responses being adequately represented, each participant was offered a copy of their transcript and the results of the analysis prior to publication. This gave them the opportunity to edit or modify their responses, or withdraw from the research completely. Member checks can help to enhance the validity of findings and reassure participants that they will not be misrepresented in the report (Flick 1999).

6.5.2 Participant Selection

All participants had a category VI PFRP site on their land, which was located in the NRM South region of Tasmania. Interviews were carried out with landowners who had completed and returned the questionnaire that was distributed for this study or indicated that they were willing to participate. A total of six landowners were interviewed for this analysis.

6.5.3 Administration and Implementation Procedures

In the questionnaire landowners were asked if they would be interested in participating in an interview and if so, to provide their contact details. An information

sheet and consent form was then sent to those who indicated that they were willing to participate. They were then contacted to arrange a suitable time. A total of six landowners were interviewed for this part of the analysis. Four interviews were done in person and two were conducted over the telephone.

Information from interviews was recorded using both audiotape and handwritten notes. Using audiotape to record interviews is beneficial for a number of reasons. It is useful for checking the wording of any statements that you may want to quote. It also allows the interviewer to maintain eye contact with the interviewee and focus at the conversation at hand. If interviews are recorded it allows the researcher to identify trends or categories by listening to the recording several times. This technique also makes it easier for participants to withdraw any statements that were made during the interview if they wish (Bell 2005). Notes were taken as a backup in case of the unlikely event of equipment failure.

6.5.4 Data Analysis

Audio recordings of interviews were reviewed to identify common themes. The common themes identified include fire management, exotic plant species, feral animal species, threatened species, grazing, wood collection, harvest of native animals and economic benefit received from sustainable production. Responses to questions relating to each of these themes were then reported by converting the number of landowners who made particular statements to percentages. Quotations were also selected from the recordings to illustrate these themes more clearly. This was done to help illustrate the actual meaning by using the landowner's own words.

6.6 Site Visits

The purpose of conducting visits to individual reserves was to gain first hand knowledge of management issues and learn about some of the research that is conducted at the sites to improve management practices. To achieve this, an unstructured observation technique was employed. This allows the researcher to observe specific themes during the fieldwork and then elaborate on them throughout the rest of the data gathering process (Bell 2005).

6.6.1 Participant Selection

All participants had a PFRP site located on their land in the NRM South region of Tasmania. Unfortunately I was not able to visit all reserves included in the investigation, due to time constraints and conflicting schedules between some landowners and myself. This resulted in site visits being conducted for a total of three reserves. Sites were selected based on landowner availability.

6.6.2 Administration and Implementation Procedures

Before conducting the site visit, landowners were asked a series of interview questions regarding ecosystem conservation and sustainable production on their site. They were then asked to point out some locations within their reserve where active management is being carried out.

Upon arriving at each location, landowners were asked to explain various aspects of management. Information from site visits was recorded using handwritten notes. A series of digital photographs was also taken at each site, documenting active management practices. This enhances the researcher's ability to illustrate specific management techniques.

6.6.3 Data Analysis

The subject that was observed was verbally explained in the relevant section of the results chapter (chapter 7). Photographs were also included to help illustrate the visual observations.

6.7 Summary

The process, output and outcome elements of the management plan were assessed in this research. Secondary data was collected through the review of operations plans, terms of covenant documents and literature relating to the PFRP, management effectiveness and IUCN protected area management prescriptions. Primary data was gathered through the distribution of questionnaires, conducting interviews and visiting individual sites.

Chapter 7

Results

7.1 Introduction

The objective of this chapter is to present the results of the documentary analysis, questionnaires, interviews and site visits. It begins by explaining data relating to fire management. Secondly, data relating to weed management is presented. It then goes on to discuss data that was gathered relating to feral animal management. Next, the results that relate to threatened species management are discussed. A number of results presented in the second half of the chapter relate to sustainable production. This includes data relating to grazing, wood collection and the harvest of native animal species. In the final section, data regarding economic benefit received for sustainable production activities is discussed. A set of tables illustrating the results follows the final section. Tables 7.1 – 7.5 present the operations plan analysis results relating to ecosystem management. Tables 7.6 – 7.10 present the operations plan analysis results relating to sustainable production. Tables 7.11 – 7.13 present the results from the questionnaires relating to ecosystem management. Table 7.14 presents the results from the questionnaires relating to sustainable production.

7.2 Fire Management

According to Kirkpatrick and Gilfedder (1999) fire can be utilized in many types of Eucalypt bush to manage weeds, maintain plant understory and promote regeneration. Because all of the sites included in this investigation contained areas of Eucalypt forest, fire management was considered to be an important part of ecosystem management. Assessment of fire management was done through the analysis of operations plans, covenant documents, questionnaire results and interview results.

7.2.1 Operations Plan Analysis

Because appropriate fire regimes vary according to vegetation type, appropriateness of regimes was assessed according to established fire management knowledge about each forest type found in the *Tasmanian Bushcare Toolkit* (Kirkpatrick & Gilfedder 1999).

Analysis of the operations plans revealed that fire management provisions were present for all ten sites (Table 7.1). All plans also prescribed fire management operations to be carried out in a mosaic pattern, to help provide diverse habitats. However, none of the provisions for fire management went into much detail regarding specific fire frequencies, intensities and seasons for different vegetation types.

All plans stated that ongoing fire monitoring and research would be conducted by the Crown. Controlled burns will then be carried out according to ecological requirements of native plant and animal species with preference given to those that are considered to be either rare or threatened.

Exclusion of fire was the first fire management prescription mentioned in eight of the ten (80%) plans included in this investigation. However, no fire management plan was in place for any of the two (20%) sites that allowed for burning. These two plans stated that a fire management plan would be developed before the first review of the plan in 2006. Until this happens all burning is done at the landowner's discretion and expected to take the ecological requirements of native species into account.

The operations plan for the site that contained She Oak forest made no mention of excluding fire from this area (Table 7.5). According to Kirkpatrick and Gilfedder (1999) She Oak forest is a fire sensitive vegetation type and fire should be excluded from it.

7.2.2 Questionnaire Results

For this part of the evaluation three aspects of fire management were analysed to determine how well management prescriptions are being followed. These include the construction and maintenance of firebreaks, fuel reduction burning and ecosystem management burning (Table 7.11).

Each operations plan used in this analysis permitted the clearing of native vegetation for the construction of firebreaks that may be necessary to protect life or property. Firebreaks may also be constructed in cases where the reserve may be threatened by wildfire. Even though each plan allowed for the construction of firebreaks only three of the six (50%) respondents conducted this activity on their reserve.

