NATIONAL RECOVERY PLAN FOR THE ABBOTT'S BOOBY Papasula abbotti



Department of the Environment and Heritage



Based on a draft plan prepared by Penny Olsen, for the Australian Government Department of the Environment and Heritage

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Disclaimer:

This recovery plan sets out the actions necessary to stop the decline of, and support the recovery of, the listed threatened species. The Australian Government is committed to acting in accordance with the plan and to implementing the plan as it applies to Commonwealth areas.

The plan has been developed with the involvement and cooperation of a broad range of stakeholders, but the making of this plan does not necessarily indicate the commitment of individual stakeholders to undertaking any specific actions. The attainment of objectives and the provision of funds may be subject to budgetary and other constraints affecting the parties involved. Proposed actions may be subject to modification over the life of the plan due to changes in knowledge.

Cover illustration by Nicholas Day from a photograph by Bryan Nelson (courtesy of the Barry Baker/Katrina Jensz art collection).

Copies available from: http://www.deh.gov.au/biodiversity/threatened/recovery/list-common.html

Species information

Species details

Abbott's booby *Papasula abbotti* is a large, long-lived seabird, with the only known extant nesting colony on Christmas Island. Background information on the biology, population status and threats to the Abbott's Booby can be found at: <u>http://www.deh.gov.au/biodiversity/threatened/recovery/list-common.html</u>.

Conservation status

Abbott's booby is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is also a listed Migratory Species and Marine Species. The International Union for Conservation of Nature and Natural Resources (Hilton-Taylor 2000; IUCN 2001) and Action Plan for Australian Birds 2000 (Garnett and Crowley 2000) list Abbott's booby as Critically Endangered.

Population estimates

There are no estimates before 1967, but it is known the global range had been severely reduced by the early 1900s. By 1967, the breeding population was limited to Christmas Island and estimated at 2300-3000 pairs (Nelson 1971). Mining in the northwest sector of the island commenced in 1970, consequently scores of chicks, adults and their nest trees were destroyed by clearing (Powell in Yorkston and Green 1997). In 1979/80 and 1982, Powell and Tranter (1981) resurveyed the population and, although they did not estimate total numbers, found that the distribution of nests had not changed significantly from 1967, despite large areas of further clearance. The total breeding population in 1983 was estimated at 1900 pairs (Reville *et al.* 1990a), after an estimated loss of 400 breeding pairs since mining commenced in 1970. Mining ceased in 1987. In 1991, the most recent survey, the population was estimated at 2500 pairs (Yorkston and Green 1997). The difference between the two most recent published estimates was due to discovery of further nesting areas on the northern side of the island, and also among the southern and southwestern areas of distribution, but was not thought to indicate an increase in population size (Yorkston and Green 1997). Preliminary results from a 2002 helicopter survey suggest that the population is not showing signs of change.

Distribution

Abbott's booby formerly bred on many islands in the Indian and Pacific Oceans (Bourne 1976; Stoddart 1981, 1984; Steadman *et al.* 1988). It is now confined to Christmas Island, Indian Ocean, at 10°25'S and 105°40'E. When breeding, it is thought to forage over open ocean northeast of Christmas Island, to Sumatra, Java, Tayandu, Kai and Aru Islands and Irian Jaya (Marchant and Higgins 1990).

Since the early 1900s Abbott's booby has only been known to breed on Christmas Island, where it was first collected by C.W. Andrews of the British Museum in 1897 (Stokes 1988). The species may still occasionally range as far as the Chagos Archipelago, some 4000km west of Christmas Island (Hirons *et al.* 1976), where it probably formerly bred. Recent sightings in the Banda Sea south of the Moluccas (van Balen 1996) may indicate a more extensive foraging range than previously supposed. These latter sightings have led to speculation that a breeding population exists in that region (Cadée 1987; van Balen 1996), however, as van Balen notes, the booby is likely to routinely travel long distances from its breeding grounds. A recent specimen, found in a weakened condition on the Australian mainland near Broome, is thought to have been a vagrant.

On Christmas Island most nests are situated on the central and western areas, in the tall plateau forest, but they are also found along the north coast, in the upper terrace forest. Nest sites are largely restricted to areas above 150m, mostly on the sides of northwest facing slopes (Nelson 1978; Stokes 1988).

Habitat critical to the survival of the species

The sole breeding habitat, tall rainforest mostly above 150m elevation in the western, central and northern portions of the island, is critical to the survival of Abbott's booby. Nearly all of this habitat is within Christmas Island National Park.

