

SPECIES MANAGEMENT PLAN

SOUTH EASTERN NSW

SOUTHERN BROWN BANDICOOT
(Isoodon obesulus)



Forests NSW

2007

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INTRODUCTION

The Threatened Species Licence (TSL) within the Integrated Forestry Operations Approval (IFOA) for the Eden Region regulates the management of threatened species and their habitat. Many species are deemed to be appropriately protected by routine timber harvesting prescriptions such as the retention of habitat trees, drainage feature exclusion zones, heath exclusion zones and rainforest exclusion zones. There is also a group of species where information regarding the lifecycle, distribution, abundance and threats posed by forestry activities is more limited. The Southern Brown Bandicoot (*Isoodon obesulus*) is one such species which, at the time of IFOA gazettal in 1999, was thought to be particularly rare. As a consequence, IFOA prescriptions were implemented requiring pre-logging surveys for Southern Brown Bandicoot (SBB) to detect individuals and to enable the implementation of protective measures (200 ha exclusion zones around a record, or group of records within 500 metres).

The IFOA also specified that following the implementation of 15 SBB exclusion zones, Forests NSW (FNSW) may apply for a review of this condition. The review was triggered in 2003. The agreed outcome of the review process is the Eden IFOA Amendment No.4 (2006). This is a two year interim arrangement which refers to new exclusion zones dominated by Yertchuk (*Eucalyptus consideriana*) and Swamp Gum (*Eucalyptus ovata*) forest types. These types are identified as occurring on lower slopes in areas of poorly drained soil that support an abundance of dense low vegetation communities and provide shelter habitat for the SBB. In addition, an agreed outcome of Amendment No.4 (2006) is the development of a Species Management Plan (SMP) which will outline the strategic management framework for the species and provide the basis for a review of the Eden TSL SBB provisions. The format of this SMP is as agreed between FNSW and the Department of Environment and Conservation (DEC) on 3rd August 2006.

OBJECTIVES

The overall objective of the SBB SMP is to provide a framework for the management of the SBB in State forests within the Eden IFOA Region that is complementary to management of the species across other public land tenures within south-eastern NSW.

The SMP monitoring program will provide information to assess whether the amended prescription is an effective strategy for conserving SBB's in the region. This will be determined by assessing SBB occupancy within the interim exclusion zones and in other areas of state forest within the planning area.

The SMP also establishes an adaptive management framework to identify and respond appropriately to potential threats to the species, such as impacts from predation by pest animals, inappropriate fire regimes and timber harvesting.

PLANNING AREA DESCRIPTION

The Planning Area includes the coastal and foothill forests south from Eden to the Victorian border extending west to the escarpment immediately east of the southern tablelands. It encompasses all of Yambulla, Nadgee, Bruces Creek, East Boyd, Timbillica and Nungatta State forests; Nadgee Nature Reserve and Mount Imlay National Park; and parts of Nullica State forest, South East Forests National Parks (Waalimma, Genoa and Yowaka Sections) and Ben Boyd National Park (Figure 1). The Planning Area represents a high proportion of the known SBB distribution on the far south coast of NSW as at 2006 based on surveys undertaken by FNSW and the DEC.