Only two out of the six (33%) operations plans that were compared with the questionnaire results permitted fuel reduction and ecosystem management burning to be carried out within the reserve. In both cases, regimes were expected to follow the landowner's discretion. Only one (50%) of these landowners actually conducted fuel reduction or ecosystem management burns on their land. The landowner who was permitted to, but did not carry out burns on his land, stated that he did not do so because of the danger that it can pose to assets.

The other four (67%) plans that were compared with the questionnaire results permitted burning only to be carried out with written authorization from the Director. Two (50%) of these landowners indicated that they conduct at least some degree of fuel reduction burning in their reserve. Another (25%) landowner stated that some degree of ecosystem management burning is conducted in his reserve.

7.2.3 Interview Results

Four out of the six (66%) landowners indicated that they carry out at least some degree of fire management for fuel reduction or ecosystem management. This was generally done on a relatively small scale. However, only two (50%) of these four landowners stated that burning is done primarily for ecosystem management purposes. The other two (50%) stated that fuel reduction was their main concern when deciding when to burn certain areas of their reserve.

Despite fire management being conducted on four of these reserves, only one of them had burning as a prescription in the management plan. The other three landowners are expected to seek approval from the director before any fire management is carried out. One (33%) of the landowners who was expected to seek approval before burning their land had stated that his last burns were carried out before the covenant was placed on the land.

One of the landowners who was permitted to conduct fire management on his land refrained from doing so. He stated that this was done because grazing is an effective way to reduce fuel loads without the risk that fire can pose to assets.

I suppose I've had problems in the past with fires getting away so that is in the back of my mind a bit... I don't have situations where I need to do those sort of burns. I mean if I needed to reduce the fire risk of vegetation I could put some sheep in there (Landowner 1).

7.3 Weed Management

For this part of the assessment a weed was defined as a plant that does not naturally grow in a particular location. In many cases the plant has been introduced from overseas. However, in some instances Australian natives may be considered to be weeds (Kirkpatrick & Gilfedder 1999). Assessment of weed management was done through the analysis of operations plans, terms of covenant documents, questionnaire results and interview results.

7.3.1 Operations Plan Analysis

Analysis of the operations plans revealed that weed management provisions were in place for all sites. The most common weeds found in the reserves include Broom, Gorse and Spanish Heath. According to the plans, seven (70%) of the ten sites currently have varying degrees of weed infestations. For sites with weed infestations, landowners were responsible for controlling them by either hand pulling or the use of herbicides. Only herbicides that target specific species are used, all of which the Crown must approve.

In situations where infestations are beyond the capacity of the landowner, the Crown will assist with control measures. For reserves without infestations, landowners are expected to make annual inspections of the reserve and report any infestations to the Crown.

7.3.2 Questionnaire Results

For this part of the analysis landowners were asked to indicate the methods used to control exotic plant species within their reserve. Their responses were then compared to the corresponding operations plan and terms of covenant document. Each plan that was compared to the returned questionnaires permitted weed management through hand pulling or the use of herbicides. Two (33%) of the landowners who returned a questionnaire indicated that they do at least some degree of weed control by hand removal.

All (100%) questionnaires that were returned stated that exotic plant species are at least partly managed with herbicides. Four (67%) of the six respondents indicated that grazing is sometimes carried out for ecosystem management purposes. This may be done to control weeds or maintain understory in native vegetation. According to Kirkpatrick and Gilfedder (1999) tactical grazing can be an effective control method for exotic plant species. Analysis of the operations plans showed that grazing was permitted at each reserve where it was used for ecosystem management purposes.

7.3.3 Interview Results

Each (100%) landowner interviewed indicated that exotic plant species were at least a minor problem within parts of their reserves. The most common weeds mentioned in the interviews include Blackberry, Spanish Heath and Gorse. Backpack spraying and hand pulling were the two primary methods that were utilized for the control of exotic plants. According to the operations plans, all landowners are permitted to control weeds through hand pulling and the use of herbicides.

Only two (33%) of the landowners who were interviewed indicated that they spend time pulling weeds by hand. One (50%) landowner stated that it is not very effective, but it makes you feel better if you pull some of them out. The other landowner stated that hand pulling can be relatively effective for individual plants scattered over a large area.

All landowners (100%) stated that backpack spraying was carried out within their reserve. Different views were expressed regarding the effectiveness of this control method. Three (50%) of the landowners interviewed expressed that the use of herbicides was quite effective. This was especially true for dense localized infestations.

Depends where it is. Some of our weed infestations are just scattered individual plants over a big area... pulling the odd plant by hand is the way to do that. In other areas there may be 50-100 square meters of dense stuff so you just get in there with a backpack and spray it (Landowner 2).

The other three landowners said that the application of herbicides were only somewhat effective.

You tend to have the same weeds coming back the next year
(Landowner 1).

Landowners were asked whether or not they take any specific measures to reduce risks that herbicides may have on natural values within their reserves. Landowners mentioned four precautions that were employed for this reason. The most common measure taken was careful application of the herbicide. Four (67%) of the landowners expressed this. However, it is suspected that the other two (33%) landowners also apply herbicides with care, but just failed to mention it.

We just do our best not to spray anything else (non-target species)
(Landowner 3).

One (17%) landowner mentioned that he only uses species-specific herbicides, which only kill the targeted plant species. All landowners are expected to use approved herbicides for the control of exotic plants. Assuming that landowners involved with the PFRP do use approved herbicides, it is suspected that most approved herbicides target specific plant species. Other provisions taken by landowners to reduce the effects that herbicides may have on natural values include spraying on days with little wind and applying minimal amounts of herbicides when possible. Each of these provisions was mentioned by one (17%) out of the six landowners interviewed.

Two (33%) of the landowners that were interviewed suggested that additional weed management support from the PFRP would be quite valuable for controlling weed infestations within their reserves. Monitoring current infestations and identifying new ones can be a time consuming process, which could become more efficient and effective if more support was available.

With our weeds, because a lot of it is looking for sparse infestations or scattered plants, and that's pretty labor intensive...To be able to get people to help with that at the right time of year would be invaluable. It would just mean we could cover more ground more often
(Landowner 2).

7.4 Feral Pest Management

Feral animals are considered to be a serious environmental threat throughout Tasmania and the rest of Australia. In many of the reserves included in this research, feral cats were considered to be an issue. Feral cats are widespread throughout the state with sighting being reported in remote locations, such as the central highlands (Commonwealth of Australia 2003). Rabbits were also present in some of the reserves. Assessment of feral pest management was done through analysis of operations plans, covenant documents, questionnaire results and interview results.