Abbott's booby nests in tall, emergent rainforest trees in the deeper plateau and terrace soils of the western, central and northern portions of Christmas Island, mostly on the central plateau, 160-260m asl. Most nest trees are associated with uneven terrain created by gullies, hill-sides or cliffs.

Within suitable habitat, the location of nest sites is determined by the topography and nature of the canopy, resulting in a patchy distribution. Most nest trees are located in uneven canopy containing emergent trees, and nest sites are densest along crests of gullies and west-facing slopes (Nelson and Powell 1986). A variety of tree species is used, most often open-crowned *Syzygium nervosum* and *Planchonella nitida*, and *Tristiropsis acutangula* and *Celtis timorensis* where they become emergent (Nelson and Powell 1986; Reville *et al.* 1990b; Yorkston and Green 1992).

Abbott's booby prefers nest sites on the lee side of slopes and gullies, with a clear area below and immediately downwind to facilitate take-off and landing. Southeast trade winds prevail between April and November and thus emergent trees that can be approached from the northwest are frequently used.

The at-sea distribution of Abbott's booby is poorly known, and may contain habitat that is critical to the species' future survival. Upwellings south of Java are thought to be important source of food for breeding boobies, but this is yet to be substantiated. To identify critical marine habitat, identification of the foraging range of Abbott's booby is desirable.

Mapping of habitat critical to the survival of the species

The distribution of Abbott's booby breeding sites in 1991 was mapped by Yorkston and Green (1997)(Fig. 1). Most sites were mapped accurately, according to the island grid surveyed for phosphate mining. The accuracy of some sites mapped earlier and a few areas away from the grid could be improved by remapping them according to a few points established by Global Positioning System. However, given that most of the breeding habitat is in the National Park, and hence already protected, accurate mapping of habitat critical to the species within the park should be a low priority action.

Although most Abbott's booby habitat is within the Park, its limited extent makes long-term protection of quality habitat outside the Park a desirable goal. Recommendations of the draft *Conservation Management Plan for Terrestrial Wildlife on Christmas Island outside the National Park* (Dexter 2002) include assessment of the ecological quality of primary rainforest outside the Park and mapping of habitat that fits the criteria of habitat critical for endangered species.

A more recent helicopter survey identified a significant cluster of nesting Abbott's boobies outside the Park. Given this and the proposal by Phosphate Resources Ltd (PRL) to undertake surface mining, transport and off-site processing of phosphate at nine sites (EPBC 2001/487), which the Minister for the Environment and Heritage has declared must be assessed, mapping of important Abbott's booby habitat on Crown Land and other jurisdictions outside the Park would be invaluable.

Important population

The only known extant breeding population of Abbott's booby is on Christmas Island, Indian Ocean. Conservation of this population is therefore essential to the survival of the species.

Additional Information

International obligations

Abbott's booby is listed under the Japan/Australia Migratory Bird Agreement (1974), as a migratory species in need of protection, and CITES Appendix I (1975), as a species threatened with extinction for which international trade in specimens is permitted only in exceptional circumstances.

Affected interests, Social and economic impacts

Tourism

Actions associated with recovery of Abbott's booby are unlikely to impact negatively on tourism. The booby is a charismatic species whose plight is likely to enhance the attraction of the island to tourists and raise awareness of the special conservation problems faced on islands. It may be possible to involve eco-tourists in rehabilitation of mining fields and weed control. The park is readily accessible to tourists and locals and this will not be compromised by the recommendations in this recovery plan. Further, the actions recommended in this plan will enhance the park for visitors.



Figure 1. Known Abbott's booby nest sites (mostly mapped 1991; Yorkston and Green 1997) in relation to the distribution of the booby's rainforest habitat

Mining

Mining was once the major source of employment on the island but wholesale mining ceased in 1987. The Mining Lease between the Commonwealth of Australia and Phosphate Resources Limited, signed in 1997, came into effect in February 1998 for a period of twenty-one years. The lease covers the re-mining of old stockpiles and in-situ mining of previously mined areas. The lease includes areas surrounded by, but not within, the National Park. The mining schedule was suspended in June 1999 pending completion of negotiations for the Asia Pacific Space Centre. The mining schedule was reinstated in principle in July 2002 and is currently being renegotiated as part of a limited review of the Mining Lease.