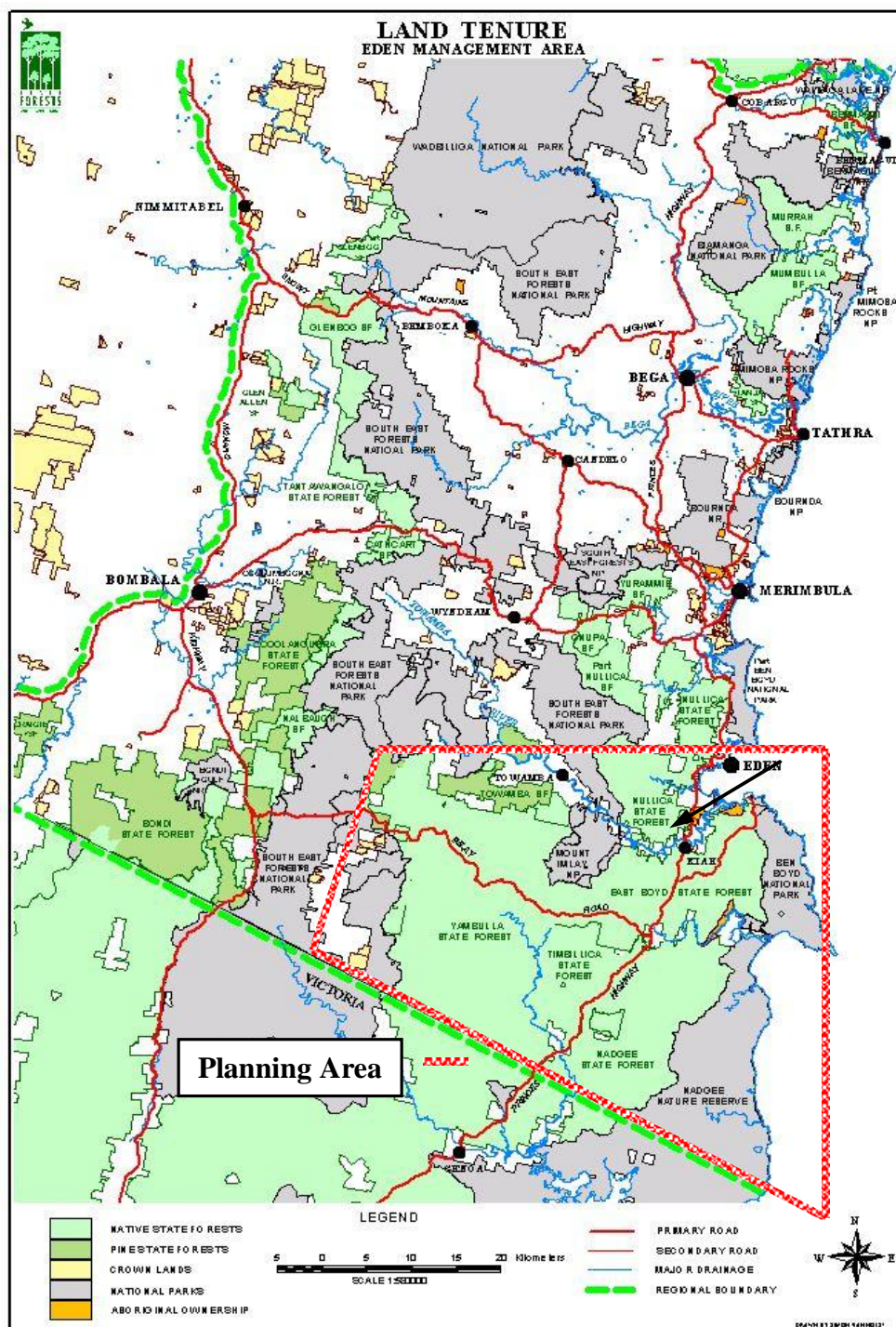


Figure 1. Southern Brown Bandicoot Species Management Planning Area.

The Eden region experiences mean daily minimum temperatures during July of between 1° and 4° and mean daily maximum temperatures during February of between 25° and 27° (SFNSW 1998). Frosts are relatively common during winter as distance from the coast increases. Rainfall is highly variable from year to year, with much of the annual volume occurring during a small number of long duration storms. Coastal areas experience an average annual rainfall of between 750 and 900 mm (SFNSW 1998).

The geology of the region is dominated by granites and granodiorites of the Devonian Bega Batholith, sediments of the Late Devonian Merimbula Group and the metasediments of the Ordovician Adaminaby Group. A range of soil types are derived from these geological units including Red, Yellow and Brown Dermosols and Kandosols, Red and Yellow Chromosols, Kurosols and Tenosols from the granites and granodiorites; and Stony Red and Yellow Kandosols, Red and Brown Dermosols and Red and Yellow Kurosols from the sediments and metasediments.