7.4.1 Operations Plan Analysis

Analysis of the operations plans revealed that feral animal control provisions were in place for all ten sites. The most common feral animals present were rabbits and cats. Operations plans did not go into specific details regarding control methods, apart from stating that control methods will be developed jointly between the landowner and Crown. The use of poisons was restricted in four (40%) of the operations plans included in this investigation. No mention of poisons was made in the other six (60%).

According to the operations plans, landowners are expected to inform the Crown of any feral animal infestations that do not respond to standard control methods or are beyond the capacity of the owner. In these cases, the Crown assists landowners with control operations.

7.4.2 Questionnaire Results

For this part of the analysis, landowners were asked to indicate the methods used to control feral animals within their reserve. Their responses were then compared to the corresponding operations plan and terms of covenant document. Each plan that was compared to the returned questionnaires contained prescriptions relating to feral pest management. Three (50%) out of the six landowners who returned questionnaires indicated that they conduct at least some degree of feral animal control.

Three (50%) out of the six management plans that were compared to the questionnaire results restricted the use of poisons, such as 1080, for feral animal control. The other

three (50%) made no mention of poisons, either restricting or permitting their use. However, none of the landowners included in this investigation indicated that they use poisons to control feral animals.

7.4.3 Interview Results

When asked whether or not feral pests were an issue in their reserves four (67%) of the six landowners that were interviewed indicated that they were at least a minor concern. The other two (33%) stated that they have not noticed a feral pest problem within their reserves. Cats were the primary feral species present in the reserves. Rabbits were also an issue in some reserves with grassy understory.

Landowners were also asked about control methods and their degree of effectiveness. Control of feral pests was prescribed in each operations plan that was included in this part of the analysis. Three (75%) out of the four landowners with feral pest problems indicated that they shoot feral animals if they come across one. However, this control method is not carried out in a systematic way.

If they are there, if we see a cat we'll shoot it or whatever... both inside and outside of the reserve (Landowner 2).

We've got a few blokes here, you know, as soon as they see a cat... Bang (Landowner 4).

Each (100%) landowner who does attempt to control feral animals on their reserve through shooting stated that they do not notice significant reductions in animal numbers. However, they seemed to suspect that populations could eventually increase significantly if some animals were not eliminated from the reserve.

As long as you keep shooting them you are going to whittle them down a bit (Landowner 4).

The landowner (25%) who indicated that feral pests were present on the reserve, but did not employ any control methods stated that this was because their shy nature made it difficult to locate and shoot them. The use of poisons, such as 1080, was only restricted in three (50%) of the six operations plans. However, no landowners that

were included in this part of the investigation indicated that they used poisons to control feral animals.

7.5 Threatened Species Management

Like many places, Tasmania is home to a number of threatened species. Assessment of threatened species management was done through the analysis of operations plans and interview results.

7.5.1 Operations Plan Analysis

Review of the operations plans revealed that considerations for threatened species were present for all reserves included in this analysis. However, the management prescriptions were quite brief for seven out of the ten (70%) plans that were reviewed for this part of the investigation. These plans only stated that the Crown and owner would develop management prescriptions if required for rare or threatened species in the reserve.

Three of the ten (30%) plans had more specific prescriptions for the protection of rare or threatened species. In addition to the future development of management prescriptions for rare and threatened species, these plans also stated that prescriptions would protect Blue Gum foraging habitat and promote sufficient regeneration of Blue Gum. However, this was the extent of threatened species management prescriptions in the operation plans that were included in this investigation.

7.5.2 Interview Results

Two (33%) of the landowners that were interviewed indicated that DPIW conducts research intended to help assess the quality of Swift Parrot habitat. Traps are set, which capture Blue Gum capsules. The data collected from these traps helps to measure available food supply for the Swift Parrot in Blue Gum forests.

7.6 Grazing

IUCN category VI sites allow some forms of sustainable production within their boundaries (IUCN 1994). The most common form of sustainable production within PFRP category VI sites was grazing of sheep or cattle. An assessment of grazing

management was done through the analysis of operations plans, covenant documents, questionnaire results, interview results and site visits.

7.6.1 Operations Plan Analysis

Analysis of the operations plans revealed that grazing was permitted at seven of the ten (70%) of the sites included in this investigation. Grazing prescriptions varied from plan to plan to account for differences in vegetation type. However, there was at least some discrepancy between actual prescriptions and established knowledge regarding grazing regimes for half of the forest types.

Grassy Eucalypt woodland and forest was the most common vegetation type and was found at nine of the ten (90%) sites included in the analysis. According to Kirkpatrick and Gilfedder (1999) this vegetation type can tolerate moderate grazing levels, but should not be stocked for extended periods of time. Stock should also be expelled in late spring and summer.

Grazing was permitted in seven out of nine (78%) reserves that contained grassy Eucalypt woodland and forest. However, only three of the seven (43%) reserves where grazing was permitted in this vegetation type, followed grazing guidelines set out in the *Tasmanian Bushcare Toolkit* (Kirkpatrick & Gilfedder 1999).

Two (50%) of the plans with discrepancies state that grazing would be permitted where CAR values will not be degraded. However, there was no prescribed grazing regime present that considered seasons, intensity and length of time. They also states that grazing management strategies will be developed with cooperation between the landowner and the Crown before the first review of the plan, which is scheduled for 2006. One (25%) of the plans with discrepancies states that light grazing would be permitted in late spring and during periods of drought during summer with the approval of the Crown. The other (25%) states that light grazing is permitted for one period of up to three weeks in each year. However, it does not specify which seasons are ideal. It also states that grazing may be permitted for summer drought relief with approval from the Crown.

The next most common vegetation type present was heathy woodland or forest and it occurred at six of the ten (60%) sites included in this investigation. Kirkpatrick and Gilfedder (1999) state that little economic benefit is gained through grazing this vegetation type. However, light sheep grazing during the winter months does not appear to harm heathy eucalypt vegetation.

Some degree of grazing is permitted at four (67%) of these sites. However, only one (25%) of the plans for these sites specifically prescribed that light sheep grazing is permitted in the winter months. This plan also states that the landowner may seek approval from the Crown to graze these areas for summer drought relief. Two of the four (50%) plans in which grazing is permitted in heathy Eucalypt vegetation exclude stock from these areas. The other (25%) plan states that light grazing is permitted in the reserve for up to three weeks out of the year. However, it does not state the preferred season for grazing or the type of livestock that is permitted.