Phosphate mining in areas of primary rainforest that are either current or potential nesting sites (see 'Habitat critical to survival' above), or forested areas adjacent to nesting sites (including areas up to 300m downwind of nesting sites) is incompatible with the recovery of Abbott's Booby as clearing of such rainforest reduces the available nesting habitat. In addition mining impacts on nesting (particularly through decreasing nesting success) at sites that are directly adjacent to lease areas. Recovery of Abbott's booby is not only incompatible with phosphate mining in these locations, but also in those areas:

- immediately adjacent to previously unmined primary rainforest that is a current or potential nesting site; and
- previously mined areas in the process of or flagged for forest regeneration specifically for the purpose of Abbott's Booby habitat restoration.

It is recommended that previous conditions, and schedule priorities identified in Table 2 of the Christmas Island National Park Management Plan (Environment Australia 2002), be reinstated but that greater consideration be given to retaining stockpiles where they support significant regrowth, which could limit the lease further.

Christmas Island community

Actions associated with recovery of Abbott's booby are unlikely to impact negatively on the resident human community on Christmas Island and may provide a source of interest, pride and involvement in nature conservation matters. The Parks Australia North Christmas Island Education and Interpretation Plan is a useful framework by which to promote community ownership, support and involvement. Interested members of the community (including the school) could be involved in implementing the plan by assisting in monitoring and forest rehabilitation programs.

The small community of Christmas Island is associated closely with all industry and development activities as a source of employment, income, and social interaction. Active consultation and education during the development and implementation of all Recovery Plans is essential to ensure community views are considered. Under the EPBC Act a 3 month public consultation process is required before plans are adopted or made. It is important to note that Christmas Island has a strong multicultural community and consideration of more proactive methods of consultation, such as meetings with community groups, should be given.

Immigration Reception and Processing Centre

Several actions associated with recovery of Abbott's booby, will have implications for the establishment and servicing of the *Immigration Reception and Processing Centre* on Christmas Island. Collaboration and consultation in relation to the construction and operation of the Centre is essential to full implementation of this recovery plan, including the rehabilitation and monitoring aspects.

Asia Pacific Space Centre

In its currently conceived form the Asia Pacific Space Centre is unlikely to be limited by actions to recover Abbott's booby. The actions contained in this recovery plan are unlikely to impact negatively on activities associated with APSC, a potential source of employment and improved transport facilities on the island.

Other development

The EPBC Act already provides a regulatory framework for the protection of rainforest on Christmas Island, and one element of this is assessing potential impacts of proposed developments on listed threatened species. These provisions have the potential to impact on economic activity. This arises from the listing of the species under the EPBC Act invoking a range of protective provisions

This arises from the listing of the species under the EPBC Act invoking a range of protective provisions and offences where a population is to be affected. The magnitude of any potential constraint is unknown,

as it will vary with the location, size and extent of the activity, proposed or current. However, the recovery plan will aid in determining what could be significant impacts on the Abbott's Booby (through defining and mapping habitat critical to survival, monitoring status and distribution, assessing success of rehabilitation, and developing a management plan outside the national park).

Benefits to other species

Minimising threats to Abbott's booby may benefit other species that share the same breeding and/or foraging habitat. Other seabird species which breed on Christmas Island, such as the Red-footed Booby *Sula sula*, Brown Booby *S. leucogaster*, White-tailed Tropicbird *Phaethon lepturus*, Great Frigatebird *Fregata minor* and endangered Christmas Frigatebird *F. andrewsi* are affected by some of the factors that threaten Abbott's booby. Similarly, rainforest-dwelling land-birds, mammals and reptiles, such as the endangered Christmas Island Hawk-Owl *Ninox natalis*, Murray's Pipistrelle *Pipistrellus murrayi* and Christmas Island Gecko *Lepidodactylus listeri*, will benefit from actions that restore and protect the rainforest. Implementation of this Recovery Plan is unlikely to have any negative impacts on other native species or ecological communities.

Threats

Relevant issues identified for each threat are listed below (based on an analysis of all available information on threats to Abbott's booby).

