



Recovery Plan for the Lord Howe Woodhen (*Gallirallus sylvestris*)



© NSW National Parks and Wildlife Service, 2002.

This work is copyright, however material presented in this plan may be copied for personal use or published for educational purposes, providing that any extracts are fully acknowledged. Apart from this and any other use as permitted under the *Copyright Act* 1968, no part may be reproduced without prior written permission from NPWS.

NSW National Parks and Wildlife Service
43 Bridge Street
(PO Box 1967)
Hurstville NSW 2220
Tel: 02 95856444
www.npws.nsw.gov.au

Requests for information or comments regarding the recovery program for Lord Howe Woodhen are best directed to:

The Lord Howe Woodhen Recovery Coordinator
Threatened Species Unit, Northern Directorate
NSW National Parks and Wildlife Service
Locked Bag 914 Coffs Harbour NSW 2450
Tel 02 66515946

Cover illustration: Margaret Murray

This plan should be cited as follows:

NSW National Parks and Wildlife Service (2002). *Approved Recovery Plan for the Lord Howe Woodhen*. NSW National Parks and Wildlife Service, Hurstville NSW.

Executive Summary

1.1 Introduction

The Lord Howe Woodhen (*Gallirallus sylvestris* Sclater 1869) is a flightless bird endemic to Lord Howe Island. This species is listed as Endangered under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is protected under the *Lord Howe Island Act 1953*.

1.2 Legislative context

This recovery plan has been prepared in accordance with the provisions of the TSC Act. The TSC Act is the legislative framework in NSW to protect and encourage the recovery of threatened species, populations and communities. Under the TSC Act, the Director-General of National Parks and Wildlife is responsible for the preparation of recovery plans.

The EPBC Act requires the Commonwealth Minister of the Environment to ensure the preparation of a recovery plan for nationally listed species and communities or adopt plans prepared by others including those developed by State agencies. It is the intention of the Director-General of National Parks and Wildlife to forward the final version of this recovery plan to the Commonwealth Minister of the Environment for consideration for adoption, once it has been approved by the NSW Minister for the Environment.

1.3 Preparation of Plan

This recovery plan has been prepared with the assistance of a number of people from the LHIB, National Parks and Wildlife Service and Taronga Park Zoo as well as local residents of Lord Howe Island. The information in this recovery plan was accurate to the best of the NPWS's knowledge on the date that it was approved. Following adoption of the recovery plan by the Minister copies of all submissions will be available for public inspection.

1.4 Current Species Status

The Lord Howe Woodhen is listed on Schedule 1 (Part 1) of the TSC Act as an Endangered species. It is listed as Vulnerable on Schedule 1 (Part 2) of the EPBC Act. The IUCN – World Conservation Union – has identified the Lord Howe Woodhen as Endangered (Baillie and Groombridge 1996).

Prior to the start of a rehabilitation program in the 1970s, the population was estimated at 30 individuals. As a result of this program, one of the most successful ever implemented for any bird species, the wild population increased between 1980 and 1985 by over 100 to 140 individuals in at least three geographically discrete populations. In the April 2002 monitoring survey, 127 individuals were counted, not including the Little Slope site, which was not surveyed due to weather conditions.

1.5 Recovery Objectives

This recovery plan is framed within the following recovery objectives:

- to maintain and where possible, increase the population of wild Woodhens on Lord Howe Island;
- to establish a Lord Howe Island recovery team to co-ordinate the implementation and ongoing review of the recovery plan;
- to involve the Lord Howe Island community in monitoring, management, habitat rehabilitation and threat abatement;
- develop a plan for establishing and resourcing an on-island captive breeding facility in the event of a substantial reduction in Woodhen numbers; and
- to establish captive populations at sites other than Lord Howe Island as insurance against catastrophe affecting the wild population.

1.6 Recovery Criteria

Achievement of the recovery objectives will be measured against the following recovery criteria:

- regular monitoring shows that numbers of Woodhens are stable or increasing;

- a recovery team is established which ensures the plan is implemented and reviewed;
- the carrying capacity of the Island for Woodhens and the critical number of Woodhens to trigger an on-island captive breeding program will be determined within six months through analysis of habitat availability and monitoring data;
- a contingency plan for on-island captive breeding is developed within eighteen months and implemented in the event of a substantial reduction in Woodhen numbers;
- captive colonies are established elsewhere as insurance against catastrophe (eg. disease, cyclone, predation) on Lord Howe Island; and
- successful establishment of broader community involvement in monitoring and management.

1.7 Recovery Actions

Recovery actions will be directed towards:

- maintaining and increasing current population levels;
- protecting existing habitats;
- controlling threatening processes;
- monitoring population levels precisely;
- establishing and activating a recovery team;
- establishing captive populations off Lord Howe Island, as insurance against catastrophic decline; and
- developing a plan for establishing an on-island captive breeding facility and implementation of the plan in the event of a substantial reduction in Woodhen numbers.

1.8 Biodiversity Benefits

The effectiveness of management efforts to rehabilitate the Lord Howe Woodhen since the 1970s is an indication of the extent to which some of the more widespread indirect impacts of human settlement on Lord Howe Island have been controlled. In this respect, the Woodhen is an indicator species for the good environmental management of the island's terrestrial ecosystems and an icon for conservation of the island and its wildlife.

The Woodhen is one of a suite of species endemic to the Lord Howe Island Group. The high level of endemism in this island group was one of the principal reasons for its World Heritage listing in 1982. Australia has an international obligation under the World Heritage Convention to protect and conserve the World Heritage values of the Lord Howe Island Group, including the Lord Howe Woodhen.

The implementation of this recovery plan will consolidate and extend these significant biodiversity benefits.



DIRECTOR-GENERAL



MINISTER FOR THE ENVIRONMENT

Acknowledgments

The plan was prepared by Brett A. Lane of Ecology Australia Pty Ltd and edited by Nick Sheppard, William Faulkner, Lynn Baker and Katrina McKay, NPWS. The plan has benefited greatly from the input of a number of key people, with special thanks to the following for their input and generous assistance:- Lisa Menke, Greg Leaman, (previous employees) and Judy Riddle, Gower Wilson and Esven Fenton (current members) of the LHIB.

- **Robert Harden, National Parks and Wildlife Service, Biodiversity Research and Management Division.**
- **Chris Hibbard, Australian Regional Association of Zoological Parks and Aquaria (ARAZPA) Taxon Advisory Group Convenor - Australian Non-passerines.**
- **Mark Bezuijen, Ecology Australia Pty Ltd.**
- **Julie Smith, Samantha Olson and Dean Hiscox, Rangers, Lord Howe Island Board.**
- **Peter Evans, Acting Manager, Lord Howe Island Board.**
- **Murray Carter, Manager, Lord Howe Island Board.**

Local residents:

- **Paul Beaumont,**
- **Gary Crombie,**
- **Matthew Retmock,**
- **Ray Shick,**
- **Christine Skeggs,**
- **Des Thompson,**
- **Rodney Thompson.**

Table of Contents

Executive Summary	i
1.1 Introduction	i
1.2 Legislative context.....	i
1.3 Preparation of Plan	i
1.4 Current Species Status	i
1.5 Recovery Objectives	i
1.6 Recovery Criteria.....	i
1.7 Recovery Actions.....	ii
1.8 Biodiversity Benefits	ii
Acknowledgments	iii
Acronyms Used in this Document	v
1 Current Conservation Status	1
2 Description	1
3 Distribution and Abundance	1
3.1 Historical Distribution and Abundance	1
3.2 Current Distribution and Abundance	3
4 Ecology	4
4.1 Feeding Ecology	4
4.2 Social Organisation	5
5 Disturbance	6
6 Habitat.....	6
7 Relevant Legislation.....	7
7.1 State, Commonwealth and International Listing	7
7.2 Recovery Plan Preparation and Implementation	7
7.3 Critical Habitat.....	8
7.4 Environmental Assessment	8
8 Management Issues	9
8.1 Threats and Reasons for Decline.....	9
8.2 Social and Economic Consequences.....	12
9 Scientific and Taxonomic Value	13
9.1 Biodiversity Benefits	13
10 Previous Actions Undertaken.....	13
10.1 Status of Woodhen Habitat.....	13
10.2 Previous Studies	14
10.3 Control of Exotic Species	14
10.4 Current Management Practices	15
10.5 Captive Breeding	15
10.6 Community Activities.....	15
11 The Species' Ability to Recover	16

12 Recovery Objectives and Performance Criteria	16
12.1 Objectives of the Recovery Plan.....	16
12.2 Risk Management Framework.....	16
12.3 Recovery Performance Criteria.....	16
13 Recovery Actions.....	17
13.1 Maintaining and Increasing Current Population Levels.....	17
Implementation.....	1
15 Preparation details	29
15.1 Date of last amendment	29
15.2 Review date.....	29
16 References	29

Figures

Figure 1. Distribution of Lord Howe Woodhen	2
---	---

Tables

Table 1: Release dates, numbers and areas of captive bred and relocated Lord Howe Woodhens.	3
Table 2: Status of selected exotic fauna on Lord Howe Island and their impacts on the Lord Howe Woodhen. (Sources are provided in brackets).	9
Table 3: Costing Table. Estimated costs of implementing the actions identified in the Lord Howe Woodhen recovery plan are provided below.....	27

Acronyms Used in this Document

AQUIS	Australian Quarantine and Inspection Service
ARAZPA	Australian Regional Association of Zoological Parks and Aquaria
EP&A Act	NSW <i>Environmental Planning and Assessment Act</i> 1979
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act</i> 1999
ESD	Ecologically Sustainable Development
IUCN	International Union for the Conservation of Nature
LEP	Local Environmental Plan
LHIB	Lord Howe Island Board
NPW Act	NSW <i>National Parks and Wildlife Act</i> 1974
NPWS	NSW National Parks and Wildlife Service

1 Current Conservation Status

The Lord Howe Woodhen (*Gallirallus sylvestris*, Sclater 1869) is listed on Schedule 1 (Part 1) of the *Threatened Species Conservation Act 1995* (TSC Act) as an Endangered Species. It is listed as Vulnerable on Schedule 1 (Part 2) of the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The species is classified as Endangered by the IUCN (Baillie and Groombridge 1996). The Lord Howe Woodhen is endemic to Lord Howe Island, a part of NSW located about 700 km north-east of Sydney in the south-west Pacific Ocean. Originally described as 'common' in the early 1800s, the number of Woodhen had declined to 37 by the late 1970s, restricted to the high plateau of Mount Gower in the southern mountains of the island (Miller and Kingston 1980). This decline heightened concern for the species' future and prompted the implementation of a rehabilitation program. This program included the elimination of feral Pigs (*Sus scrofa*) from Lord Howe Island and a very productive captive breeding and release program for the Woodhen. As a result of this program, one of the most successful ever implemented for any bird species, the wild population increased between 1980 and 1985 by over 100 to 140 individuals in at least three geographically discrete populations. In April 2002 monitoring survey, 127 individuals were counted, not including the Little Slope site which was not surveyed due to weather conditions (see Section 3.2).