Shrubby Eucalypt forest was present in three (30%) of the reserves included in this analysis. According to Kirkpatrick and Gilfedder (1999) the grazing of shrubby Eucalypt forest provides little economic return. Ideally stock should be excluded from this vegetation type. Two out of the three (67%) plans, which covered shrubby Eucalypt forest prescribed that stock be excluded from these areas. However, there was no mention of excluding stock from these areas in the other (33%) plan.

She Oak forest was present in one (10%) of the sites included in this investigation. Grazing this vegetation type provides little economic return. It also does not tend to regenerate well after grazing (Kirkpatrick & Gilfedder 1999). The operations plan for the site that contains She Oak forest made no mention of excluding stock from this vegetation type.

7.6.2 Questionnaire Results

Four (67%) out of the six plans included in this section of the analysis permitted grazing within the reserve. Three (75%) out of these four landowners actually utilized their reserve for grazing purposes. One (17%) out of the six plans stated that grazing would be permitted with written approval from the Director. The owner of this reserve indicated that some degree of grazing is carried out on that reserve. The other (17%)

plan prescribed that no grazing take place. According to the questionnaire, this landowner does not graze in any part of the reserve.

7.6.3 Interview Results

Four (67%) out of the six landowners included in this part of the analysis indicated that they do graze areas of their reserves. There were a number of measures taken to reduce the negative effects that this could have on natural values within the reserves. The two most common provisions taken were spelling the reserve at appropriate times (late spring and summer) and maintaining low stocking rates. Each of these provisions were taken by three (75%) out of the four landowners who utilized areas of their reserve for grazing purposes. Two (50%) out of the four landowners who graze areas of their reserve also indicated that regular monitoring of vegetation is important for maintaining a healthy under story.

Other provisions taken to reduce the effect that grazing can have on natural values within reserves include the rotation of stock, restricting stock from sensitive areas and stocking appropriate species in appropriate areas at specific times. Each of these provisions was mentioned by one (25%) of the four landowners who graze areas of their reserves.

Some areas will have sheep and cattle through the year at different times... In other areas just have sheep...grazing is a bit complimentary... some areas might not have been grazed for a couple of years with a lot of rank growth and whatever... we might choose to put cattle in instead of sheep (Landowner 2).

Two (50%) out of the four landowners who graze areas of their reserves indicated that grazing is also used for ecosystem management purposes. Both of these landowners utilize grazing to reduce fuel loads and maintain a grassy understory. One (25%) of the landowners who conducted grazing on his land also stated that grazing is also useful for controlling exotic plant species in some situations.

Proper fencing was also identified as important for maximizing the benefits that grazing may have and reducing the negative risks that it can pose. A typical exclusion fence found in a Private Forest Reserve is illustrated in figure 7.1. One (25%)

landowner who allows grazing on areas within his reserve indicated that additional funding would help to exclude stock from sensitive areas.

I don't see myself willing to use my own money... I don't mind using my time but as far as paying for the materials and so on, so I don't think I need to do that (Landowner 5).



Figure 7.1 A typical livestock exclusion fence used for the PFRP.

7.6.4 Site Visits

By visiting the reserves some of the provisions that are taken to help ensure that grazing is carried out in a sustainable manner were revealed. Grazing exclusion plots were located on two (50%) out the three reserves visited (Figure 7.2). These allow researchers to gather data about how specific vegetation types respond to varying degrees of grazing pressure by excluding only livestock, or both livestock and native grazing species.



Figure 7.2 Grazing exclusion plot.

Reserves that were visited had fences built with the purpose of preventing unwanted intrusion into the reserve and managing grazing regimes. The unwanted intruders

were usually sheep and cattle. However, one landowner allows a music festival (Falls Festival) to be held annually on his land. Much of the activity is within close proximity to some of his reserved areas. After noticing that there was a problem with patrons encroaching into the reserve in one particular year, a large fence was set up with the purpose of excluding people and preventing damage (Figure 7.3). According to the landowner, this was very effective.



Figure 7.3 Falls Festival fence.

7.7 Wood Collection

The next most common form of sustainable production that occurred within the sites selected for this investigation was the collection of wood for domestic firewood purposes. An assessment of wood collection provisions included the analysis of operation plans and terms of covenant documents, questionnaire results and interview results.

7.7.1 Operations Plan Analysis

Operation plans for nine of the ten (90%) sites studied contained provisions for sustainable wood collection. All wood that is collected should be used as firewood for domestic purposes. Each (100%) plan that permitted wood collection contained a collection limit that the landowner is not permitted to exceed. Collection limits for each site varied according to reserve size and vegetation type.

Only six of the nine (67%) sites in which wood collection is permitted had provisions that dealt with the maintenance of habitat. The degree to which that was done in the plans varied from site to site. The plans for all six (100%) of these sites prescribed that firewood collection be dispersed throughout the landscape. However, provisions in two of the six (33%) plans only stated that wood should not be collected from

priority forest communities. The other four (67%) had provisions stating that dead or live habitat trees (containing hollows or structural damage) or those with the potential to become habitat trees should not be harvested.

7.7.2 Questionnaire Results

According to the operations plan and terms of covenant document, regular wood collection is permitted in five (83%) out of the six reserves included in this part of the analysis. However, only four (80%) of the six landowners actually collect wood on their reserves. Wood collection may be permitted with approval from the Director, in the reserve without wood collection prescriptions. This landowner indicated that he does collect some firewood within the reserve.

7.7.3 Interview Results

Five (83%) out of the six landowners who were interviewed stated that they do collect a small amount of wood from their reserve. This is utilized primarily as domestic firewood. In each reserve the amount of wood taken was described as minimal with the most being five tonnes per year. Two (40%) out of the five landowners who do collect some wood said that they have not collected wood within their reserves in quite some time, indicating that this was not a regular activity.

Landowners who do collect wood were asked if they use any strategies to ensure that wood collection does not negatively affect natural values within the reserve. One of the landowners (20%) stated that he tries to collect trees over a wide area. He also indicated that he only collects non-habitat trees.

They're usually just spars, they are not like hollow trees or anything like that, where wildlife would live (Landowner 3).

Another (20%) landowner stated that he would take care when harvesting a large fallen tree to help ensure that he did not trample any of the vegetation growing within the reserve.

7.8 Harvest of Native Animals

The harvesting of native animals was mainly conducted from areas outside of the reserves. However, this was not always the case. Assessment of native animal harvest

provisions consisted of an analysis of operations plans and terms of covenant documents, questionnaire results and interview results.