Modification and destruction of breeding habitat

- Clearance of Abbott's booby breeding habitat has essentially ceased, and almost all habitat is within Christmas Island National Park.
- Wind turbulence is exacerbated downwind from clearings, with negative impacts on breeding boobies and their habitat.
- Rehabilitation of old mining fields has proceeded slowly and there are still a number of sites adjacent to critical breeding sites requiring urgent attention.
- One of these mining fields, ranked fourth highest in order of priority for rehabilitation, has been taken over as the site of the Immigration Reception and Processing Centre.
- Exotic weeds are in many old mine sites and may pose a risk to adjacent rainforest and the success of rehabilitation. Implementing the Weed Management Strategy will address this.
- It is not known how many years it will take before rehabilitation will have an effect on the breeding success of Abbott's booby.
- It is not known whether current rehabilitation practices are benefiting Abbott's booby, and which procedures are the most effective; feedback to effect best practice rehabilitation at each site is essential (Christmas Island National Park Management Plan Prescription 7.2h).
- Development of a wind turbulence model would provide guidance for rehabilitation of mining fields and may provide a means to assess the effectiveness of mining field rehabilitation.
- Rapid implementation of the CIRRP focussing on the priority sites detailed in Table 2 of the Christmas Island National Park Management Plan (Environment Australia 2002) will provide significant long-term benefits to the recovery of Abbott's booby.
- Under the new administrative arrangements for the phosphate conservation levy, it is important that the legislative requirements of the lease are met and priorities for the CIRRP remain focussed on Abbott's booby.
- The mining schedule is currently being renegotiated. PAN should be involved in these discussions and the new agreement should not compromise the ability of the CIRRP revegetation schedule to meet the legislative requirements of the Abbott's Booby Recovery Plan or Christmas Island National Park Management Plan (Prescription 7.3g).

Yellow crazy ant

- Potentially, Yellow crazy ants are the most serious threat facing Abbott's booby.
- Whilst a direct impact on breeding adults, eggs or nestlings has not been detected, the effect on
 ecosystem function is likely to lead to degradation and loss of essential breeding habitat.

• It is essential the control program for crazy ants be continued as a high priority action, with the proviso that avoidance of accidental poisoning of Abbott's booby, and minimisation of disturbance by bait distribution methods, receive the highest priority within that action.

Immigration Reception and Processing Centre

- The siting of the Immigration Reception and Processing Centre is adjacent to prime Abbott's booby habitat and in an area with a high priority for rehabilitation.
- Construction of the facility and road upgrade may remove nesting trees and add to the wind turbulence, caused by man-made forest openings, that causes nesting failure, although most of the buildings will be single story, which should help to minimise wind turbulence.
- Every effort should be made to identify and avoid disturbance of Abbott's Booby nests sites during any future road widening and to minimise road width, although it is noted that the IRPC design does not impact outside the existing road reserve.
- At the facility itself, every effort should be made to carry out construction as far as possible from local nest sites, to minimise tree removal, and to lessen wind turbulence at nest sites downwind by careful design and placement of the centre's structures. Construction contracts for the IRPC include the mandatory development of a site specific Environmental Management Plan and the briefing of all construction personnel prior to their commencement on site.
- Wherever possible rehabilitation of the unused parts of the co-opted mining fields should proceed. The Department of Finance and Administration has already undertaken to rehabilitate the area surrounding the Centre in accordance with best practice and in consultation with Parks Australia.

Asia Pacific Space Centre

- Abbott's booby nesting sites are located at least 5 km from the APSC site on South Point. As a result, impacts from launching satellites are less likely than for species which nest on South Point.
- The impact of satellite launches and associated noise levels are untested for Abbott's booby.
- There may be differential affects of launches dependent on their timing (time of day, stage of breeding).
- Monitoring the impact of satellite launches to detect both short and long-term effects on Abbott's booby is essential. To assist in interpreting any effects, collection of data prior to launches will be necessary to serve as a baseline against which to assess long-term impacts.
- If operation of the APSC does impact on vital Abbott's booby population recovery rates, launches should be halted until the possible causes are understood.

Inadequate knowledge of population trends

- Estimating the size of the Abbott's booby population is extremely difficult and has been resource intensive when attempted.
- Annual monitoring programs were discontinued in 1994 and have not been reinstated.
- A revised monitoring program should be designed and implemented as a high priority to guide future management. This should focus on measuring population change rather than total size. Parameters that should be measured include the number of breeding pairs at sites both affected and not-affected by mining, and the breeding success or otherwise of pairs at these sites.
- Sampling design for the revised monitoring program should allow for assessment of: overall population trends and breeding success; the impact of wind turbulence and success of rehabilitation efforts; and the impact of IRPC and APSC.
- Statistical advice should be sought in the development of monitoring methodology.
- Historical Abbott's booby monitoring data should be upgraded and keyed for future reference.