2 Description

The Lord Howe Woodhen was formally described by Sclater as *Ocydromus sylvestris* (*Proc. zool. Soc. Lond.* 1869: 472). It is a medium-sized, flightless rail that inhabits the forest floor on Lord Howe Island. It has a body length of 30 to 40 cm (males 34 to 42 cm; females 32 to 37 cm) (Fullagar 1985). Adults weigh between 450 and 500 grams; males are typically 15% heavier than females and lowland birds 25% heavier than those on Mount Gower (R. Harden, NPWS, pers. comm.). It is generally dull olive brown with paler markings around the face (including grey flecks in birds > 7 yrs old). The primaries and secondaries (flight feathers) are bright chestnut with fine black barring. The Woodhen's pinkish-grey bill is slender, down-curved and slightly shorter or the same length as the head. Its legs are thick, with a pinkish grey-brown tarsus between 40 and 57 mm long (Marchant and Higgins 1993).

3 Distribution and Abundance

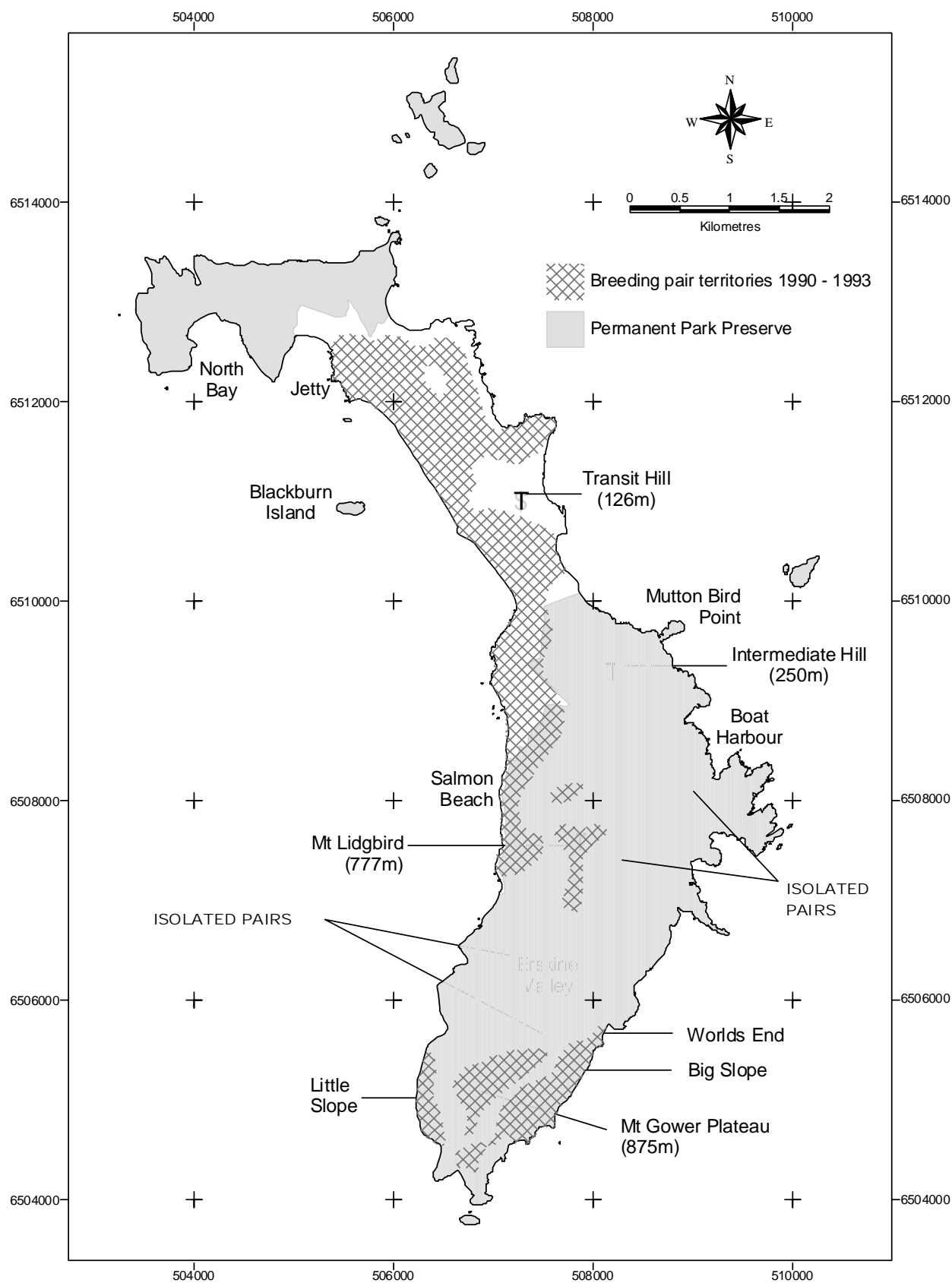
3.1 Historical Distribution and Abundance

The Lord Howe Woodhen occurs only on Lord Howe Island (see Figure 1). It was discovered in 1788 and observed on subsequent visits by mariners who described it as common. It appears always to have been confined to the mainland of the island and there are no records of it on the offshore islands, which lack forest (Fullagar 1985).

The island was settled in 1833-34, at which time the Woodhen was still reported as quite common (Lourie-Fraser 1985). By 1853, however, the species had become almost restricted to the higher and more isolated southern parts of the island (the southern mountains), with a few persisting in lowland areas until the end of the 1930s (Miller and Kingston 1980, Fullagar 1985, Lourie-Fraser 1985).

A bird collector named R. Bell resided on Lord Howe Island just before World War 1. From his shooting records, it was clear that the Woodhen occurred throughout the southern mountains, both in the lower and upper areas (Miller and Kingston 1980). Bell recorded particularly high densities at Little Slope on the south-western part of the island. At the same time, he described population densities on the small (25 ha) plateau on Mount Gower as comparatively low, suggesting that this area was possibly marginal habitat for the species (Miller and Kingston 1980).

Figure 1. Known distribution of Lord Howe Woodhen.



By 1940, the species was confined to the upper regions of Mounts Lidgbird and Gower and three isolated pockets on the south-eastern flank of Mount Gower. By the 1970s, most individuals occurred on the Mount Gower plateau, above the cliff line. There is a single record of a Woodhen from the Transit Hill area (Miller and Mullette 1985). The reasons for the contraction in range are discussed in Section 8 of this plan.

Since 1940 the distributions of Woodhens and feral Pigs have mostly been mutually exclusive. It is probable that Pig predation on nesting Woodhens, as well as habitat disturbance and modification from Pig feeding activities, contributed significantly to the disappearance of birds from areas inhabited by Pigs (Miller and Mullette 1985) (see Section 8).

Between 1978 and 1983, Pigs were eliminated from the island and a captive breeding program for the Woodhen was producing birds for release into the wild (see Section 9). The release sites of the captive-bred birds are shown in Table 1.

Table 1: Release dates, numbers and areas of captive bred and relocated Lord Howe Woodhens.

DATE	NO. OF BIRDS	RELEASE AREAS
May 1981	4	Little Slope (S.W. coast of island)
Nov 1981	1	Kings (Salmon Beach on W coast of island)*
Dec 1981	3	Little Slope
Feb 1982	7	Little Slope
Jun 1982	8	Little Slope
Jan 1983	17	Erskine Valley (btw Mts Lidgbird and Gower)
Feb 1983	7	Erskine Valley
June 1983	12	Erskine Valley
Nov 1983	7	“Goat House” (E. of Mt Lidgbird)
Nov 1983	3	Boat Harbour (N.E. of Mt Lidgbird)
Dec 1983	8	Boat Harbour
Mar 1984	5	Boat Harbour
TOTAL	82	

(Source: Fullagar 1985)

* only bird released in the settlement area.

Between 1982 and 1988, Woodhen numbers on Little Slope increased to an estimated 28 birds (1986-88), but by 1989 had declined to six birds (Harden 1990a, see Sections 4 and 8). Surveys conducted in 2001 recorded 13 individuals on Little Slope. Viable breeding populations had established themselves patchily through much of the settlement area in the central and northern lowlands of the island (Harden 1986).

Post release surveys of Erskine Valley and on the east side of Mt Lidgbird showed that the captive released populations did not persist at either locality between 1985 and 1989, and only a handful of birds were recorded in those areas (Harden 1986, 1987, 1990b; Harden and Robertshaw 1988, 1989). A small number of isolated pairs persists in these areas to the present (R. Harden, NPWS, pers. comm., D. Hiscox, LHIB, pers. comm.). By 1989, it became apparent that the vast majority of territories of released captive bred birds in the lowlands were located in Megaphyllous Broad Sclerophyll Forest (*sensu* Pickard 1983), particularly the Kentia Palm (*Howea forsteriana*) association. Territories in other settings have been associated with residences where supplementary food has been available. Within this vegetation type, most territories occurred on or immediately downslope of areas of igneous geology (Harden and Robertshaw 1988, 1989). Similar vegetation with calcarenite geology was unoccupied. Despite the high fecundity of the species and its ability to colonise suitable new areas subsequent to rehabilitation, birds have not colonised such vegetation on other geology to the same degree.

3.2 Current Distribution and Abundance

The total number of birds on the island has not increased significantly since the initial captive release program (1981 – 1983) and associated rapid breeding and spread of released birds (1981 – 1985). This suggests that, at least in the lowlands, the population of Woodhen may have reached carrying capacity, as suggested a decade earlier by Harden and Robertshaw (1988).

The total population can be estimated by adding 20-30 birds (10 pairs), to account for areas not surveyed (R. Harden, NPWS, pers. comm.). On this basis, the total population estimate in 1997 was 220-230 individuals and 71-74 breeding pairs. These were distributed approximately as follows:

- c. 70 birds in the settlement area;
- c. 65 birds on Mount Gower summit;
- c. 30 birds on Far Flats;
- c. 15 birds at Grey Face;
- c. 10 birds at Little Slope; and
- c. 20-30 estimated total on the summit and east side of Mount Lidgbird, Thatch Pocket, Little Pocket and Big Pocket on Mount Gower.

The November 1998 survey counted 160 individuals and 44-50 breeding pairs. However, this was considered to be an underestimate as the weather was the most unfavourable of any survey since 1985, and the seas too rough to allow access to Little Slope. Counts recorded for surveys conducted since November 1999 are presented in Table 2. The Lord Howe Island Board (LHIB) staff has conducted the surveys since 1999 (Harden in prep.) and some adjustment in survey results may initially have occurred due to changes in survey personnel.