7.8.1 Operations Plan Analysis

One (10%) of the plans allowed for the hunting of native animals for non-commercial uses. It stated that shooting and hunting is permitted, provided that an approved game management plan is in place and all shooters adhere to its conditions. This plan did have an extensive game management plan in place with provisions ensuring that all hunting is carried out in a sustainable manner without the use of hunting dogs. The only species that can be hunted are Bennett's Wallaby, Rufous Wallaby and Brush Tail Possum. All hunting must be carried out in a way that maintains stable and viable populations of these species at levels close to what they were when the game management plan was implemented. Populations of species included in the Game Management Plan are regularly monitored by the Crown through the use of hunting log books harvest index and on-ground inspection.

7.8.2 Questionnaire Results

Five (83%) out of the six plans state that native animals may be harvested with written approval from the Director. However, only two (40%) of these landowners ever allow for the hunting of native animals to be done in their reserves. One (17%) of the six plans prescribes that the hunting of native animals should not occur under any circumstances. This landowner indicated that no hunting of native animals takes place within the reserve.

7.8.3 Interview Results

Each landowner that was interviewed indicated that native species are harvested from their property. However, only two (33%) of them indicated that native species are ever harvested from within the reserve. This seemed to be a relatively uncommon occurrence though.

I do have people who come up here on an ad hoc basis, who do some shooting and on some occasions I let them into the covenant area where it is easy access. But if you look at the total area of the covenant I'd say only about 10% would be actually used for killing of any of these animals (Landowner 5).

According to the each of the corresponding operations plans, all native animal harvest or control must be conducted from outside the reserve unless written approval is given by the Director.

7.9 Economic Benefit

Because contribution to regional and national development is the fourth management objective for a category VI reserve, each landowner was asked whether or not they receive any economic benefit for the sustainable production activities that take place on their land.

7.9.1 Operations Plan Analysis

Seven out of the ten (70%) operations plans that were included in this analysis permitted grazing within the reserves.

7.9.2 Interview results

Four (67%) of the six landowners indicated that they do receive economic benefit. All economic benefit that landowners do receive from sustainable production in their reserves is from the grazing of livestock.

Table 7.1: Ecosystem Management Operations Plan Prescriptions

Grassy Woodland and Forest

Management Action	Plans with Provision in Place	Total	%
Fire management provisions	10	10	100
6-18 year fire interval	0	10	0
Diverse fire regime	10	10	100
Weed control	10	10	100
Feral Animal control	10	10	100
Threatened Species Considerations	10	10	100
Threatened Species Provisions In Place	3	10	30

Table 7.2: Fire Management Operations Plan Prescriptions for Grassy Eucalypt Woodland and Forest

Management Action	Plans with Provision in Place	Total	%
6-18 year fire interval	0	10	0

Table 7.3: Fire Management Operations Plan Prescriptions for Shrubby Eucalypt Forest

Management Action	Plans with Provision in Place	Total	%
20-40 year fire interval	0	3	0

Table 7.4:Fire Management Operations Plan Prescriptions for Heathy Eucalypt Woodland and Forest

Management Action	Plans with Provision in Place	Total	%
15-30 year fire interval	0	6	0

Table 7.5:Fire Management Operations Plan Prescriptions for She Oak Forest

Management Action	Plans with Provisions in Place	Total	%
Exclusion of fire	1	1	100

Table 7.6: Sustainable Production Operations Plan Prescriptions

Production Activities	Plans with Provisions in Place	Total	%
Wood collection limit	9	9	100
Sustainability provisions for native animal collection	1	1	100

Table 7.7: Grazing Management Operations Plan Prescriptions for Grassy Eucalypt Woodland and Forest

Production Activities	Plans with Provisions in Place	Total	%
Moderate grazing (not late spring or summer)	3	7	43

Table 7.8: Grazing Management Operations Plan Prescriptions for Shrubby Eucalypt Forest

Production Activities	Plans with Provisions in Place	Total	%
Exclusion of stock	2	3	67

Table 7.9: Grazing Management Operations Plan Prescriptions for Heathy Eucalypt Woodland and Forest

Production Activities	Plans with Provisions in Place	Total	%
Light sheep grazing only in winter or exclusion	3	4	33

Table 7.10: Grazing Management Operations Plan Prescriptions for She Oak Forest

Production Activities	Plans with Provisions in Place	Total	%
Exclusion of stock	0	1	100

Table 7.11: Fire Management Questionnaire Results

	Permitted	Conducted	Permitted with Approval	Conducted
Firebreaks	6	3	0	0
Fuel reduction burns	2	1	4	2
Ecosystem management burns	2	1	4	1

Table 7.12: Weed Management Questionnaire Results

	Permitted	Conducted
Hand Pulling	6	3
Herbicides	6	6

Table 7.13: Feral Pest Management Questionnaire Results

	Permitted	Conducted
Shoot/Trap	6	5
Poison	0	0

Table 7.14: Sustainable Production Questionnaire Results

	Permitted	Conducted	Permitted with Approval	Conducted
Grazing	4	3	1	1
Wood Collection	5	4	1	1
Harvest Native Plants	0	0	0	0
Harvest Native Animals	0	0	5	1

Chapter 8

Discussion

8.1 Introduction

The purpose of this chapter is to draw together the results of the operations plan analysis, questionnaires, interviews and site visits. It will also outline some of the strengths and weaknesses associated with various elements of PFRP. Suggestions are then made as to how the PFRP might improve management effectiveness. Elements of ecosystem management and sustainable production that are reviewed here include fire management, weed management, feral animal management, threatened species management, grazing, wood collection, harvest of native animals and economic benefit.

8.2 Fire Management

8.2.1 Strengths

This assessment revealed that there are a number of strengths associated with fire management prescriptions within PFRP operations plans and terms of covenant documents. Each of the operation plans reviewed for this analysis contained some sort of provisions relating to fire management. Each plan also contained a prescription stating that burning operations should be conducted in a mosaic pattern in order to help create a diverse range in habitats. In addition to this, operations plans stated that burning should be carried out according to ecological requirements of native plant and animal species. Much of this data will be obtained through fire management research conducted by the Crown.

Each of the operations plans allowed for the clearing of native vegetation for the construction or maintenance of firebreaks. This is important for the protection of assets, which are often vital for the livelihood of many landowners who participate in the PFRP. Without this provision some landowners may be reluctant to participate in such a program. Only 50% of the landowners interviewed utilized this provision, which indicates that it is only taken advantage of by these PFRP landowners when necessary.