Global warming and other impacts

- Loss of climatic habitat, including an increase in sea surface temperature, caused by anthropogenic emissions of greenhouse gases is a potential threat to Abbott's booby and many other species. Management requires both domestic and international action, and is beyond this recovery plan.
- Abbott's booby are threatened by stochastic events such as storms and cyclones, which are atypical
 of the region, but there is no practical or feasible way to manage this process.

- Abbott's booby may face threats in the marine environment, including those associated with global warming, but poor knowledge of the species' pelagic distribution limits identification of these threats and development of management responses.
- Interaction between Abbott's boobies and longline fishing gear has not been recorded. However, the
 potential for this to occur should not be discounted without observer studies of the development of
 any new fisheries in the waters adjacent to Christmas Island.

Areas under threat

The threats identified as directly impacting on Abbott's booby (modification of breeding habitat, crazy ants) affect the Christmas Island National Park, which is described in Environment Australia (2002). The impact of global warming and other threats in the marine environment will affect the foraging areas of Abbott's booby, which have yet to be identified.

Populations under threat

The Christmas Island population is the only extant population.

Objectives, performance criteria and actions

Overall objective and criteria

In the longer time frame it may be possible to downlist this species, but by definition, it will at best be classed as Vulnerable (Criterion D - a population that is characterised by an acute restriction in its area of occupancy, typically less than 100 km² or in less than 5 locations). Human-induced threats, particularly the destruction of breeding habitat, have long been implicated in the reduction of Abbott's booby to one breeding population, which has also been reduced in numbers. Alleviation of these threats is the only means to secure the recovery of the species. This concept is reflected in the overall objective.

Overall Objective and Criteria

To minimise or eliminate human induced threats to long-term stability or increase in the Abbott's booby population in the wild

Attainment of this objective will be achieved when:

- all human induced threats to the Abbott's booby population have been minimised or eliminated; and
- the breeding population ceases to decline, and stabilises or exhibits a sustained increase in size

Specific recovery objectives and criteria

The specific objectives of this recovery plan are achievable within the next five years, and are ordered according to subject matter more than importance:

- (1) Protect, restore and enhance the breeding habitat
- (2) Manage any threats posed by the crazy ant to ecosystem function in areas of infestation
- (3) Ensure activities associated with construction and operation of Immigration Reception and Processing Centre do not impede recovery
- (4) Ensure activities associated with the construction and operation of the Asia Pacific Space Centre do not impede recovery
- (5) Identify feeding habitat of adults and juveniles and develop appropriate management responses to any threats identified
- (6) Establish a population monitoring program
- (7) Develop a wind turbulence model to guide and evaluate the CIRRP in restoration of breeding habitat
- (8) Monitor and assess the likely impact of developing fisheries in the Christmas Island
- (9) Assess and revise the Recovery Plan as necessary

Population estimates indicate that the population may be stable and demographic models indicate that recruitment may be adequate to maintain the current population. These estimates are in need of

refinement and confirmation. Nevertheless, on present evidence, maximisation of the area and quality of breeding habitat is the most pressing issue for the conservation of Abbott's booby. Maintenance of the integrity of existing habitat and restoration of forest structure to major mined areas within the National Park are vital to the recovery of the species.

The actions listed below are grouped according to subject matter and not according to order of significance or impact.