The forest ecosystems within the Eden region are broadly classified into 6 ecosystem groups: Rainforest, Wet Layered forests, Moist forests, Intermediate Shrubby forests, Dry Shrubby forests and Dry Grassy forests (SFNSW 1998). The Dry Shrubby forests contain the most likely habitat for *I. obesulus* where heathy understoreys occur under an often sparse eucalypt overstorey in areas of poorly drained subsoil. These understoreys are dominated by, but not limited to, species such as *Melaleuca squarrosa*, *Banksia spinulosa*, *B. serrata*, *Daviesia buxifolia*, *Xanthorrhoea* sp, *Epacris impressa*, *Pteridium esculentum*, and *Lomandra longifolia*. Eucalypt species often associated with these understorey habitat types include *E. consideniana*, *E. ovata*, and *E. globoidea*.

DISTRIBUTION & ABUNDANCE

Within New South Wales *I. obesulus* is apparently rare. It occurs primarily in two areas: (i) Ku-ring-gai Chase National Park just north of Sydney, and (ii) the south-east corner of the State (Ashby *et al.* 1990). In between these two areas the species has been found in a number of National Parks (Ben Boyd, Blue Mountains, Budderoo, Garigal and South-East Forests) and a similar number of State forests (East Boyd, Mumbulla, Nadgee, Nalbaugh, Nullica, Timbillica and Yambulla), although the number of records in any one location is scant (NPWS Wildlife Atlas, unpublished data). While suitable habitat for *I. obesulus* also exists on various Crown Lands along the coastline, as well as privately owned land, little or no specific survey effort has been undertaken in these areas.

Within the Planning Area *I. obesulus* occurs in scattered populations within East Boyd, Nadgee, Nullica, Timbillica and Yambulla State Forests and Ben Boyd and South-East Forests National Parks along with Nadgee Nature Reserve (Figure 2). The distribution of existing SBB records is largely a function of the concentrated survey effort on State forest under the original IFOA pre-harvest survey prescription. Some of the records mapped below, particularly on National Park tenures, are historical and may not represent current presence of the species.