Table 2: Woodhens counted during surveys 1999-2002

Location	Nov. 1999	April 2000	Nov. 2000	April 2001	Nov. 2001	April 2002
Settlement	64	48	35	32	48	41
Far Flats	28	34	25	19	15	22
Grey Face	27	15	14	12	22	15
Boat Harbour	0	0	0	3	2	2
Little Slope	6	no survey	9	13	13	no survey
Erskine Valley	3	2	2	4	3	2
Mt. Gower	47	47	51	34*	46	45
Total	175	146	136	117	149	127

*Survey undertaken after Providence Petrels (*Pterodroma solandri*) had arrived making it difficult to hear and locate Woodhens.

#Add 20-30 to total for population estimate as per 1997 estimate.

There has been concern over the apparent lower numbers counted in the April 2001 survey. The drop in numbers appeared to be located primarily in the settlement, Far Flats and Mt Gower. Supplementary feeding of Woodhens at some locations within the settlement has ceased and this may have contributed to the lower numbers of birds in the settlement and Far Flats. In addition, the Providence Petrels had arrived on the top of Mt Gower prior to the survey and the noise generated by the birds impacted on the survey teams ability to locate and record Woodhens. The November 2002 and April 2002 surveys indicate that the numbers on Mt Gower appear relatively stable. Similarly numbers within the settlement have increased since April 2001. Of particular interest is the reappearance of Woodhens at Boat Harbour in April 2001. A database for managing the Woodhen survey data has been developed and will be managed by the LHIB. The database will assist in analysing trends in the survey data and assessing the status of the Woodhen population.

4 Ecology

4.1 Feeding Ecology

The Lord Howe Woodhen forages from the ground during the day and occasionally at night (Marchant and Higgins 1993). It moves slowly across the forest floor, using its bill to sift among fallen leaves and rotting timber for arthropods and for digging in the underlying soil for earthworms (Marchant and Higgins 1993). It has not been recorded using its feet to scratch (Miller and Mullette 1985).

Miller and Mullette (1985) investigated the foraging behaviour and diet of the Woodhen. Some 52.2% of foraging actions involved digging with the bill in the soil, which usually resulted in the capture of earthworms from depths as great as 10 cm. When feeding like this, individual Woodhens often worked a small area (0.5 sq. m) for up to 30 minutes. Some 30.7% of foraging actions involved sweeping the half open bill through the leaf litter and catching arthropods. When feeding, the Woodhen regularly moved quite large objects (eg. palm fronds) to expose earth or litter for foraging.

The vast majority of the Woodhen's diet (>80% by both frequency and weight) comprised earthworms (Miller and Mullette 1985). The same study found that white grubs (coleopteran and hemipteran larvae) were the second most consumed diet item. Informal observations have also been recorded of Woodhens taking flying cicadas, the blossoms of the green plum (*Randia stipulosa*), and occasionally lichen and fungi (Miller and Mullette 1985), as well as molluscs, spiders, millipedes, amphipods and isopods (Fullagar 1985, Marchant and Higgins 1993).

Woodhens readily scavenge food from walkers and residents (eg. butter, porridge, stew, biscuits, meat, chocolate and bread, Marchant and Higgins 1993). Their scavenging behaviour has included eating the flesh and insect larvae in dead Providence Petrels. Bester *et al.* (in prep) found that the greatest cause of Providence Petrel mortality was attributed to Woodhen predation. The Woodhen predation rate on Providence Petrels during 2000 was 14.7% (ie. 46 losses / 312 burrows with eggs). Woodhens took substantial numbers of petrel chicks, not only entering burrows to take them, but also by excavating small holes in the roof of the nest chamber through which to extract the chick below. However, the predation rate on eggs was much lower as the Woodhens would refrain from entering the burrows whilst the adult was in attendance. Woodhens took mostly those eggs that were abandoned and later pushed out of the burrow by rising floodwaters or by prospecting non-breeding birds.

It is likely that the Lord Howe Island Woodhen is not posing a threat to the long-term survival of this species at this stage, and that the Woodhen may depend upon Providence Petrel chicks when other food sources are in short supply.

Additionally the Woodhen has been observed to kill and eat introduced Rats and Mice (R. Harden, NPWS, pers. comm.).

In the settlement area, Woodhens often eat food provided for domestic poultry and are regularly observed breaking and eating chicken eggs. The Woodhen drinks fresh water from streams, pools and droplets on moss. It is significant that earthworms, the predominant item in the Woodhen's diet, were also found to be a major item in the diet of feral Pigs located on the island. Other potential food competitors in Woodhen habitat include the Buff-banded Rail (*Gallirallus philippensis*) and Purple Swamphen (*Porphyrio porphyrio*), numbers of which appear to have increased in the settlement area in the last five years (D. Hiscox, LHIB, pers. comm.). The self-introduced Blackbird (*Turdus merula*) and Song Thrush (*T. philomelos*) forage in similar habitat and in the same way as Woodhens and may compete with them in the settlement area, the only part of the island where these species co-occur regularly.

Studies were undertaken before the release to the wild of captive bred Woodhens to locate sites supporting good populations of soil invertebrates. The studies showed that densities of soil invertebrates were significantly higher in lowland forest than in the Woodhen's habitat on Mount Gower (Miller and Kingston 1980). Work by Miller and Mullette (1985) showed that lower altitude Woodhen territories (established after the rehabilitation of the species) showed a higher proportion of successfully breeding pairs and higher numbers of chicks fledged per pair. This may relate to the greater food resources available in lowland territories but also to the unoccupied space available for population expansion at that early stage in the species' rehabilitation.

4.2 Social Organisation

The Woodhen has been reported to be monogamous, usually pairing for life (Miller and Kingston 1980, Lourie-Fraser 1985). Observations of Woodhen pairs by Island residents indicate that birds will change partners (D. Hiscox, *pers comm*). If pairs split then one of them moves to fill a vacancy in an adjacent territory; seldom do they move any further (Miller and Mullette 1985). On Mount Gower in the late 1970s the population reached its lowest level of only three to four breeding pairs (Miller and Mullette 1985). Harden and Robertshaw (1988, 1989) analysed post rehabilitation banding records and found pairs were more stable in the southern mountain area of the island than in the settlement area. For example, between 1986 and 1988, in the former area, four of an original eight known pairs were still together, while in the latter area, only three of an original 16 pairs were still together. The reasons for pairs splitting are unknown.

Pairs defend an exclusive territory in which they forage and breed and, once established, rarely move further than 500 m (Harden 1986). Between 1978 and 1980, territories on Mount Gower averaged 2 to 3 ha (Lourie-Fraser 1985). Since rehabilitation, lowland territories are of the order of 1 to 4 ha (R. Harden, NPWS, pers. comm.).

Most commonly, Woodhens reproduce from August to January and continue raising young until April.

However, the start and finish dates of breeding can vary between years and there are breeding records for much of the year (Miller and Mullette 1985).

Woodhens construct a nest in a shallow depression on the ground, lined with dry grass and leaves, between 10 and 25 cm across and about 2.5 cm deep. It is located on the ground under dense ferny vegetation, or in the unused burrow of a Providence Petrel (Miller and Kingston 1980). One to four eggs are laid 24 to 36 hours apart and incubated by both parents for 20 – 23 days. The young are precocial and move from the nest within 2 days of hatching. Within the territory, the pair builds 3 or 4 nursery nests in which to brood young chicks at night. Both parents brood and feed the chicks, helped by young of the previous brood. Chicks fledge at 28

days of age and are approaching adult size after about 80 days. However, they are not fully grown until about 12 months old, after which time they can be sexed based on measurements.

The adults expel juvenile Woodhens from the parental territory in the winter months (Lourie-Fraser 1985) and at about four months of age (Marchant and Higgins 1993). The juveniles then move about until they either find a mate in an existing territory or establish a new territory with a mate (Harden and Robertshaw 1988). They can breed at nine months of age (Marchant and Higgins 1993). Juveniles that do not establish in a territory by the next breeding season generally do not survive (Harden and Robertshaw 1988, 1989). Earlier hatched juveniles have a higher survival rate than later hatched birds and it has been postulated that the former may have a time and size advantage in establishing a territory (Harden and Robertshaw 1989).

Breeding success is greater in the lowlands than on Mount Gower and greater in the settlement area than in the southern mountains (Marchant and Higgins 1993, Harden and Robertshaw 1988, 1989). For example, between 1986 and 1990, lowland pairs produced between 2.9 and 3.6 young per year, while over the same period in the southern mountains (both lowland and mountain sites), pairs produced between 1.2 and 1.7 young per year.

Conversely, between 1986 and 1995 the mean juvenile mortality in the first year was much lower on Mount Gower (41%) than southern mountains lowland sites (54%) and the settlement area (71%) (R. Harden, NPWS, pers. comm.). The reasons for these differences are not known. This relatively high avian rate of reproduction more than compensates for adult mortality but leads to a proportionally high rate of juvenile mortality in the first year (c. 60%) (Harden and Robertshaw, 1989). The high juvenile mortality rate is likely to be a consequence of their social organisation and possibly limited high quality habitat.

Some settlement residents regularly feed some Woodhen pairs residing in the vicinity of their houses.

Anecdotal evidence (D. Hiscox, LHIB, pers. comm.) suggests that it is these pairs that produce the most young in the Settlement area, even when they live in apparently sub-optimal habitat (e.g. garden vegetation on calcarenite). Feed provided for domestic poultry may also be an important source of food for the Woodhen within the Settlement area.

An unusual example of social organisation arose in 1981 – 82 as a result of a captive released female pairing with a wild male at the King's house near Salmon Beach (Miller and Mullette 1985). With supplementary feeding by the King's, the pair produced 16 chicks in 18 months and, within four years, had produced 36 chicks. Young from one brood assisted in the defence and feeding of chicks from subsequent broods and in the defence of the territory. This behaviour was never observed in the remnant population on Mount Gower where all available territories were occupied. The young from this exceptional pair almost certainly occupied the Far Flats and the settlement area. However, the original breeding pair died in 1995, which may have contributed to fewer Woodhens being recorded in the settlement.

5 Disturbance

The Lord Howe Woodhen is tolerant of a range of human activities and a significant proportion of the population (c. 40%) lives in the settlement area on the island. The Woodhen, like many island animals, is tame and, at times, inquisitive. This made it vulnerable in the early days to predation by humans and introduced predators such as Cats (Fullagar 1985) and Masked Owls.

Dogs are well managed on the island and incidents of Dogs taking Woodhens are rare. Feral Cats no longer exist and there is one domestic Cat remaining on the island, which is desexed. Importation of Cats to the island is prohibited.

A full account of the factors leading to the decline of the Woodhen is provided in Section 8.