8.2.2 Weaknesses

There are also some inherent weaknesses that were uncovered through analysis of the operations plans and terms of covenant documents. Despite having fire management provisions present in each of the plans, there was little detail relating to specific fire frequencies, intensities and seasons. Eighty percent of the landowners included in this investigation are required to obtain written permission from the Director to conduct any burns within their reserve. This could result in one of two scenarios. Either the area will not be burned, resulting in changes to vegetation structure or landowners will burn areas without written permission. This could also result in undesired changes to the vegetation structure. The questionnaire and interview results revealed that both of these scenarios could occur on occasion (section 7.2.2 & 7.2.3). They also revealed that most landowners who do conduct burns consider fuel loads as the top priority, rather than ecological requirements of native species.

Two of the plans did allow for burning operations to be conducted without written permission from the Director. However, neither of these plans had a fire management plan developed for it yet. In both cases, the operations plan stated that a fire management plan would be developed before the first review of that plan in 2006. Until that time, fire regimes are supposed to be based on the landowner's discretion. Only one of the two landowners who are permitted to conduct burns without written permission from the director, actually did this. The other landowner declined to carry out fire management operations, due to the risk that it can pose to assets.

8.2.3 Recommendations

To help ensure that undesirable changes do not occur to the vegetation structure, a detailed fire management plan for each reserve would be invaluable. It seems that many landowners would like to conduct some type of burning in their reserves (section 7.2.2 & 7.2.3). Fire management plans would allow them to do this in a way that takes the needs of native species into account. Landowners who do not feel comfortable conducting such operations on their land by themselves should not be expected to do so. In these cases, extra support from those who specialize in fire management could help to maintain vegetation structure of those vegetation types that rely on fire.

8.3 Weed Management

8.3.1 Strengths

This analysis revealed that there are a number of strengths associated with weed management within the PFRP. Weed management provisions were present in all plans (section 7.3.1), whether serious infestations were present or not. Landowners with no infestations in their reserves were expected to conduct regular monitoring.

Landowners who do not have the capacity to control current infestations are provided with additional support from the Crown.

Analysis of the questionnaire and interview results (section 7.3.2 & 7.3.3) revealed that alternatives to herbicides were used despite the fact that each landowner was permitted to use herbicides. In instances where it was practical some weeds were removed by hand. Grazing was also used in some instances as a method of exotic plant control. When herbicides were used, precautions were taken to minimize the risk that they posed to natural values. Species-specific herbicides are used to reduce the chances of killing non-target species. Other measures taken include careful application, spraying on calm days and using a minimal amount of herbicides when possible.

8.3.2 Weaknesses

Despite the many strengths associated with weed management, analysis of the operations plans (section 7.3.1) revealed that seven out of the ten sites had varying degrees of weed infestations. This number may actually be higher, since the newest operations plan included in this investigation was approximately four years. It is possible that new infestations may have developed since the plans were written. Half of the landowners who were interviewed (section 7.3.3) indicated that herbicides seemed to be only somewhat effective. Landowners also suggested that additional weed management support would be very helpful, especially for monitoring.

8.3.3 Recommendations

Weed management within the PFRP seems to be quite effective. Provisions are in place at all sites and herbicides are not used as the lone method for weed control. Despite this, many sites do contain varying degrees of infestations. Landowners also indicated that they would appreciate additional weed management support. Perhaps

extra support, in terms of monitoring could help to reduce the degree of exotic plant infestations within the PFRP.

8.4 Feral Pest Management

8.4.1 Strengths

There are some strengths associated with feral pest management within the PFRP. Analysis of operations plans (section 7.4.1) revealed that feral pest provisions were in place for all ten sites. In situations where feral pest problems exceed the landowner's management capacity, the Crown will assist with control operations.

None of the landowners who were interviewed or returned a questionnaire (section 7.4.2 & 7.4.3) indicated that they use poisons, such as 1080, to control feral species. Seventy-five percent of landowners who do have an issue with feral pests will shoot them when they encounter one. Each landowner who does employ feral control methods stated that populations have not yet increased to a significant level.

8.4.2 Weaknesses

Little detail was present in operations plans (section 7.4.1) regarding specific control methods for feral animals. Even though the use of poisons was prohibited in 40% of the plans, the other 60% made no mention of poisons, either restricting or permitting their use. This could lead to confusion amongst landowners without this provision in their operations plan.

Four out of the six landowners who were interviewed (section 7.4.3) indicated that feral animals were an issue within their reserves. Despite this, control was not conducted in a systematic way. Most landowners would just shoot feral species if/when they encountered one. According to the landowners, current control methods don't seem to significantly reduce population numbers.

8.4.3 Recommendations

More detail regarding feral pest management in operations plans could increase the effectiveness of current control measures. If a systematic control program was established at some reserves with feral pest issues, it may result in population reductions, rather than just reducing the chance that numbers would increase. Perhaps

a live trapping program, where animals could be trapped and then euthanized if they are non-native species could achieve this. Provisions should also be placed in each operations plan regarding the use of poisons for feral animal control, to avoid confusion amongst landowners.

8.5 Threatened Species Management

8.5.1 Strengths

By reviewing operations plans (section 7.5.1) it was learned that threatened species management provisions were in place for all ten sites included in this analysis. Some of the plans called for the protection of Blue Gum foraging habitat and the promotion of sufficient Blue Gum regeneration, which is vital for the survival of the swift parrot. DPIW also conducts research intended to assess the quality of Swift Parrot habitat in some reserves.

8.5.2 Weaknesses

Despite threatened species management provisions being present for all sites, 70% of the plans (section 7.5.1) contained very little detail. These plans only stated that the Crown and owner would cooperate in the development of threatened species management prescriptions if necessary.

8.5.3 Recommendations

More extensive management prescriptions regarding threatened species may improve management. A detailed survey intended to identify any threatened species could be done for each reserve. From this data, specific management prescriptions could be developed to help ensure that threatened species populations increase, or at the very least remain stable.

8.6 Grazing

8.6.1 Strengths

The PFRP has some strengths relating to the sustainable management of grazing. Two of the sites visited had grazing exclusion plots (section 7.6.4). The data gathered could then be used to help implement appropriate grazing regimes that account for the ecological needs of native plants and animals. DPIW also provides funding for the construction of fences to exclude stock from appropriate areas. Some operations plans

(section 7.6.1) permitted stock grazing during summer drought periods. Provisions such as this, may appeal to landowners who have reservations about joining the program due to summer grazing restrictions.

The interviews (section 7.6.3) revealed that landowners with PFRP sites seem to be quite knowledgeable about grazing management strategies that promote ecological health in native vegetation. Half of the landowners who graze their land stated that they spell their land during appropriate times of the year (late spring and summer). Other measures taken to reduce the effect that grazing has on native flora include regular monitoring and expelling stock when necessary and stock rotation. Half of the landowners who graze their land also stated that they utilize grazing for ecosystem management purposes. This may include fuel load reduction, maintenance of plant understory and control of exotic plants.