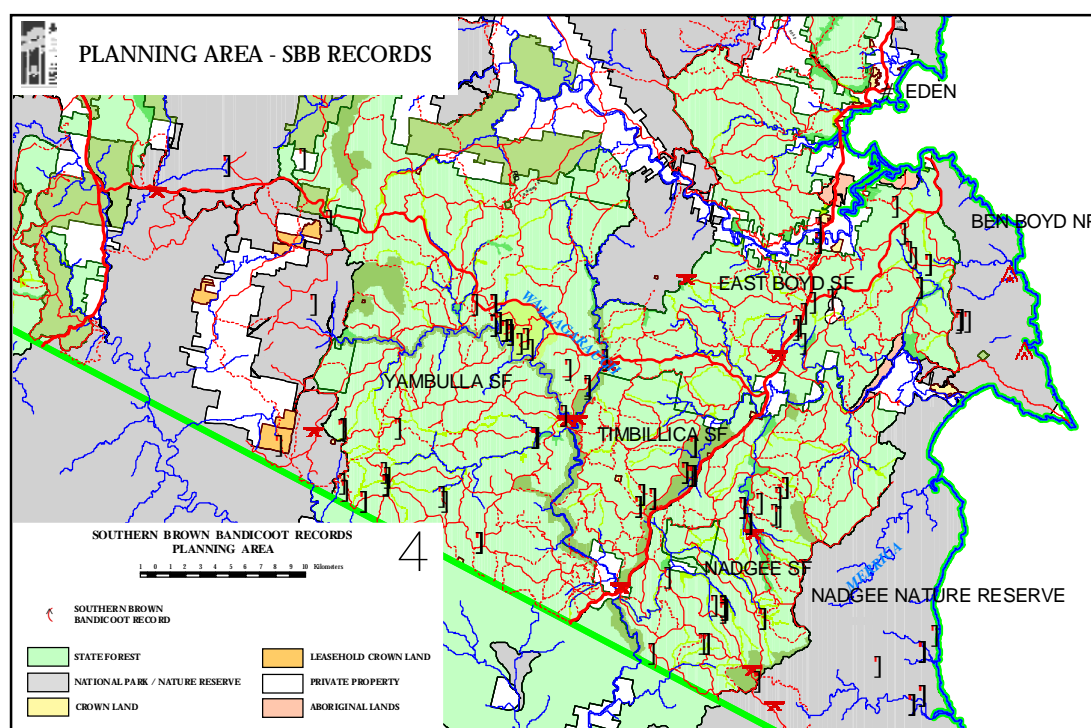


Figure 2 - SBB records in the Planning Area

SPECIES ECOLOGY

The Southern Brown Bandicoot (*Isodon obesulus* Shaw and Nodder 1797) is a medium-sized (400 to 1600g) ground-dwelling marsupial. Like other members of the bandicoot family (Peramelidae) *I. obesulus* has a long tapering snout with a naked nose, a compact body and short tail with a pointed end. The head has small rounded ears and small eyes. The coarsely furred dorsal surface of the body is usually dark grey with golden-brown flecks, and the softer underbelly is creamy-white. While the forelegs are short with curved claws on the digits, the hind limbs are much longer, resembling those of macropods. In New South Wales *I. obesulus* may be confused with the Long-nosed Bandicoot (*Perameles nasuta*) and Long-nosed Potoroo (*Potorous tridactylus*), both of which may occur in the same or similar habitats. *I. obesulus* is generally smaller than the other two species and has relatively small ears, particularly compared to *P. nasuta* (NPWS 1999). The average longevity of individual *I. obesulus* in the wild is unknown but individuals up to 3.5 years of age have been reported (Lobert and Lee 1990). It is nocturnal.

I. obesulus occurs in a variety of habitats in south-eastern NSW and Victoria, including heathland, shrubland, dry sclerophyll forest with heathy understorey, sedgeland, and woodland (Menkhorst and Seebeck 1990). These habitats are prone to fires (Braithwaite 1983; Lobert 1990) and some authors have suggested that the species prefers to occupy early seral stages following disturbance (e.g. Braithwaite and Gullan 1978, Stoddart and Braithwaite 1979, Opie 1980, Menkhorst and Seebeck 1990). Menkhorst and Seebeck (1990) suggested the use of controlled fires to produce a mosaic of areas of different ages so that favoured seral habitat was constantly being created.

Bandicoots usually nest in a shallow depression in the ground covered by leaf litter, grass

or other plant material (Rayment 1954; Ride 1970; Gordon 1974). The upper surface of this covering may be mixed with earth to waterproof the inside of the nest (Stoddart 1983; Gordon 1983). Internally, the nest comprises a hollow chamber, often lined with grass and leaves with no distinct entrance or exit.

Reproductive Biology

I. obesulus is thought to have a very short gestation period of less than 15 days (Lobert and Lee 1990). Neonates have a pouch life of approximately two months (Stoddart and Braithwaite 1979). Female *I. obesulus* are capable of resuming oestrus and becoming pregnant before the completion of suckling of the previous litter (Lyne 1964; Close 1977). Although female *I. obesulus* are capable of producing up to 6 young per litter (Braithwaite 1983), the mean litter size is typically between 1.5-3.5 young (Heinsohn 1966, Stoddart and Braithwaite 1979, Copley *et al.* 1990, Lobert and Lee 1990). Thus, bandicoots have the potential to produce multiple litters during the year.

Social Behaviour

Male bandicoots are highly pugnacious and mainly solitary from a young age (Moloney 1982; Thomas 1990). Individuals apparently nest alone supporting suggestions of social intolerance (Stoddart and Braithwaite 1979). Male-female interaction appears to be restricted to that necessary for successful reproduction (Moloney 1982).

Diet

I. obesulus, like other bandicoots, is omnivorous, opportunistically exploiting a wide variety of food resources such as invertebrates, plant material and fungi (Stoddart and Braithwaite 1979; Lee and Cockburn 1985). The water in food may completely account for the total daily water needs of the species (Nagy *et al.* 1991).

For further details on the ecology of *I. obesulus* refer to the Southern Brown Bandicoot (*Isoodon obesulus*) Recovery Plan (NPWS 1999).