6 Habitat

The Lord Howe Woodhen occurs predominantly in three vegetation types (*sensu* Pickard 1983):

- **Gnarled Mossy-Forest;**
- **Megaphyllous Broad Sclerophyll Forest, particularly the *Kentia* Palm (*Howea forsteriana*) association, where it is growing on soils derived from igneous geology; and**
- **gardens around houses.**

The first occurs on the summit plateau of Mount Gower and the summit ridge of Mount Lidgbird. The second occurs patchily through the settlement area, mid-slope on the northern face of Mount Lidgbird ('Grey Face'), and low on the eastern slopes of Mount Gower and the western flanks of both mountains. The third occurs in the settlement area (Harden and Robertshaw 1988, 1989).

The Woodhen is rarely found in the rainforest sub-formation of Closed Forest, the most widespread forest type on the island (Marchant and Higgins 1993).

In addition to these broad habitat types, the Woodhen has also been seen in areas of:

- **forest bordering pasture and gardens (Marchant and Higgins 1993);**

- pasture and reedy swamp (Fullagar 1985); and
- rubbish dump where they obtained supplementary food (Fullagar 1985) prior to upgrading of the disposal facility.

Only 10% of the island has been cleared and a further 10% disturbed by human activities. This leaves 80% of the indigenous vegetation on the island comparatively intact although subject to weed invasion, particularly at its margins (see Section 9). It is of interest that a disproportionate amount of the favoured lowland habitat occurs as remnants within the settlement area on the island. This has implications for management discussed in Sections 10 to 12.

7 Relevant Legislation

7.1 State, Commonwealth and International Listing

The Lord Howe Woodhen is listed as Endangered under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is protected under the *Lord Howe Island Act 1953*.

The TSC Act is the legislative framework in NSW to protect and encourage the recovery of threatened species, populations and communities. One of the consequences of listing as a threatened species on the TSC Act is that consideration must be given to the species in assessing the impacts of developments and activities with the aim of minimising adverse impacts. A licence under the TSC Act may be required if actions are likely to result in the harming of the species or damage to its habitat.

Animal Ethics approval and licences must also be obtained under the *National Parks and Wildlife Act 1974* to take, handle or keep the Lord Howe Woodhen for scientific purposes, for the welfare of the animal or if there is threat to life and property. Research on any flora and fauna on the island requires a permit under this act, Animal Ethics approval and the *Lord Howe Island Act 1953* (NSW) (LHI Act).

The LHI Act established the LHIB, which is charged with the care, control and management of the affairs and trade of the Island. The Permanent Park Preserve is established under s.19A of the LHI Act and is managed in accordance with a Plan of Management.

Additionally the Lord Howe Island Group is listed as a World Heritage site and therefore must be managed in accordance with the provisions of the EPBC Act.

7.2 Recovery Plan Preparation and Implementation

Recovery plan preparation

The TSC Act provides a legislative framework to protect and encourage the recovery of Endangered and Vulnerable species, Endangered Populations and Endangered Ecological Communities in NSW. Under this legislation the Director-General of National Parks and Wildlife has a responsibility to prepare recovery plans for all Endangered and Vulnerable species, Endangered Populations and Endangered Ecological Communities listed on the TSC Act schedules. Similarly, the EPBC Act requires the Commonwealth Minister for the Environment to ensure the preparation of a recovery plan for nationally listed species and communities or adopt plans prepared by others, including those developed by State agencies. Both Acts include specific requirements for the matters to be addressed by recovery plans and the administrative process for preparing recovery plans.

This recovery plan has been prepared to satisfy both the requirements of the TSC Act and the EPBC Act and therefore will be the only recovery plan for the species. It is the intention of the Director-General to forward this recovery plan to the Commonwealth Minister of the Environment for adoption, once it has been approved by the NSW Minister for the Environment.

Recovery plan implementation

The TSC Act requires that a public authority must take any appropriate measures available to implement actions included in a recovery plan for which they have agreed to be responsible. Public authorities and councils identified as responsible for the implementation of recovery plan actions are required by the TSC Act to report on measures taken to implement those actions.

In addition, the Act specifies that public authorities must not make decisions that are inconsistent with the provisions of the plan. The government agencies responsible for implementing this plan are the NSW National Parks and Wildlife Service (NPWS) and the LHIB.

The EPBC Act states that the Commonwealth must implement a recovery plan on those areas that apply to Commonwealth lands. There are no Commonwealth owned lands on Lord Howe Island.

The EPBC Act additionally specifies that a Commonwealth agency must not take any action that contravenes a recovery plan.

Many Woodhens occur on private leases in the settlement area of the island (there is no freehold title land on the island). Therefore, the implementation of this plan will depend significantly on a co-operative approach involving local leaseholders.

The attainment of the recovery plan objectives will be subject to available funding.

7.3 Critical Habitat

The TSC Act makes provision for the identification and declaration of Critical Habitat for species, populations and communities listed as Endangered. Once Critical Habitat is declared, it becomes an offence to damage Critical Habitat (unless the action is specifically exempted by the TSC Act). A Species Impact Statement (SIS) is mandatory for all developments and activities proposed within Critical Habitat, with the nature and extent of the SIS determined by the Director-General of National Parks and Wildlife. The declaration of Critical Habitat is not considered to be a priority for this species, as other mechanisms provide for its protection.

Under the EPBC Act, Critical Habitat may be registered for any nationally listed threatened species or ecological community. When adopting a recovery plan the Federal Minister for the Environment must consider whether to list habitat identified in the recovery plan as being critical to the survival of the species or ecological community. It is an offence under the EPBC Act for a person to knowingly take an action on a Commonwealth area that will significantly damage Critical Habitat (unless the EPBC Act specifically exempts the action). Although this offence only applies to a Commonwealth area, any action that is likely to have a significant impact on a listed species occurring within registered Critical Habitat on other areas is still subject to referral and approval under the EPBC Act. Proposed actions within registered Critical Habitat on non-Commonwealth areas are likely to receive additional scrutiny by the Commonwealth Minister.

This recovery plan identifies those habitat features and the location (sections 3.2 and 6) currently known to be critical to the survival of the Lord Howe Woodhen, as required by the EPBC Act.

7.4 Environmental Assessment

The TSC Act amendments to the environmental assessment provisions of the *Environmental Planning and Assessment Act 1979* (EP&A Act) require that consent and determining authorities in NSW consider threatened species and their habitats when exercising a decision-making function under Parts 4 & 5 of the EP&A Act. When considering any activity that may affect the Lord Howe Woodhen, these authorities should consider the conservation strategy outlined in this plan.

Where an activity or development that may impact upon Lord Howe Woodhen or its habitat is not subject to approval under the EP&A Act, an approval may nevertheless be required under the *Native Vegetation Conservation Act 1997* or the TSC Act. These approvals must also take the strategy in this plan into consideration.

Exceptions are where the proposed activity or development is classed as exempt or is undertaken in accordance with previously approved Regional Vegetation Management Plans or Property Management Plans.

The NSW NPWS is represented on the Regional Vegetation Management Committees that are responsible for the preparation of these plans and will seek appropriate identification and protection of relevant Lord Howe Woodhen habitat under them.

Development applications on Lord Howe Island are considered in accordance with the provisions of the EP&A Act and the Lord Howe Island Regional Environmental Plan 1986 (REP). The consent authority for the Island is the LHIB. Planning NSW is currently undertaking a review of the REP.

The following public authorities currently have a decision making function in relation to the Lord Howe Woodhen:

- **The LHIB;**
- **Planning NSW;**
- **the NPWS; and**
- **the Commonwealth through its responsibilities to manage World Heritage properties and nationally listed threatened species and ecological communities under the EPBC Act.**

Any other activity not requiring development consent under the EP&A Act, which is likely to harm the Lord Howe Woodhen or damage its habitat, requires a Section 91 licence from the NPWS under the provisions of the TSC Act. If the impact is likely to be significant, a Species Impact Statement is required.

The EPBC Act regulates actions that may result in a significant impact on nationally listed threatened species and ecological communities. It is an offence to undertake any such actions in areas under State or Territory jurisdiction, as well as on Commonwealth-owned areas, without obtaining prior approval from the Commonwealth Environment Minister. As the Lord Howe Woodhen is listed nationally under the EPBC Act, any person proposing to undertake actions likely to have a significant impact on this species should refer the action to the Commonwealth Minister for the Environment for consideration. The Minister will then decide whether the action requires EPBC Act approval.

Administrative guidelines are available from Environment Australia to assist proponents in determining whether their action is likely to have a significant impact. In cases where the action does not require EPBC Act approval, but will result in the death or injury of a Lord Howe Woodhen and the bird is in, or on, a Commonwealth area, a permit issued by the Commonwealth Minister under the EPBC Act, will be required. The Environment Minister can also delegate the role of assessment and approval to other Commonwealth Ministers under a Ministerial Declaration and to the States and Territories under bilateral agreements. The development of a bilateral agreement between NSW and the Commonwealth is not yet complete, but when in place will avoid the need for duplication of environmental assessment.

8 Management Issues

8.1 Threats and Reasons for Decline

The decline of the Lord Howe Woodhen started with the discovery of the island in 1788. Mariners visiting the island described the species as abundant and a good source of food (Miller and Kingston 1980, Miller and Mullette 1985, Fullagar 1985).

Observations reported in Miller and Kingston (1980) indicate that the Woodhen underwent its most dramatic decline between 1833 and 1853. The Australian Museum expedition in 1887 as reported the Woodhen as “soon to become extinct” (in Miller and Kingston 1980).

It is clear that by the end of the 19th century they were restricted to the area now known as Little Slope, the higher slopes of Mounts Lidgbird and Gower, and the Erskine Valley (Figure 1). The decline continued until about 1940, by which time the species was restricted to small populations on the tops of Mounts Lidgbird and Gower, and on the south-eastern flank of Mount Gower.

The introduction of exotic fauna is considered to be the principal reason for the decline of the Woodhen. Permanent settlement of the island in 1833-34 resulted in the release of Cats and Dogs. The reasons for the dramatic decline in Woodhens between settlement and 1853 were thought at the time to be the “ravages” of Cats and hunting by people for food (Miller and Kingston 1980). Table 3 summarises the history, status and impacts of key exotic species.

Table 3: Status of selected exotic fauna on Lord Howe Island and their impacts on the Lord Howe Woodhen. (Sources are provided in brackets).