8.6.2 Weaknesses

Despite the strengths associated with grazing management, some weaknesses were also identified. Analysis of the operations plans (section 7.6.1) and the *Tasmanian Bushcare Handbook* (Kirkpatrick & Gilfedder, 1999) revealed discrepancies between the two in over half of the comparisons. Two (29%) of the seven plans that permitted grazing were lacking information about specific seasons, intensity and type of livestock. One (14%) plan allowed for grazing but did not specify seasons. There were instances where grazing was allowed during summer drought periods. Even though this was earlier identified as a strength it could be detrimental to natural values if not monitored closely. It also seemed that there was little detail relating to grazing regimes amongst specific vegetation types.

During the interviews (section 7.6.3) one landowner stated that a lack of funding had resulted in some areas of fence falling into disrepair. Perhaps better communication between DPIW and landowners could help in similar cases where this may be an issue.

8.6.3 Recommendations

Even though many of the landowners seemed to understand grazing strategies that promote health in native vegetation, many of the operations plans were lacking

specific prescriptions relating to grazing management. More extensive grazing prescriptions in the operations plans for each vegetation type could help guard against mistakes being made that may compromise natural values within the reserves.

Maintaining good communication between landowners and DPIW is important for ensuring that grazing within, or on land adjacent to, reserves does not compromise ecological integrity within the sites. When grazing is permitted during summer drought periods, careful monitoring by both landowners and DPIW staff should be done. Landowners should also have regular discussions with DPIW and inform them of any extra support that may be needed to improve grazing management at sites.

8.7 Wood Collection

8.7.1 Strengths

Operations plan (section 7.7.1) provisions contained some strengths relating to wood collection. All wood that is collected is only to be used for domestic purposes. A collection limit was also in place for each reserve that permitted wood collection. Both of these provisions help to ensure that an appropriate amount is collected and habitat quality is not compromised.

The landowner interviews (section 7.7.3) revealed that the amount of wood collected is minimal and not likely to have a negative effect on natural values. Measures were also taken to reduce effects that wood collection might have. This included, collection over a wide area of forest, no collection of habitat logs and taking care not to trample native vegetation during collection.

8.7.2 Weaknesses

Even though wood collection was minimal and landowners made provisions to reduce the effect that collection has on native vegetation, some operations plans (section 7.7.1) were lacking prescriptions relating to habitat maintenance. These include dispersing collection and non-harvesting of habitat trees or those with potential to become habitat trees. However, it should be noted that a large proportion of the plans contained such provisions.

8.8 Harvest of Native Animals

8.8.1 Strengths

One of the operations plans (section 7.8.1) included in this analysis allowed for the hunting of native species within the reserve. This plan was accompanied by an extensive game management plan, which contained many provisions relating to sustainable harvest. In some cases native animals can put grazing pressure on land that is utilized by sheep or cattle (Commonwealth of Australia, 2003). If this does occur, landowners are encouraged to control animals from outside of reserves without the use of poisons in most cases.

8.8.2 Weaknesses

Two of the landowners interviewed (section 7.8.3) stated that some shooting does occur within their reserves. Neither of the corresponding operations plans included a game management plan. However, each of the plans stated that shooting might be permitted with written approval from the Director. It is not known whether these landowners had obtained approval.

8.8.3 Recommendations

The interviews (section 7.8.3) indicated that some shooting is done in some of the reserves where approval from the Director is required. This seemed to be done on a minimal scale. For landowners who wish to do this a game management plan, similar to the one mentioned in the operation plan analysis (section 7.8.1), would help to ensure that this is carried out in a sustainable manner.

8.9 Economic Benefit

Seventy percent of the operations plans (7.9.1) included in this analysis permitted sustainable grazing to be carried out within reserves. Sixty-seven percent of the landowners interviewed (section 7.9.2) indicated that they receive economic benefit from the grazing that occurs on their reserve. The landowners who do not receive economic benefit do not graze in their reserves. It is likely that most landowners who do graze in their reserves would receive at least some economic benefit from that activity.

8.10 Summary

This chapter drew together the results from the operations plan analysis, questionnaire results, interview results and site visits. It has shown that there are a number of management strengths within the PFRP. However, there are also areas where improvements could be made. Perhaps some of the recommendations provided can help improve management effectiveness within the program.

Chapter 9

Conclusion

9.1 Introduction

The purpose of this chapter is to present the conclusions drawn from this research and assess management effectiveness of PFRP Category VI sites within the NRM South region of Tasmania. It also provides answers to the research questions that were addressed in this study:

1. Are objectives for IUCN category VI sites being met on PFRP reserves?
2. Are land uses consistent with IUCN category VI management prescriptions?
3. How could management be improved within the Tasmania PFRP program?

9.2 Are IUCN Category VI Objectives Being Met?

There are four main objectives in place for IUCN category VI sites.

9.2.1 Long-term Protection and Maintenance of Biodiversity and Natural Values

The purpose the PFRP is to protect and maintain biodiversity within its sites. There are a number of measures that are taken to achieve this. Fire, weed, feral pest and threatened species management strategies are in place at each reserve to help maintain natural values. Provisions also help to ensure that any production activities are conducted in a sustainable manner. The fact that PFRP sites are protected in perpetuity helps to ensure that these sites are protected in the long-term. However, weaknesses associated with ecosystem management were identified and will be further discussed in section 9.4.

9.2.2 Promote Sound Management Practices for Sustainable Production

The primary sustainable production activity conducted within the reserves was grazing. Although wood collection did occur, it was done on a minimal scale. Provisions were in place to ensure that grazing was carried out in a sustainable

manner. However, there were some weaknesses associated with grazing management, which will be discussed further in section 9.4.

9.2.3 Protect Resource Base from Land Uses Detrimental to the Site's Health

Land uses that are permitted with PFRP category VI sites that could be detrimental to the sites health include wood collection and grazing. Wood collection is done on such a small scale that it is unlikely to degrade the site in any way. As an extra precaution, provisions are in place to help ensure that this does not occur. Grazing within reserves is also carried out on a relatively small scale. Provisions are also in place to help ensure that grazing will not threaten a reserve's natural values. However, there were some weaknesses identified with grazing management, which will be discussed in section 9.4.

9.2.4 Contribute to Regional and National Development

Grazing of both cattle and sheep was conducted on a large proportion of the reserves included in this analysis. Landowners who do utilize their reserves for grazing purposes receive economic benefits from wool and meat products, which they sell (section 8.9). Some of the category VI reserves included in this study do not permit grazing in the reserves. However, the appropriateness of the activity should be judged on its impact on natural values, rather than its economic contribution (IUCN, 1994).