ACTION PLAN

Introduction

A program of survey and monitoring for the SBB will occur on State forest within the Planning Area. The program will replace the survey effort previously prescribed under the TSL for the Eden Region. It will aim to establish the ongoing presence of SBB's in State forests within the planning area and to monitor occupancy of the species over time.

Aims

The aims of this program are to:

1. Test the assumption that the area retained as SBB habitat under the Eden IFOA Amendment No.4 (2006) is occupied by SBB's.
2. Assess a wider range of sites within the Planning Area for occupancy by SBB's and identify trends in SBB occupancy over time.
3. Identify aspects of the ecology of the SBB requiring additional research.

The process to achieve these aims is as follows.

Censusing methodology

The success or otherwise of a broader survey/monitoring program for the SBB is contingent upon developing a reliable censusing technique. Available methods include trapping, hairtubes and infrared cameras.

While trapping has historically produced the best results, it is significantly more labour intensive and invasive than other available techniques and is not favoured for that reason.

Hairtubes have many advantages in that they are relatively inexpensive to produce, are non-invasive, do not require daily monitoring, and can be deployed in large numbers. A number of hairtube designs are available, but past experience has shown that the “fauna tech” and “Scott” designs are of little use in detecting SBB’s. The “Handiglaze” design seems likely to deliver better outcomes than the alternatives and accordingly will be the design utilised during this study.

The use of infrared cameras in fauna survey is a relatively recent development. While early results are encouraging, the cameras are relatively expensive. It is intended that, subject to availability, several cameras will be utilised during this monitoring program, initially to gauge their effectiveness relative to hair tubes. If the hairtubes are not providing sufficient records for meaningful interpretation, and infrared cameras are proving to be effective, DEC and FNSW may modify the monitoring methodology to enhance data collection.

Distribution Survey and Monitoring Program

The monitoring program will have two principal objectives:

- Ø to provide information on the level of occupancy of SBB’s in each of the two strata (as identified in Action Plan Aims 1 and 2); and
- Ø to provide a means to gauge trends in SBB occupancy over time.

An “occupancy model” has been identified as the most appropriate means of undertaking the distribution survey and monitoring program (See Tyre *et al.* 2003; Bailey *et al.* 2004; Wintle *et al.* 2005; Wintle *et al.* 2004 and Mackenzie and Royle 2005 for general context on the concepts and methods of estimating detectability). A major strength of the occupancy model is that there can be flexibility within the sampling design throughout the life of the programme. Accordingly, decisions can be made at any time to enhance or reduce the power of the data.

The State forest estate within the planning areas will be stratified, with the mapped areas of the SBB exclusion zone (refer Eden IFOA Amendment No.4 (2006)) comprising one stratum, and all other areas being the other. To assist in maintaining the integrity of the two strata, a 250 metre buffer will be implemented between the mapped preferred habitat and the remainder of the State forest estate. The 250 metres approximates the maximum distance that individual SBB’s might move within their home range. The occupancy model approach will provide a mean level of occupancy of SBB within each of the stratum. In addition, critical action thresholds can be developed and agreed to by FNSW and the DEC. The critical action thresholds will provide a mechanism for action if the relative mean levels of site occupancies drop below this value.

Selection of Sites, Timing of Survey and Survey Effort

On three occasions each year (spring, summer and autumn), 20 sites in each stratum will be surveyed for a period of two weeks using the Handiglaze hair tunnels and, to the extent of their availability, camera detection units. Each site will have a transect of 10 hairtubes at 50

metre intervals and the same 40 sites will be used during each survey. The monitoring will continue for a minimum of three years.

Data recording

A generic proforma will be developed to be used across all study sites. Data to be collected at each hairtube location will include: AMG's, Topography, Forest Type, Habitat Complexity, Dominant Species (canopy, mid-storey and shrub layer). Information will also be available on management history at each site, including harvesting, burning and predator control. A record will be made of the weather conditions for each of the sampling days during the survey to account for variation in detection rates.

Data analysis

Following the first round of monitoring, the rate of detectability of SBB will be assessed by FNSW and DEC to determine if it is sufficient to identify trends in occupancy. Pending the outcome of this assessment, monitoring effort or methods may be altered to improve the rate of detectability.