Recovery actions and performance criteria

| Actio | n Description | Performance Criteria | | | | |
|---|---|--|--|--|--|--|
| Specific objective 1- Protect, restore and enhance the breeding habitat of Abbott's booby | | | | | | |
| 1.1 | Manage the removal/mining of phosphate stockpiles in and adjacent to the Park in accordance with the mining lease and <i>Third Christmas Island National Park Management Plan</i> , to ensure this activity does not have a significant environmental impact on breeding habitat. Agency responsible: PAN | Removal of stockpiles proceeds in accordance with the CINPMP.Breeding habitat is not compromised by removal of stockpiles. | | | | |
| 1.2 | Implement the Christmas Island Rainforest Rehabilitation Program, giving priorities for to mining fields detailed in Table 2 of the <i>Third Christmas Island National Park Management</i> <i>Plan</i> (Page 94, Environment Australia 2002) with consideration of land tenure and long term success of the rehabilitation. Agency responsible: PAN; DOTARS | Mining fields rehabilitated in accordance with priorities in CINPMP. Extent to which mining fields are rehabilitated. Breeding success and survival of Abbott's booby nesting adjacent to mining fields increased to levels observed in good (non-turbulent) habitat. | | | | |
| 1.3 | Continue to implement the Christmas Island weed management strategy. Agency responsible: PAN | • Extent to which the actions and priorities of the CI weed management are implemented. | | | | |
| 1.4 | Accurately map critical breeding habitat inside and outside the Park. The wind turbulence model (Action 7) will help to determine and assess potential breeding habitat. Agency responsible: PAN | • Habitat critical to survival is mapped. | | | | |
| Speci | fic objective 2- Manage any threats posed by the crazy ant to ecosystem function in | areas of infestation | | | | |
| 2.1 | Continue control of crazy ants as a high priority action to preserve ecosystem integrity and hence protect breeding habitat. Agency responsible: PAN | Control program is maintained at, or increased above, current (2002) levels. Crazy ants reduced to a level where ecosystem function is re-established in affected areas. Crazy ant control has no negative impact on Abbott's booby. | | | | |
| Speci | fic objective 3- Ensure activities associated with construction and operation of Imn | nigration Reception and Processing Centre do not impede recovery | | | | |
| 3.1 | Closely supervise construction of the IRPC to ensure environmental impacts are minimised, in particular, design and siting of the Centre to minimise: wind-turbulence effects on adjacent Abbott's booby nests; and removal of revegetation within the designated site. Agency responsible: Department of Finance and Administration (DoFA) | Removal of vegetation on site is minimised. Wherever possible, revegetation is undertaken on parts of the site. Development of the Centre is contained within the site Breeding success and survival of Abbott's booby nesting adjacent to the Centre is not reduced. | | | | |
| 3.2 | Closely supervise road upgrading and infrastructure construction along Murray's Road during development of the IRPC, to ensure environmental impacts are minimised. In particular: rainforest clearing should be minimised if not prevented; waste treatment and other services should be laid close together on the same side of the road; minor road re-alignments should be considered to prevent destruction of nesting trees. Agency responsible: DoFA | Wind-shear effects on nests along Murray's Road are not increased. Breeding success and survival of Abbott's booby nesting along Murray's Road is not reduced. | | | | |

| | * | | | | | | |
|---------|--|--|--|--|--|--|--|
| 3.3 | The day-to-day operational activities of the IRPC are managed to ensure that environmental impacts are minimised. In particular, breeding of Abbott's booby pairs nesting adjacent to the site should not be compromised by the Centre's operational activities. | • Breeding success and survival of boobies nesting adjacent to the Centre is not reduced as a result of routine operation of the facility. | | | | | |
| | Agency responsible: DIMIA | | | | | | |
| 3.4 | Establish and implement a monitoring program for construction and operational activities of | • Monitoring program is established, preferably one that is integrated with the | | | | | |
| | the IRPC which: | regular monitoring program (objective 7). | | | | | |
| | • establishes baseline data; and | | | | | | |
| | • rapidly detects any adverse impacts on Abbott's booby (both short and long-term). | | | | | | |
| | Agency responsible: DoFA | | | | | | |
| Speci | fic objective 4- Ensure activities associated with the construction and operation of t | he Asia Pacific Space Centre do not impede recovery | | | | | |
| 4.1 | Establish a monitoring program of construction and operational activities of the APSC | • Monitoring program is established, preferably one that contributes to the | | | | | |
| | which: | regular monitoring program (objective 7). | | | | | |
| | • collects baseline data for at least 3 years prior to the first launch; and | | | | | | |
| | • detects any significant impacts on Abbott's booby. | | | | | | |
| | Agency responsible: APSC | | | | | | |
| 4.2 | If a significant impact is detected, any satellite launch regime should be suspended | • APSC activities suspended if an adverse impact identified. | | | | | |
| | immediately and a review conducted. Any detrimental activity should not re-commence until | • APSC activities not resumed until the adverse situation has been rectified | | | | | |
| | the cause of the impact has been rectified. | and Abbott's booby conservation assured. | | | | | |
| Note: | this objective and associated actions and criteria have been developed as a precautionary measure | e. Abbott's booby nesting sites are located more than 5km from the APSC site, | | | | | |
| hence, | hence, the impact of satellite launches is unlikely to be a major threat. However, there is no data to support this assumption and monitoring of the situation is warranted, at least in the | | | | | | |
| short t | short to medium term, given the conservation status of Abbott's booby. This should be coordinated with the regular monitoring program. | | | | | | |
| Speci | fic objective 5- Identify feeding habitat of adults and juveniles and develop approp | riate management responses to any threats identified | | | | | |
| 5.1 | Investigate at-sea distribution of Abbott's booby through the use of satellite telemetry to: | Satellite telemetry studies completed. | | | | | |
| | • determine foraging range and potential overlap with threatening processes - e.g., fishing | • Marine habitat critical to survival (if any), and potential threats to this | | | | | |
| | and hunting. Studies need to resolve at-sea range both spatially and temporally and | habitat, identified. | | | | | |
| | account for sex, age class, season and breeding status; | | | | | | |
| | • resolve/define marine habitat critical to survival. | | | | | | |
| | Agency responsible: PAN | | | | | | |
| Speci | fic objective 6- Establish a population monitoring program | | | | | | |
| 6.1 | Develop and trial sampling techniques for use in monitoring program. | Techniques for monitoring developed and trailed. | | | | | |
| 6.2 | Develop and implement a cost-effective monitoring program for Abbott's booby to: | • A regular monitoring program is implemented within two years. | | | | | |
| | • detect changes in population with high precision; | • Results of the monitoring program are reported immediately to assist in | | | | | |
| | • monitor effectiveness of mine site rehabilitation on adjacent nesting Abbott's boobies to | management and recovery. | | | | | |
| | ascertain whether population size, distribution and breeding success are increased; | • Results of the monitoring program used to evaluate and guide CIRRP. | | | | | |
| | • estimate total population size with low to medium precision; and | | | | | | |
| | • where possible, allow monitoring of other potential threats, such as from APSC and IRPC. | | | | | | |
| | Agency responsible: PAN; APSC; DOTARS; DIMIA | | | | | | |