9.3 Are Land Uses Consistent with IUCN Category VI Prescriptions?

To be considered a category VI protected area, any land uses within it cannot have a negative impact on natural values. Intensive grazing, farming or harvest of forest products would be considered unacceptable. Grazing and wood collection are done on such a small scale that those activities are unlikely to compromise natural values. However, more detailed grazing prescriptions in some plans would help to ensure that this does not occur. This analysis also revealed that harvesting of native animals is also carried out within reserves to some degree. This is also done on a very small scale. However, game management plans for all sites where landowners wish to shoot within their reserves would help to ensure that these activities are sustainable.

9.4 How could Management be Improved within the PFRP?

Overall the PFRP does a good job of maintaining and protecting natural values in the long-term, while allowing for the sustainable use of natural resources that does not threaten natural values. However, this research identified some areas where management could be improved within the program to provide further protection to these sites.

1. A detailed fire management plan for each site outlining ideal burning intervals, seasons and intensities for each vegetation type would help to ensure that actual fire regimes consider the ecological requirements of native species (section 7.2.1 & 8.2.2).
2. Additional weed management support would likely help reduce the instances of weed infestations within PFRP sites (section 7.3.3 & 8.3.2).
3. More detailed feral animal control prescriptions and a systematic feral animal control program may help to reduce the threat that feral cats can pose to native species (section 7.4.1 & 8.4.2).
4. More extensive threatened species management prescriptions in operations plans could help to improve this aspect of management (section 7.5.1 & 8.5.2).
5. More extensive grazing prescriptions in operation plans could further ensure that this activity does not negatively impact natural values (section 7.6.1 & 8.6.2).
6. Wood collection management prescriptions relating to the maintenance of habitat should be present for each site that permits this activity (section 7.7.1 & 8.7.2).
7. Better communication between landowners and DPIW regarding the harvest of native animals. Shooting was conducted at a couple of sites without game management plans (section 7.8.2, 7.8.3 & 8.8.2). It was not known whether or not these landowners had received written approval from the Director.
8. Implement game management plans in all cases where landowners wish to harvest native animals within their reserves (section 7.8.1).

9.5 Final Remark

Even though much of this thesis focused on areas where changes could be made to improve management within the PFRP, the overall results of this evaluation were

positive. Landowners seemed to be knowledgeable about strategies that can be used to promote health in native vegetation. The fact that these sites are each accompanied by a detailed operations plan, ensures that each landowner has a document they can refer to when they are unsure about specific aspects of management. This helps to ensure that reserves are managed with conservation as the top priority. The program also protects each of the sites in perpetuity, which provides long-term protection to each reserve. However, there is room for improvement within the program. The eight recommendations above may help to improve management effectiveness for category VI sites within Tasmania PFRP.

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Appendix A

Landowner Questionnaire

Name of Participant.....

Questions for Landowners

Management of PFRP Sites in the NRM South Region of Tasmania

Ecosystem Management

1. Please indicate the extent of effort you dedicate to each of the following.

Fire Management	Extensive	Moderate	Some	None
Construction of fire breaks				
Fuel reduction burns				
Ecosystem management burns				
Other (please specify)				
Weed Management	Extensive	Moderate	Some	None
Removal by hand				
Use of herbicides				
Other (please specify)				
Feral Pests	Extensive	Moderate	Some	None
Shooting or trapping				
Poison				
Other (please specify)				

2. Are there any other ecosystem management activities that you conduct within your reserve, which do not relate to fire, weed or pest management?

3. Are there any specific threats not mentioned above, that currently require management attention and are not yet being addressed? If so, what is the nature of those threats?

4. Are you aware of any specific threats to your reserve that may require management attention within the next five years? If so, what is the nature of those threats?

Sustainable Production

1. Please indicate the degree to which each of these activities is carried out within your reserve.

Activity	Extensive	Moderate	Some	None
Grazing				
Harvesting of firewood				
Harvesting of wild plants				
Harvesting of wild animals				
Other (please specify)				

2. Do you receive any economic benefit from the sustainable production activities that take place within your reserve, or are the resources utilized mainly for your own personal consumption?

3. May I contact you for a follow up interview and/or site visit regarding the management of your reserve? If so, could you include your contact details (name, phone number, mailing address, email)

Thankyou for participating in this survey.

Appendix B
Landowner Interview Schedule
Questions for Landowners
Management Effectiveness of PFRP Sites

Ecosystem Management

1. How often do you conduct fuel reduction burns on your reserve? On what scale are they carried out?
2. How often do you conduct ecosystem management burns on your reserve? On what scale are they carried out?
3. If you do not carry out fire management on your reserve, what are the reasons for this?
4. How serious an issue are exotic plant species on your reserve?
5. If you remove exotic plant species by hand on your reserve, how effective is this?
6. If you manage exotic plant species with herbicides on your reserve, how effective is this? Do you take any specific measures to reduce the effects that this may have on the natural values of your reserve?
7. How serious an issue are feral pests on your reserve?
8. If you manage feral pests by shooting or trapping on your reserve how effective is this?
9. If you manage feral pests through the use of poisons, how effective is this? Do you take any specific measures to reduce the effects that this may have on the natural values of your reserve?
10. Do you conduct any other ecosystem management activities on your reserve? If so, what are the details of these activities?
11. Do you have any suggestions of how the PFRP could help you improve ecosystem management on your land?
12. Do you take any measures to encourage regeneration of native plants in degraded areas? If so, what measures are taken, what species are targeted and how effective are these measures?

Sustainable Production

1. If you graze livestock on your reserve what are the specifics of the grazing regime (number and type of livestock, size of area grazed, length of time grazed, time of year grazed, etc.)
2. Are any measures taken to help reduce the effect that the grazing may have on the natural values of your reserve?
3. If you collect firewood or utilize timber for any other reasons on your reserve, approximately how much do you collect on an annual basis?
4. Are any measures taken to help reduce the effect that the removal of wood may have on the natural values of your reserve?
5. If you harvest native plant species on your reserve, how much is taken, which species are harvested and what are they used for?
6. If you harvest native plant species on your reserve, what measures are taken to ensure that this does not negatively affect the natural values of your reserve?
7. If you harvest native animal species on your reserve, how much is taken, which species are harvested and what are they used for?
8. If you harvest native animal species on your reserve, what measures are taken to ensure that it does not negatively affect the natural values of your reserve?
9. Do receive any economic benefit for any of the sustainable production activities that are carried out on your reserve?