Animal Care and Ethics

The survey and monitoring program will be conducted under the NPWS Scientific Licence S11203 and Animal Care and Ethics Licence 03/05. If appropriate, the proposal will be assessed by the NSW Department of Primary Industries (DPI) Animal Care and Ethics Committee.

MANAGEMENT ACTIONS AND IMPACTS

The primary objective of this Plan is to determine the ongoing presence of Southern Brown Bandicoots within the State forests of the study area, and to monitor changes in occupancy over time with reference to the Eden IFOA Amendment No.4 (2006) prescriptions.

Supplementary objectives include the identification of threats to the species, and an assessment of the role of management in threat abatement. The monitoring program should be supplemented by additional research programs, reviewing in greater depth aspects of the ecology of the species and of the manageable impacts on its distribution and abundance. A summary of threat abatement issues would include:

POTENTIAL THREAT	MANAGEMENT ACTION	POTENTIAL IMPACT OF ACTION	PERFORMANCE MEASURE	LEARNING OUTCOME
Pest Animal Predation	Conduct pest animal control programs within the legislative framework and agency guidelines (including the FNSW Southern Region Pest Animal Management Plan).	Sections of Planning Area with known SBB predator issues targeted for pest animal control programs.	Pest animal control programs continually adapted to target areas with known SBB predator issues within the Planning Area.	SBB occupancy and persistence monitored over time to assess impact of predator control programs on SBB populations.
Use or Exclusion of Low Intensity Fire (Hazard Reduction Burning)	<p>1. Conduct low intensity burning according to agency prescriptions (e.g. frequency, intensity, coverage, etc.).</p> <p>2. FNSW and the DEC to reach agreement on prescriptions for low intensity burning within SBB exclusion zones.</p>	<p>1. Mosaic of low intensity burnt and unburnt forest achieved within planned burn units in the Planning Area.</p> <p>2. Maintenance of early seral stages seemingly favoured by SBB (refer <i>Species Ecology</i>).</p> <p>3. Greater risk of spread of high intensity wildfire within contiguous areas of unburnt forest.</p>	<p>Existing survey data analysed in context of known burning history.</p> <p>Where required, monitoring plots to be established in areas planned for, and excluded from, low intensity burning.</p> <p>Burning undertaken in planned areas.</p>	<p>SBB occupancy and persistence monitored over time within both low intensity burnt and unburnt forest.</p> <p>Monitoring results used during future development of low intensity burning strategies.</p>

High Intensity Fire (Wildfire)	Conduct low intensity burning and other fire protection methods (e.g. strategic fire breaks) within the Planning Area according to agency guidelines (including the FNSW Corporate Fuel Management Plan).	Mosaic of low intensity burnt and unburnt forest maintained within the Planning Area. A network of strategic fire breaks established and maintained within the Planning Area.	Spread of high intensity wildfire reduced by managing fuel loads and distribution, and provision of access for fire suppression.	Assessment of the effectiveness of fire protection strategies in minimising the extent of high intensity wildfire, and the consequent damage to SBB populations and habitat.
Timber Harvesting	<p>1. Integrated Logging conducted in available multi-aged compartments (those released from exclusion as part of the IFOA Interim Amendment 2006 and others with identified suitable habitat within the Planning Area).</p> <p>2. Thinning conducted in suitable regrowth forest compartments.</p>	<p>1. Mosaic of integrated logged coupes within scheduled compartments with logging intervals ranging from a minimum of five years up to fifteen years (alternate coupe system under the IFOA).</p> <p>2. Mosaic of thinned and unthinned regrowth forest within scheduled thinning compartments.</p>	<p>Existing survey data analysed in context of known integrated logging / thinning history.</p> <p>Where required, monitoring plots to be established in areas planned for, and excluded from, integrated logging / thinning.</p> <p>Integrated logging / thinning undertaken in planned areas.</p>	<p>SBB occupancy and persistence monitored over time within unlogged, integrated logged, unthinned and thinned forest.</p> <p>Monitoring results used to assess future access for timber harvesting of excluded multi-aged forest compartments.</p>

ADDITIONAL RESEARCH

Cage trapping since the commencement of the IFOA in 1999 has resulted in a large dataset of sites where SBB's were present within the Eden RFA Region. The data will be compiled and analysed to determine any statistical trends in trap captures and habitat correlations, and to relate these to management actions, such as predator control or disturbance, where possible. Analysis of outcomes from the monitoring program outlined above will also provide useful indications of areas requiring further investigation.