EARLIEST DATE	STATUS	IMPACTS ON WOODHEN
PIGS		
<i>1800 (Miller and Mullette 1985)</i> <i>before 1839 (Fullagar 1985)</i>	Spread through all but the inaccessible areas of the island isolated by the sea and cliffs (eg. Mount Gower Plateau, Little Slope). Almost eradicated from 1979 – 85 (200 killed in this period). By 1985, one boar thought to remain on Mt Lidgbird. Pigs now considered to have been eradicated from the island.	<ul style="list-style-type: none"> • Eat Woodhens and their nest contents. • Eat earthworms so possible food competitor with Woodhen. • Disturb soil invertebrate communities. • Thin dense vegetation and arrest regeneration. • Cause erosion and downslope sedimentation and stream turbidity. • Probably responsible for the decline

		of the Woodhen in the southern part of the island.
GOATS		
before 1851 (Miller and Mullette 1985; Fullagar 1985)	Spread through all accessible parts of the island. Introduced to Big Slope around 1900 and to Little Slope in 1920s. Eradicated from Little Slope (300 animals) in 1955. In 1998, 150 – 200 were thought to occur in the southern mountains. In 1999, a goat control program was undertaken which reduced the known population to three. Follow up programs are required to achieve eradication.	<ul style="list-style-type: none"> • Thin dense vegetation and arrest regeneration. • Cause erosion and downslope sedimentation and stream turbidity. • Contribute to habitat modification by weeds through soil disturbance and dispersal of propagules.
CATS		
before 1845 (Miller and Mullette 1985; Fullagar 1985) c. 1837 (Miller and Kingston 1980)	Spread through much of island by 1850s. Probably not in high numbers in the wetter, southern and mountainous parts of the island. Cats probably not present at Little Slope after 1950. Cats are now banned from importation and one old, desexed domestic cat now remains. Feral Cats have been eradicated.	<ul style="list-style-type: none"> • Eat Woodhens. • Cat predation probably partly responsible for the initial disappearance of the Woodhen from the northern and central parts of the island in the early years of settlement. • Probably not responsible for the decline in the southern part of the island.
RATS		
1918 (Fullagar 1985)	<p>Came off shipwreck in 1918 and increased dramatically, spreading throughout island. In 1927, in response to a bounty, 13,771 rat tails were handed in. Numbers kept low through poisoning in settlement area and kentia palm seeding areas (eg. Little Slope). Numbers at higher densities on Mount Gower. Ongoing rat control programs (poisoning with warfarin) are in place.</p> <p>Predation by the Ship Rat (<i>Rattus rattus</i>) on Lord Howe Island was listed as a Key Threatening Process under the TSC Act in 2000.</p> <p>LHIB is considering a rodent eradication proposal.</p>	<ul style="list-style-type: none"> • Probably have had a limited effect on Woodhen. • Woodhen can kill Rats and defend themselves from attack. • Co-existed with Woodhens for many years on Mount Gower. • May predate eggs and small chicks. • Woodhens consuming rat bait may be poisoned. • A Threat Abatement Plan must be prepared for Ship Rats on Lord Howe Island. • The LHIB rodent eradication proposal would likely require Woodhens to be removed and held in captivity during the baiting program.

MASKED OWLS		
1920-1930 (Fullagar and Disney 1975)	Masked Owls and Barn Owls introduced to control Rats, without success. Barn Owls thought to be extinct. Masked Owl persists today in most parts of the island but more commonly in the southern mountains (D. Hiscox, LHIB, pers. comm.).	<ul style="list-style-type: none"> Initially not thought to have caused decline. Woodhens have been killed by owls and a captive bird was taken once from its enclosure. Possibly implicated in the decline of the Woodhens on Little Slope. Potentially a significant factor limiting population growth in some parts of the island. (D.Hiscox, LHIB, pers. comm.). If Rats are eradicated, the potential threat to Woodhens is likely to increase.
HUMANS		
first visited 1788 then settled permanently 1833-34 (Miller and Mullette 1985; Fullagar 1985)	Small community established in northern and central part of island. Current population 320 plus a maximum permissible 400 tourists at a time.	<ul style="list-style-type: none"> Human predation probably largely responsible for the initial disappearance of the Woodhen from the northern and central parts of the island in the early years of settlement. Clearance of 10% and disturbance of further 10% of island's forests, some of which was Woodhen habitat. Woodhens are occasionally run over by vehicles. Woodhens consume rat bait (some types of which are lethal) in the settlement area. Some members of the community protect Woodhens in their gardens and provide supplementary food to increase survival and breeding output.

The current and potential threats to the Woodhen population are discussed below.

- The species occurs only at Lord Howe Island and, as such, is vulnerable to disease or natural disaster.
- Introduced Masked Owls may be impacting on juvenile Woodhen survival rates (D. Hiscox, LHIB, pers. comm.).
- Increased rat control is likely to cause an increase in predation of Woodhens by Masked Owls (B. Harden, BRMD, pers comm.).
- A proposal is being considered by the LHIB to eradicate rodents from the island using aerial baiting and bait stations. A Risk Assessment Report is currently being prepared for the LHIB which will consider the potential impacts of the program on the Woodhens and other species and the mitigation measures required. The Woodhens are likely to be significantly at risk from the baits.

- In the settlement area, introduced Blackbirds and Song Thrushes, together with apparently increasing numbers of Buff-banded Rails and Purple Swamphens, may be competing with the Woodhen for food (D. Hiscox, LHIB, pers. comm.).
- The introduction to the island of additional exotic species (animal or plant) could threaten the species or the integrity of its habitat.
- Existing weed species may encroach into areas of key habitat and could threaten habitat integrity.
- Quarantine controls on the island are not well developed. There is a risk that a soil, plant or animal pathogen could reach the island and significantly affect the habitat, food or health of Woodhens.
- Loss of preferred habitat through clearing for agriculture or development.
- Consumption of rat bait by Woodhens.
- Impacts of domestic Dogs.
- Reduction in amount of supplementary feeding may affect populations numbers in the settlement.

The bulk of the population is descended from a very small number of captive-released birds derived from three pairs taken from the wild at Mount Gower. Inbreeding and a lack of genetic diversity may theoretically cause future inbreeding depression and associated problems (eg. decreased reproduction success or decreased resistance to disease). However, this is not considered a priority issue at this stage.

A population viability analysis (PVA) of the species using the VORTEX program by Brook *et al.* (1996) revealed that, in the absence of further changes or catastrophes, there was a 2% chance of the species going extinct in the coming 100 years. When the time frame was increased to 1,000 years, the probability of extinction rose significantly to 21%.

The impacts of a range of factors on the Woodhen's future survival were assessed using the model developed for the PVA. A 10% increase in mortality resulted in the Woodhen's demise within 100 years. Juvenile mortality was more important than adult mortality in raising extinction probability. Doubling the variance in fecundity (eg. due to climatic change) resulted in a lower population size but did not significantly increase the probability of extinction. Halving of carrying capacity quickly reduced population size, did not significantly affect the probability of extinction within 100 years but increased the probability of extinction within 1,000 years.

Harden and Robertshaw (1988) suggest that habitat availability may be limiting the expansion of the species on the lowlands. There is some evidence to support this proposal in that the Woodhens habitat preferences appear to be very narrow and most of the available habitat has existing territories within it. There has been little increase in numbers or range extension beyond these areas since their initial re-occupation after captive-release. If the preferred habitat on the island is fully occupied, this has implications for management (see Sections 10 – 12).

8.2 Social and Economic Consequences

The total cost of implementing the recovery actions will be \$476500 over the five year period covered by this plan. Responsibility for implementing the plan lies with the LHIB and the NSW National Parks and Wildlife Service. Some funds will be provided from existing resources within the NPWS and LHIB. The balance of the costs identified in Table 3 (\$452000) are unsecured. External funding options including State and Commonwealth Government funding will be investigated.

The Plan will be forwarded to the Commonwealth Minister for consideration for adoption, once it has been approved by the NSW Minister for the Environment.

Social Benefits

The Woodhen has been a focus for educating local, mainland and international communities about the unique and vulnerable environmental values of Lord Howe Island and about the conservation of Endangered Species. The local community has been very involved in Woodhen conservation. It participated in the captive breeding program and many residents have contributed to the successful re-establishment of birds in the settlement through supplementary feeding and protection of the birds on their properties.

Commercial Value

Ecotourism is a growing business activity in Australia. Lord Howe Island has particular values as an ecotourism destination. The Lord Howe Woodhen is one of a number of bird species for which the island is

famous among tourists with an interest in natural history. The Woodhen thus contributes to the image of the island as a high value ecotourism destination.

9 Scientific and Taxonomic Value

The genus *Gallirallus* has been the subject of much taxonomic review and currently contains sixteen extant and recently extinct species (Taylor, 1996). Various species are found between India, through Indonesia and New Guinea to the islands east of New Zealand. Many species have become flightless, particularly on Pacific Islands, and this has led to many suffering population declines after European settlement. The Lord Howe Woodhen has been in the past placed in the separate genus *Tricholimnas* with the Critically Endangered New Caledonian Rail (*G. lafresnayanus*) and the Gilbert Rail (*G. conditicius*). The latter is known from one specimen from Kiribati and has been considered by some as a juvenile specimen of *G. sylvestris* that has been mislabeled. The three volant species (Buff-banded *G. philippensis*, Barred *G. torquatus* and Slaty-breasted Rails *G. striatus*) are all widespread and common. However, many of the flightless species are of restricted range and are under threat. These include the Endangered Okinawa (*G. okinawae*), Near Threatened Roviana (*G. roviae*) and the poorly known New Britain (*G. insignis*) Rails from southern Japan, Solomon Islands and Papua New Guinea respectively. The Guam Rail (*G. owstoni*) is already extinct in the wild but a captive population remains. Many other island species have not been so lucky with the list of extinct rails including Hawaii's Wake Island (*G. wakensis*), Dieffenbach's (*G. dieffenbachii*) and Chatham Islands (*G. modestus*), both from the islands to the east of New Zealand and Tahiti (*G. pacificus*) (Fuller, 2002). Sharpe's Rail (*G. sharpei*) is another species represented by one specimen from an unknown location that is probably extinct. The last remaining species in the genus, the flightless, polytypic Weka (*G. australis*) is widespread in New Zealand and nearby islands.

The Lord Howe Woodhen is one of the last remaining monotypic, insular species in the genus that has been reasonably well studied. This makes it of significant scientific and taxonomic interest.

9.1 Biodiversity Benefits

The impacts of human activities (including the introduction of exotic species) on the natural terrestrial ecosystems of Lord Howe Island have been significant, notwithstanding the comparatively small area of the island settled by humans (c. 20%). For example, the introduction of Pigs and Goats not only contributed to reducing the Woodhen's range and numbers but also had similar impacts on the Providence Petrel, and possibly other ground-breeding seabirds (eg. Flesh-footed Shearwaters *Puffinis carneipes*).

The rehabilitation of the Lord Howe Woodhen is an indication of the extent to which some of the more widespread indirect impacts of human settlement on the island have been controlled. In this respect, the Woodhen is an indicator species for the successful environmental management of the island's terrestrial ecosystems and is an icon for conservation of the island and its wildlife.

The Woodhen is one of a suite of species endemic to Lord Howe Island. One of the principal reasons for the island's listing on the World Heritage Convention is its high species numbers and high level of endemism. For the reasons outlined above, protection of the Woodhen has resulted in the removal of a range of significant threats to this biodiversity.