| 6.3 | Upgrade existing monitoring data and ensure that the coding system is documented. | Historical database upgraded and keyed. | | | | | |
|---|---|--|--|--|--|--|--|
| Speci | fic objective 7- Develop a wind turbulence model to guide and evaluate the CIRRP | in restoration of Abbott's booby breeding habitat | | | | | |
| 7.1 | Appraise effectiveness of mine site rehabilitation in ameliorating wind turbulence upwind of breeding sites through use of GIS and computer modelling. Use model to determine at what | Refined wind turbulence model for Abbott's booby breeding habitat developed | | | | | |
| | stage wind turbulence upwind of clearings is ameliorated to an extent that breeding success | Effectiveness of existing mine rehabilitation in improving habitat assessed. | | | | | |
| | and survival of Abbott's booby is not compromised, and to improve guidelines for | • Rehabilitation priorities and prescriptions of CIRRP are re-evaluated. | | | | | |
| | Agency responsible: PAN | | | | | | |
| Specific objective 8- Monitor and assess the likely impact of developing fisheries in the Christmas Island area | | | | | | | |
| 8.1 | In the event of a fishery developing in the area, ensure observer coverage to identify whether | • As necessary, assessment of risk and development of preventative | | | | | |
| | Agency responsible: PAN; Australian Fisheries Management Authority | procedures. | | | | | |
| Speci | Specific objective 9- Assess and revise the Recovery Plan as necessary | | | | | | |
| 9.1 | Form Recovery Team and implement Recovery Plan. Team should include experts and | Recovery Team formed and Plan implemented. | | | | | |
| | stakeholder representatives and communicate via email and telephone conferencing. | | | | | | |
| 9.2 | Prepare and submit nomination to TSSC for listing as Critically Endangered. Agency responsible: PAN | Consistency across National and International threatened species lists. | | | | | |

| Priority. | feasibility. | duration an | d estimated | costs of | recoverv | actions |
|-----------|--------------|--------------|-------------|----------|----------|---------|
| | icusionicy, | uur uuron un | a commutea | | recovery | actions |