10 Previous Actions Undertaken

Conservation measures that have been undertaken to protect the Woodhen and its habitat are described in this section.

10.1 Status of Woodhen Habitat

The Lord Howe Island Group, including Lord Howe Island, Ball's Pyramid, the Admiralty Islands and the contiguous seas, was inscribed on the World Heritage List in 1982.

The LHIB is responsible for the care, control and management of the island in accordance with the LHI Act. Approximately 75% of the land in the Island Group is included in the Lord Howe Island Permanent Park Preserve (PPP). The PPP has similar status to a national park but is managed by the Board. The remaining land area is Crown land, much of which is subject to various leases administered by the Board. A Regional Environmental Plan (REP) (1986) zones land on the island with identified permissible land uses. The REP is currently under review.

In the southern mountains, Woodhen habitat falls within the PPP. Under the REP development within the Preserve may only occur in accordance with the plan of management for the area. The plan of management restricts development to park infrastructure and no residential or commercial development is permitted. Many local residents with Woodhens on their leases take an interest in the birds and in the outcome of breeding attempts and the fate of chicks. Many residents provide supplementary food to the Woodhens in their area. This interest has contributed to the species' rehabilitation.

10.2 Previous Studies

In 1970, an environmental survey of the island was initiated to determine its natural values and management needs (Recher and Clark 1974). In 1972, a management plan for the island was prepared (Recher 1972). The 1970 survey led to an intensive study of the Lord Howe Woodhen on Mount Gower by the Australian Museum starting in February 1971 (Fullagar 1985). Most Woodhens were individually colour-banded and aspects of their social organisation, reproduction and feeding were documented for the first time.

In 1978, a full time study began by the LHIB and the NPWS, supported by the National Parks and Wildlife Association of NSW. The study included the evaluation of captive breeding and release site options. This study confirmed the significant role of Pigs in limiting the return of the Woodhen to the lowlands (Miller and Mullette 1985).

From 1986 to 1997, twice-yearly monitoring was undertaken by the NPWS Biodiversity Research and Management Division (NPWS BRMD). The methods and results of this program were documented in annual reports until 1998 (Harden 1986, 1987, 1990, Harden and Robertshaw 1988, 1998), and involved both census methods and maintaining a high percentage of the population individually colour-banded. A report describing the methodology and summarising results to 1997 has been produced (Harden 1998). In 1998 and 1999, annual monitoring was undertaken.

Responsibility for the surveys was transferred to the LHIB in 1999. During the 1999 November survey, Justin Billing (NPWS BRMD) trained Board staff in the survey methodology. In 2000 and 2001 the twice yearly monitoring program was reinstated. A report detailing the results from these surveys is currently in preparation (Harden in prep). An Access database has been developed for managing the monitoring data collected. The database needs to be updated to improve accuracy of data entry, reporting and to include all existing data.

In 1987, a study was undertaken to determine the occurrence of disease in the Woodhen population (see appendix to Harden and Robertshaw 1988). None was found in the birds sampled.

10.3 Control of Exotic Species

Like many islands in the Pacific, Lord Howe Island had a range of mammals introduced that affected the status and distribution of indigenous fauna. Table 3 summarises current knowledge of the date of introduction of exotic species and evidence for their spread on the island, as well as summarising the range of effects on the Woodhen. Information is also provided on current status and control measures.

A significant component of the Woodhen rehabilitation program and one with significant ancillary biodiversity benefits was the control of Goats and Pigs. Predation by the Ship Rat on Lord Howe Island was listed as a Key Threatening Process under the TSC Act in May 2000. A proposal to eradicate rodents from the island is being considered by the LHIB. It is likely that Woodhens would be vulnerable to the baits being laid as part of this program and birds would probably need to be removed from the wild and kept captive until the program was complete. A Risk Assessment Report is currently being prepared.

The LHIB has a 'Noxious Weed Control Procedure' under the LHI Act and the *Noxious Weeds Act 1993*. This procedure is being reviewed to incorporate the impact of many existing and potential environmental weed species on the island, which are not declared noxious. The new document will provide strategic direction for LHIB weed control programs.

Additionally LHIB staff carries out noxious weed inspections on all leases. These inspections allow for the identification of weed infestations and, in conjunction with the leaseholder, the development of control strategies for individual infestations.

Noxious weed species of highest priority with potential to significantly alter Woodhen habitat are:

- **Bitou Bush** (*Chrysanthemoides monilifera* subsp. *rotundata*)
- **Ground Asparagus** (*Protoasparagus aethiopicus*)
- **Climbing Asparagus** (*P. plumosus*)
- **Bridal Veil** (*Myrsiphyllum asparagoides*)
- **Sweet Pittosporum** (*Pittosporum undulatum*)
- **Cherry Guava** (*Psidium catteianum* var. *catteianum*)
- **Ochna** (*Ochna serrulata*)
- **Castor Oil Plant** (*Ricinus communis*)

10.4 Current Management Practices

Southern Mountains

In the southern mountains, Woodhen habitats fall within the Permanent Park Preserve (PPP). The Woodhens in this area are protected from the effects of developments that might occur on the island. A permit system currently operating for the track to Mount Gower requires all visitors to the Mountain to be accompanied by a guide. This enables the monitoring and control of visitor activities. The current bed limit on the island makes significant growth in visitation unlikely.

However, two indirect impacts may occur if there were increased tourism and associated development on Lord Howe Island:

- **increased human visitation to key habitat areas, causing increased disturbance and possible interference with the Woodhen's usual behaviour. (Miller and Mullette (1985) warn that examination of Woodhen nests resulted in the parents destroying the eggs and the nest); and**
- **the requirement for the installation of additional visitor infrastructure in or near the Woodhen's key habitats.**

Any proposed increase in visitor access or infrastructure would be subject to environmental impact assessment and the protection of Woodhen habitat and populations would remain a priority.

Vegetation Management

- **The LHIB is funding the development of a strategic plan for the management of vegetation on the island. The Plan will provide for a weed management strategy and a re-vegetation strategy.**

10.5 Captive Breeding

One of the most successful activities to promote the rehabilitation of the Lord Howe Woodhen was the captive breeding and release program between 1981 and 1983. Miller and Mullette (1985) and Lourie-Fraser (1985) provide detailed accounts of this program. The following summary is based on these accounts.

- **In 1978-80, the NPWS and the Australian Museum studied the soil fauna of the island to determine possible sites for release of captive-bred birds.**
- **In 1980, a captive breeding facility was established at Steven's Reserve in the Settlement area and a cat-proof fence built around it.**
- **In June 1980, three wild, territory holding pairs were caught and transported to the facility.**
- **In the first season (1980-81), 13 chicks were reared. In the second season 19 chicks were reared and the breeding stock was raised to five pairs. In the third season 34 chicks were reared. In the fourth season (1983-84) 14 chicks were reared.**
- **Including the original wild caught birds, 82 Woodhens were released between May 1981 and March 1984 (see Table 1).**
- **The captive breeding and release program ceased in 1984.**
- **Two Woodhens were taken from the island to an enclosure at Taronga Park Zoo in 1989, however they died in 1990 without breeding. These birds were not part of a designed captive breeding proposal.**

10.6 Community Activities

The Lord Howe Island community has taken an active interest in the protection and rehabilitation of the Woodhen since the first studies in the 1970s. This interest has included active involvement in conservation activities, including:

- **participation in research and monitoring activities;**

- monitoring and reporting Woodhen activities to the LHIB;
- maintaining suitable habitat for Woodhens on leases; and
- feeding Woodhens to assist their survival.

These efforts have contributed significantly to the re-establishment and survival of Woodhens in the settlement area and to rehabilitation of the species as a whole.

11 The Species' Ability to Recover

The Lord Howe Woodhen has proved to have a strong ability to recover, helped by the comparatively intact nature of the island's terrestrial ecosystems and a very effective, well funded and co-ordinated rehabilitation effort. The ability of the species to respond to effective management intervention is illustrated by the results of the rehabilitation program. Efforts to maintain the wild population has a high probability of success compared with many other threatened species; provided that limiting factors are identified and effectively managed.

12 Recovery Objectives and Performance Criteria

12.1 Objectives of the Recovery Plan

This recovery plan is designed to achieve five outcomes:

- to maintain and, where possible, increase the population level of wild Woodhens on Lord Howe Island;
- to establish a Lord Howe Island recovery team to co-ordinate the implementation and ongoing review of the recovery plan;
- to involve the Lord Howe Island community in monitoring, management, habitat rehabilitation and threat abatement;
- develop a plan for establishing and resourcing an on-island captive breeding facility in the event of a substantial reduction in Woodhen numbers; and
- to establish captive populations at a sites other than Lord Howe Island as insurance against a catastrophe affecting the wild population.

12.2 Risk Management Framework

This recovery plan has been formulated within a framework of spreading the risk of extinction among a number of "sub-populations". The distinction between sub-populations is made for management purposes, notwithstanding likely movements of individuals between them. These are described below.

The southern mountains (PPP) sub-populations represents the Lord Howe Woodhen in its "pristine" state, with population processes taking their natural course, within a context of reducing island-wide threats (e.g. control of feral pests, Masked Owls, weeds).

The settlement area sub-population is more intensively managed through the involvement of the local community, as insurance against serious, natural decline in the southern mountain population.

If total numbers of the Lord Howe Woodhen on Lord Howe Island drop substantially then a captive breeding facility will be established on Lord Howe Island to enable captive-bred releases to supplement the wild population. The population level which will trigger this process will be determined as part of the recovery actions.

An appropriately designed program to establish off-island captive populations at a suitable institution(s) will be implemented as insurance against catastrophe on Lord Howe Island.

12.3 Recovery Performance Criteria

Recovery performance criteria are that:

- regular monitoring shows that numbers of Woodhens are stable or increasing;
- a recovery team is established which co-ordinates the implementation and review of the recovery plan;

- The carrying capacity of the Island for Woodhens and the critical number of Woodhens to trigger an on-island captive breeding program will be determined through analysis of habitat availability and monitoring data within six months;
- a contingency plan for on-island captive breeding is developed within eighteen months and implemented in the event of a substantial reduction in Woodhen numbers;
- captive colonies established elsewhere as insurance against catastrophe (eg. disease, cyclone, predation) on Lord Howe Island; and
- successful establishment of broader community involvement in monitoring and management of threatening processes.

13 Recovery Actions

13.1 Maintaining and Increasing Current Population Levels

Protecting existing habitats from developments

Existing habitats occur in two distinct management areas: the Permanent Park Preserve and the settlement area.

The Permanent Park Preserve

The Woodhen habitats within the Permanent Park Preserve (PPP) zone specified in the Regional Environmental Plan are protected from the effects of developments that might occur on the island. However, two indirect impacts may come from if there was an increase in tourism and associated development on Lord Howe Island. Specifically, these would be increased human visitation to key habitat areas, causing increased disturbance and possible interference with the Woodhen's usual behaviour; and the requirement for the installation of additional visitor infrastructure in or near the Woodhen's key habitats. Access to Mt Gower is currently strictly limited to tours with small numbers guided by a local expert.

The installation of new paths, board-walks, lookouts and other visitor infrastructure has the potential to affect the habitat of the Woodhen. Conversely, such infrastructure, appropriately placed, also has the potential to protect areas of significant habitat. In this respect, it is essential that any such developments be appropriately assessed for their impact on the Woodhen and on the habitat factors that sustain it.

Action 1: Continue to implement strict procedures for managing the Permanent Park Preserve (PPP) and for minimising the impacts of infrastructure and tourism in the PPP on the Lord Howe Woodhen. Ensure that a full assessment of proposals is undertaken as required by the EP&A Act.

Settlement Area

In the settlement area, Woodhens are found on public land, as well as on perpetual and special leases. In such areas, Woodhen habitat protection derives from the development controls set out in the Lord Howe Island REP and the procedures under the EP&A Act and the TSC Act (see section 9.1).

Action 2: Ensure that the revised REP considers protection of the Woodhen and continue to implement planning controls in the settlement area to ensure protection of habitat for the Lord Howe Woodhen.

Controlling threatening processes

In the settlement area, Woodhens are subject to a range of threats related to human activities.

Predation by domestic Dogs

The *Companion Animals Act 1998* applies to Lord Howe Island and the LHIB controls the importation of Dogs to the Island under section 36 of the *Lord Howe Island (General) Regulation 1994*. Additionally the LHIB has adopted a Dog Control Policy.

This policy outlines the owner's requirements for control of their Dog and identifies areas on the Island designated as Dog exercise (off leash) areas and as Dog prohibited areas. Dogs imported to the Island are required to be de-sexed, only certain breeds are permitted (although some of these are hunting breeds) and Dogs must undergo obedience training.

Action 3: Enforce current Dog controls, and if required review current Dog controls, to ensure protection of the Woodhen.

Feral Pests

Feral Pigs and Cats are no longer present on Lord Howe Island. Feral Goats and Ship Rats continue to occur, although the former were subject to a control program in 1999 which reduced the known population to three.

Further programs are required to ensure that Goats are eradicated and that domestic Goats are not re-introduced into the wild.

Rats do not appear to be a serious problem for the Woodhen, although they adversely affect the Kentia Palm industry and a control program is currently underway. However there is potential for indirect impacts upon Woodhen the population via rat and mouse control programs. In July 2001 the LHIB commissioned a feasibility study for the eradication of Rats and Mice from the Lord Howe Island group. A risk assessment report is currently being prepared for the proposal. The potential impacts of any eradication actions upon the Woodhen population should form a key component of any assessment of the proposal.

Action 4: Eradicate feral Goats on Lord Howe Island and manage domestic Goats to prevent re-introduction to the wild.

Action 5: Liaise with Rodent Eradication Taskforce regarding potential impacts and mitigation measures relating to Woodhens.

Masked Owl

There is some evidence that the introduction of Masked Owls from Tasmania may be contributing significantly to Woodhen mortality. In view of this possibility, the eradication of the owl from the island may reduce the risk to the Woodhen and possibly contribute to an increase in the survival of individuals and, therefore, to an increase in the population size.

An assessment is required to determine if the owl's impact on the Woodhen is significant. Should it be determined that the impact is significant, then knowledge of the population level and ecology of the Masked Owl on the island will be required to develop an effective eradication strategy. The level of impact of owls on Woodhens is likely to increase significantly if the rodent eradication program is approved.

Action 6: Assess the impacts of the introduced Masked Owl on Woodhen population levels and develop appropriate management response.

Weeds

A number of weeds have the potential to alter the structural, floristic and ecological characteristics of Woodhen habitat in the southern mountains. These weed species are included in the priorities under the Lord Howe Island Noxious Weed Control Procedure (soon to be replaced by the Strategic Plan for weed control) (see Section 9.3).

Action 7: Ensure that implementation of the Lord Howe Island Weed Control Programs protects Woodhen habitat.

Quarantine

Quarantine procedures are in place on Lord Howe Island to prevent the introduction of fowl diseases. However, procedures for other bird imports are less rigorous (e.g. ducks, cage birds). It is appropriate to apply the same level of quarantine control to all imported birds where a risk of disease introduction is identified. This would reduce the risk of a disease affecting the Woodhen population on the island. A number of other quarantine issues affect the island and a quarantine plan is to be prepared by the LHIB.

Action 8: Ensure that the quarantine plan being prepared for the island addresses issues of avian disease and the introduction of plants or animals that may impact on the Lord Howe Woodhen.

Potential Competitors

The Buff-banded Rail and Purple Swamphen have increased in numbers on Lord Howe Island in the last five years (D. Hiscox, LHIB, pers. comm.). It is not known if this represents a significant risk to the Woodhen by increasing competition for food and space. The similar foraging habits of the Blackbird and Song Thrush to those of the Woodhen may also reduce food and space for the Woodhen. Controlling these species, particularly in the settlement area, may result in an increase in Woodhen numbers.

Action 9: Assess the potential impact on the Lord Howe Woodhen of food competition from Buff-banded Rails, Purple Swamphens, Common Blackbirds and Song Thrushes and, if necessary, formulate and implement a control strategy.

Monitoring

A thorough and consistent monitoring program for the Lord Howe Woodhen was undertaken between 1986 and 1998 (Harden 1986, 1987, 1990b, 1998; Harden and Robertshaw 1988, 1989). This monitoring program involved a count and banding in November, and again in March. The most accurate results come from sighting and counting individual banded birds and most (up to more than 90% in some years) of the population of Woodhens on the island to date have been individually colour-banded. This makes repeatable estimates of the total population feasible, providing the most accurate possible assessment of any changes in numbers and distribution on an annual basis.

Notwithstanding the success of the rehabilitation program the Woodhen remains one of the world's rarest birds. An effective monitoring program that measures population change is an essential foundation upon which to base the recovery plan. It is essential to alert managers to increased risks to the Woodhen's survival and to enable the performance of management to be evaluated accurately.

The LHIB currently undertakes the twice-yearly monitoring program. A computer database has been developed by NPWS to manage the data derived from the monitoring program. The LHIB will ultimately be responsible for the management of the database. The LHIB staff will require training and support in the management of the Lord Howe Woodhen database.

Action 10: Continue the Woodhen monitoring program using the methodology developed in 1999. Ensure that LHIB staff are trained and supported in the management of the Lord Howe Woodhen database.

Action 11: The carrying capacity of the Island for Woodhens and the critical number of Woodhens to trigger an on-island captive breeding program will be determined through analysis of habitat availability and monitoring data within six months of approval of the recovery plan.

Establishing the Recovery Team

To date; implementation of management actions for the Lord Howe Woodhen has been undertaken by the LHIB, with input from the NPWS. The establishment of a recovery team would assist the Board in consolidating recovery actions and resources for a number of Lord Howe Island species. A significant role of the recovery team would be the storage, analysis and reporting of the monitoring results to measure the performance of management actions. The recovery team would also co-ordinate the implementation of contingency plans if required.

The team should review the recovery plan every five years.

Action 12: Establish a recovery team under the auspices of the National Parks and Wildlife Service and the LHIB to co-ordinate the implementation and funding of species recovery plans.

Community Co-operation Program

The Lord Howe Woodhen occurs in significant numbers on leasehold land in the settlement area. A number of leaseholders have been feeding Woodhens, which has contributed to the increase in numbers in the area. Many of the Woodhens that now occur in the settlement area are found away from their preferred habitat and on calcareous geology. Their persistence in such apparently unsuitable habitats is in part, due to the food provided by residents.

A risk management framework for the Lord Howe Woodhen was outlined in Section 11.2. A significant plank of this framework was the more intensive management of the Woodhen population in the settlement area. It is proposed to maintain this through the establishment of a community-based program of monitoring, habitat protection and supplementary feeding. The activities proposed for this program are described below.

Community Based Monitoring

Residents who currently take an interest in their local Woodhens are able to report regular sightings and movements of individuals, as well as the outcome of breeding attempts and the results of supplementary feeding. To facilitate continuation of community input to the management of Woodhens, a community information brochure should be prepared. The brochure should describe how the monitoring surveys are undertaken, the colour banding process for identification of individual birds and summarise the findings of the surveys. The brochure should also cover issues of Woodhen management, habitat enhancement and protection and appropriate supplementary feeding strategies.

Action 13: Prepare a community information brochure on Woodhen management.

Habitat Protection and Supplementary Feeding Program

A significant number of Woodhens live in artificial garden habitats in the settlement area, as well as remnant indigenous habitats on leases. The planning provisions covering leases provide significant mechanisms for protecting Woodhen habitat. However, the positive involvement of the island's leaseholders in habitat protection is the most effective way of assuring the future of such habitat in the settlement area. This component of the community co-operation program is designed to facilitate this involvement.

The successful ingredients of such a program would include but not be limited to:

- **a positive relationship between leaseholders with habitat on their leases and the LHIB and Recovery Team;**
- **willingness of the leaseholder to protect and manage Woodhen habitat on their lease;**
- **provision of information on how to protect, manage and/or enhance habitat for the Woodhen.**

The leaseholder needs a personal contact, most appropriately in the LHIB, with whom to discuss and develop individual approaches, and from whom to seek information.

In addition, such a program could be pro-active in identifying leaseholders whose leases support areas of potential habitat in which Woodhens may survive, given additional protection and/or supplementary feeding. Supplementary feeding by local residents of wild Lord Howe Woodhens has contributed significantly to the rehabilitation of the species. The settlement is likely to be supporting artificially high populations levels through community based supplementary feeding. Caution will be required in interpreting a population decline following any cessation of food provision. Such a decline may meet the criteria for implementing the on-island captive breeding; however, in fact, the wild population may be stable and at carrying capacity.

A survey of the community based supplementary feeding program for Woodhens in the settlement area should be undertaken to establish how many people are feeding Woodhens, how frequently, and what quantities and types of food are being provided. Guidelines should be prepared for the community on the most appropriate feed types for the Woodhen. Any formal supplementary feeding program should be managed by the LHIB and have an annual budgetary allocation.

Action 14: Formulate and implement guidelines for the protection, management and enhancement of Woodhen habitat on leasehold land. Undertake a study to determine the most appropriate supplementary food types and assess the effectiveness of a community based supplementary feeding program for Woodhen on leasehold land.

Establishing a Captive Population

The Woodhen occurs only on Lord Howe Island. Such a small distribution, combined with low numbers, makes it vulnerable to catastrophic extinction. The precise mechanism of catastrophic extinction is difficult to anticipate. Catastrophic extinction could occur due to:

- cyclone;
- extended drought;
- fire;
- introduction of an avian disease;
- introduction of an exotic predator;
- introduction of a particularly invasive weed;
- reduced reproductive ability relating to low genetic diversity of population.