| Action | Description | Priority | Feasibility | Yr 1 | 2 | 3 | 4 | 5 | Total | |
|--------|---|----------|-------------|--|----------------------|----------------------|---------------------|----------------------|----------------|--|
| 1.1 | Manage removal of phosphate stockpiles | High | High | 5,000 | 5,000 | 5,000 | 5,000 | 5 000 | 25 000 | |
| 1.2 | Christmas Island Rainforest Rehabilitation Program | High | High | 750,000 ¹ | 750,000 ¹ | 750,000 ¹ | 750,000 | ¹ 750,000 |) ¹ | |
| 1.3 | Christmas Island weed management strategy | Medium | Medium | Included in PAN budget | | | | | | |
| 1.4 | Accurately map critical breeding habitat: Inside Park | Low | Medium | | | | | 15 000 | 15 000 | |
| | Outside Park | High | Medium | | | | | | | |
| 2.1 | Yellow crazy ant control program | High | Medium | Included in PAN budget | | | | | | |
| 3.1 | Supervise construction of the IRPC facility | High | Medium | 20 000 | | | | | 20 000 | |
| 3.2 | Supervise upgrading of roadworks | High | Medium | 20 000 | | | | | 20 000 | |
| 3.3 | Manage the day-to-day operational activities | High | Medium | 5 000 | 5 000 | 5 000 | 5 000 | 5 000 | 25 000 | |
| 3.5 | Monitoring for impact of IRPC on booby | High | Medium | Included in actions 7.1 and 7.2 | | | | | | |
| 4.1 | Establish an APSC monitoring program | Medium | Medium | Short-term monitoring ³ | | | | | | |
| 4.2 | Conduct review in event of impact | High | Medium | Dependent on impacts | | | | | | |
| 5.1 | Satellite tracking of Abbott's booby | High | Medium | | | $70\ 000^4$ | 50 000 ⁴ | | 120 000 | |
| 6.1 | Develop and trial booby monitoring techniques | High | High | 15 000 | | | | | 15 000 | |
| 6.2 | Implement population monitoring program | High | High | | 10 000 | 10 000 | 10 000 | 10 000 | 40 000 | |
| 6.3 | Upgrade historical database | Moderate | High | 2 000 | | | | | 2 000 | |
| 7.1 | Assess rehabilitation effectiveness via wind model | High | Medium | 15 000 | | | | | 15 000 | |
| 8.1 | Monitor fisheries, as needed | Low | High | c. 5 000 to oversee; costs borne largely by AFMA ⁵ | | | | | | |
| 9.1 | Recovery group | Low | High | $5\ 000^6 \qquad 5\ 000^6 \qquad 5\ 000^6 \qquad 5\ 000^6 \qquad 20$ | | | 20 000 | | | |
| 9.2 | Re-evaluation of conservation status | Low | High | 1 000 | | | | | 1 000 | |

¹Conservation levy paid by Phosphate Resources Ltd to DOTARS for mine site rehabilitation program, total dependant on phosphate production; ³Shorterm monitoring during launches: watches at nests with nightscopes or video cameras; ⁴Costs for transmitters, capturing, fitting and monitoring ten birds each in Years 3 and 4, and removal of tags after monitoring; ⁵Australian Fisheries Management Authority; ⁶Phone hook-up conferences; review monitoring techniques and data; prepare short annual report.

Resource allocation

The most critical conservation problem facing Abbott's booby is habitat loss and degradation. Actions to remedy this problem will benefit a whole range of the island's fauna and flora, threatened and otherwise. Many of the actions relating to this (actions 1-3) are actions prescribed in the Christmas Island National Park Management Plan. There is also scope for the involvement of volunteers, residents and tourists, in forest regeneration and weeding projects.

Monitoring of the population is a necessary action to gauge and guide the recovery effort. Ideally this work should be carried out by a member of Parks North staff dedicated to seabird monitoring programs on the island. A cost-effective sampling program should be designed with the aid of a statistician. Economies of scale can be achieved by ensuring that the needs of the various monitoring actions recommended (actions 3.5, 4.1 and 7.1) are catered for in the routine Abbott's booby monitoring program (action 6.1).

Management practices

Protection and restoration of habitat is the main objective of this plan. This includes the management of threats from development in or near booby habitat, weed control and control of crazy ant. Broad management approaches are outlined in the relevant sections above. More detailed management prescriptions have been developed and are being implemented under the Christmas Island National Park Management Plan, Christmas Island Rainforest Rehabilitation Plan, Christmas Island Weed Management Strategy and the Invasive Ants on Christmas Island Action Plan. Some of the recommended actions described above, such as development of a wind turbulence model and monitoring of breeding boobies, will allow monitoring and refinement of existing management practices. The issue of greenhouse gas emissions is being addressed through implementation of Australia's National Greenhouse Strategy to ensure net greenhouse gas emissions are reduced, thus minimising the impact of this key threatening process on Abbott's booby.

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