As insurance against these or other eventualities, a captive colony outside Lord Howe Island, for example on mainland Australia, is required.

The Woodhen is listed as a category one species by the Australian Species Management Program (C. Hibbard, Taronga Park Zoo, pers. comm.). This means that participating zoos around Australia and New Zealand have identified it as a priority for captive management. Zoos that participate in the Australian Species Management Program manage captive populations of endangered indigenous fauna. The Australian Regional Association of Zoological Parks and Aquaria (ARAZPA) Taxon Advisory Group Convenor - Australian Non-passerines has provided the following recommended approach for establishing a captive population as insurance against catastrophe (Hibbard pers comm, August 2001). This includes actions such as:

- **Appoint a regional captive management coordinator within the Australian Regional Association of Zoological Parks and Aquaria (ARAZPA) to coordinate the captive management of the species.**
- **Develop a draft Husbandry Manual for the species based on review of all available literature on natural history of the species, previous management and husbandry of the species in captivity and related material for other *Gallirallus* if further information is required.**
- **Develop a Population Management Plan that outlines the steps needed to meet the objectives of the captive management program.**
- **Establish a complex of approximately 12 purpose built aviaries at a major zoological institution on the Australian mainland. This would act as the primary breeding institution for the establishment phase of the program.**
- **Establish a protocol for the recruitment of suitable founders from Lord Howe Island and their establishment in the captive facility. It is proposed that eight to ten birds form the initial base for the establishment of the captive population.**

- Following the initial establishment of the mainland Australian population, specimens would be provided to other statutory zoos within Australia for expansion of the captive population. This would be undertaken under advice from the Species Coordinator and in consultation with the Recovery Team.
- Additional specimens may need to be recruited from Lord Howe Island in order to maintain the genetic integrity of the captive population. It is estimated that this would only require a few individuals every five or so years.
- Once fully established the captive population would remain highly managed to ensure its genetic and demographic health, however, the specimens would need to be integrated into the general collection facilities as it would be financially not realistic to hold the birds in dedicated off-exhibit facilities on an indefinite basis.
- At no stage would the birds be considered for trade, sale or export. All major decisions involving the birds would be coordinated through the Recovery Team. The birds would remain the property of the Government, not the zoological park at which they may be residing.
- Initial establishment costs will be high as the project has limited capacity to be phased in over time. As the program expands to include secondary institutions it would be expected that they use existing facilities to house the birds, otherwise the overall cost would become prohibitive.

Cost estimates are:

Development of husbandry protocols and Population Management Plan	\$5000	
Establishment of purpose built facilities at primary institution (12 aviaries @ \$6000ea)		\$72000
Recruitment of founder specimens from LH Island (transport, quarantine etc)	\$5000	
Staffing costs for dedicated staff member to implement program (half staff member for two years)		\$30000
	TOTAL	\$112000

Some expenses relating to the establishment of this project may be supported by the institution initiating this project, however a funding source for a significant proportion of the funds will need to be secured.

Individuals from this population should only be re-introduced to Lord Howe Island in the event of extinction in the wild, as the risk of introducing disease is too high.

Action 15: Establish and manage captive populations of the Lord Howe Woodhen in appropriate off-island institutions, consistent with the protocols of the Australian Species Management Program.

The risk management framework described in Section 11.2 identified on-island captive breeding as a contingency in the event that the wild Woodhen population fell substantially. Before such an eventuality, it would be necessary to have already identified and costed options for the establishment and staffing of a facility. This facility may be required if the rodent eradication program proceeds. To this end, the recovery team should ensure that, early in the implementation of the current plan, these options have been identified.

Action 16: Develop a plan within eighteen months for establishing and resourcing an on-island captive breeding facility, for implementation in the event of a substantial reduction in Woodhen numbers below a population size which will be identified as part of Action 11 or if the rodent eradication program is approved.

14 Implementation

The following table allocates responsibility for the implementation of recovery actions specified in this plan to relevant government agencies for the five year period covered by the plan.

Table 4: Estimated costs of implementing the actions identified in the Lord Howe Woodhen recovery plan are provided below.

Action No:	Action Title	Priority	Estimated \$ Cost/yr					Total Cost	Responsible party for actions in the plan	In-Kind	Cash
			Year 1	Year 2	Year 3	Year 4	Year 5				
1*	Permanent Park Preserve managed to protect Woodhen habitat	1							LHIB		
2*	Ensure settlement planning controls protect Woodhen habitat	1							LHIB		
3*	Dog control	2							LHIB		
4	Goat eradication	3			3500			3500	LHIB	3500	
5*	Liaise with Rodent Eradication Taskforce	1							LHIB NPWS		
6	Introduced Masked Owl impact assessment	2	10000	10000				20000	LHIB NPWS		20000
7*	Ensure Noxious Weed Control Procedure protects habitat for Woodhen	3							LHIB		
8	Prepare Quarantine Plan	2				21000		21000	LHIB NPWS	21000	

9	Assess impacts of avian competitors; develop control strategy	2			10000	1000 0		20000	LHIB NPWS		20000
10	Woodhen population monitoring	1	45000	45000	45000	4500 0	4500 0	225000	LHIB NPWS		225000
11	Determine Woodhen carrying capacity and critical number of Woodhens	1	5000					5000	LHIB NPWS		5000
12	Establish the Recovery Team	1	10000	10000	10000	1000 0	1000 0	50000	NPWS		50000
13	Prepare Community information brochure	2	5000					5000	LHIB NPWS		5000
14	Supplementary feeding program. Habitat protection and enhancement guidelines for the settlement	2	10000					10000	LHIB NPWS		10000
15	Establish off-island captive breeding population	2	5000	92000	15000			112000	NPWS, LHIB		112000
16	Develop plan for on-island captive breeding facility	1	5000					5000	LHIB, NPWS		5000
Total			95000	157000	83500	8600 0	5500 0	476500		24500	452000

Priority ratings are as per Commonwealth recovery plan guidelines: 1- Action critical to prevent extinction, 2-action prevents negative impact short of extinction, 3-other actions.

* These actions are to be funded by ongoing recurrent funding.

15 Preparation details

15.1 Date of last amendment

10 July 2002

15.2 Review date

July 2007.

16 References

- Baillie, J. and Groombridge, B. (1996). *IUCN Red List of Threatened Animals*. IUCN: Gland.
- Bester, A., Priddel, D., Klomp, N., Carlile, N. (in prep). Breeding success and mortality of the Providence Petrel *Pterodroma solandri* and implications for management.
- Brook, B W; Leong, L; Harden, R and Frankham, R. (1996). How secure is the Lord Howe Island Woodhen? A population viability analysis using VORTEX. *Pacific Conservation Biology* 3:125-133.
- Fullagar, P J. (1985). The Lord Howe Island Woodhen Project. *Avicult. Mag.* 91:15-30.
- Fullagar, P J and Disney, H J de S. (1975). The Birds of Lord Howe Island: A report on the rare and endangered species. *XII Bulletin of the International Council for Bird Preservation* :187-202.
- Fuller, E. (2002). Foreword – Extinct Birds in Handbook of the Birds of the World, Volume 7 Jacamars to Woodpeckers; Edited by del Hoyo, J., Elliot, A. and Sargatal, J.; Pp. 10-68; Lynx Editions, Barcelona.
- Harden, R. (1986). 'Lord Howe Island Woodhen census 1985.' Unpubl. Report. Scientific Services Section, National Parks and Wildlife Service.
- Harden, R. (1987). 'Lord Howe Island Woodhen census 1986.' Unpubl. Report. Scientific Services Section, National Parks and Wildlife Service.
- Harden R. (1990a). 'The decline in Woodhen numbers on Little Slope.' Unpubl. Report. Environmental Survey and Research Branch, National Parks and Wildlife Service.
- Harden, R. (1990b). 'Lord Howe Island Woodhen census. 1989 Interim report.' Unpubl. Report. National Parks and Wildlife Service.
- Harden, R. (1998). 'Methods used in the census of the Lord Howe Island Woodhen population from 1985 to 1998.' Unpubl. Report. Biodiversity survey and research division, National Parks and Wildlife Service.
- Harden, R. and Robertshaw J. (1988). 'Lord Howe Island Woodhen census 1987.' Unpubl. Report. Environmental Survey and Research Branch, National Parks and Wildlife Service.
- Harden, R. and Robertshaw, J. (1989). 'Lord Howe Island Woodhen census 1988.' Unpubl. Report. Environmental Survey and Research Branch, National Parks and Wildlife Service.
- Hindwood, K. A. (1940). The birds of Lord Howe Island. *Emu* 40:1-86.
- Knight, B. (1989). Report on Lord Howe Island observations. *Austr. Birds* 22:41.
- Lourie-Fraser, G. (1985). Successful Woodhen project – a brief overview. *Austr. Aviculture* 39: 255-271.
- Marchant, S. and Higgins, P. J. (Eds) (1993). 'Handbook of Australian, New Zealand and Antarctic Birds. Volume 2, Raptors to Lapwings.' Oxford University Press, Melbourne.
- Miller, B. and Kingston, T. (1980). Lord Howe Island Woodhen. *Parks and Wildl.* Aug. 1980:17-26.
- Miller, B. and Mullette, K. J. (1985). Rehabilitation of an endangered Australian bird: Lord Howe Woodhen *Tricholimnas sylvestris*. *Biological Conserv.* 34:55-95.
- Pickard, J. (1983). Vegetation of Lord Howe Island. *Cunninghamia* 1(2) 133-266.
- Recher, H. F. and Clark, S. S. (1974). A biological survey of Lord Howe Island with recommendations for the conservation of the island's wildlife. *Biological Conservation* 6(4):263-273
- Sclater (1869). Proceedings of Zoological Society London. 1869:472.
- Taylor, P.B. (1996). Family Rallidae (Rails, Gallinules and Coots) in Handbook of the Birds of the World, Volume 3 Hoatzin to Auks; Edited by del Hoyo, J., Elliot, A. and Sargatal, J.; Pp. 108-209; Lynx Editions, Barcelona.



ADDENDUM

March 2003

To meet the statutory requirements of the Environment Protection and Biodiversity Conservation Act 1999, the Recovery Plan for the Lord Howe Woodhen (*Gallirallus sylvestris*) is amended to include the following:

Indigenous Consultation

There are no indigenous inhabitants either historically or current for the Lord Howe Island.

Confirmation to place final plan and map on the web

Confirmation is given that the plan and map as per electronic copy does not contain any confidential information and can be placed on the web.

NSW NPWS



NSW
NATIONAL
PARKS AND
WILDLIFE
SERVICE

NSW National Parks and Wildlife Service
43 Bridge Street (PO Box 1967)
Hurstville NSW 2220
Phone: 02 9585 6444
Website: www.npws.nsw.gov.au