Linkages with higher education institutions will be sought, and post graduate student projects developed, in order to provide more information about SBB's response to disturbance.

Research question	Context
Effectiveness of current predator control programs	Predator control programs are routinely employed with a focus of results being a reduction in stock loss in adjacent private farming lands and/or number of predators controlled. Monitoring of critical weight range vertebrate species has commenced at several sites within the Planning Area in an attempt to quantify the effects of these programs on populations of SBB's, but the programs need to be extended with more comprehensive data collection and analysis.
Response of SBB's to hazard reduction burning	Research indicates that SBB's are an early to mid successional species. It is hypothesised that the decrease in frequency of low-intensity fire, and the increase in extent and frequency of wildfires since European settlement may have contributed to a decline in distribution and abundance.
Response of SBB's to integrated harvesting	Research indicates that SBB's are an early to mid successional species. Survey results from FNSW pre-logging surveys indicate presence of individuals at sites after integrated logging events, but there has been little long-term research into the effects of integrated timber harvesting.
Response of SBB's to thinning harvesting	Research indicates that SBB's are an early to mid successional species. FNSW surveys indicate continued presence of individuals at sites after thinning events, but more research is required to improve knowledge of SBB response to thinning.

ADAPTIVE MANAGEMENT

After each survey episode a progress report will be developed by FNSW. The report will detail the survey effort, results, problems encountered, and any preliminary inferences from the collected data. This will be used to assess the need for monitoring design modification and provide feedback for the SMP review process. The periodic reporting process will be agreed and formalised between FNSW and the DEC to provide transparency should the process be subject to external scrutiny.

The information obtained through the monitoring program will help to ascertain whether the current prescription for the species is adequate for conserving the species.

Results from supplementary monitoring sites and additional research will provide information on SBB response to forest management activities; and inform the DEC's decision regarding the management of excluded multi-aged compartments within State forest. Should the initial

survey and monitoring provide insufficient data to address the objectives of the SMP then FNSW and DEC will jointly review the SMP and IFOA conditions and recommend amendments as necessary. Any review of the conditions applying to the management of SBB's on State forest under the Eden IFOA Amendment No.4 (2006) on the basis of monitoring results, will require agreement between FNSW and the DEC and will take into account potential effects on sustainable timber supply from the Eden RFA Region. Collected and analysed data from the monitoring program will also refine research questions and generate new directions in which additional information may be required.

REPORTING AND SMP REVIEW

In addition to the periodic survey progress reports (see *Adaptive Management* section above), reporting will be undertaken annually by FNSW. This will be in the form of a written report detailing surveys results, other activities undertaken, recommendations and a formal meeting between FNSW and the DEC. Outcomes of the annual report and forum will include review of completed activities, performance measured against the SMP objectives and monitoring program aims, endorsement of proposed upcoming activities and the general direction of the SMP.

A formal review of the SMP between FNSW and the DEC will be undertaken every three years. The review will form part of the adaptive management process with results being used to provide future direction for SBB management under the SMP. If issues arise in the period between formal SMP review forums, then reviews shall occur as part of the survey progress report process, the annual reporting forums or on an as needs basis.

ACTIONS, ACCOUNTABILITIES AND TIMEFRAMES

Action	Description	Time-frame	Responsibility
Existing Data Review	Collate and analyse existing data held by FNSW	Year 1	FNSW (DEC review)
Occupancy survey site selection	Stratification and random selection of sites within the planning area.	Year 1	FNSW
Occupancy survey	Conduct surveys each autumn, spring and summer	Years 1-3	FNSW
Develop research questions and projects	With reference to the recovery plan for the SBB, develop a set of additional research objectives to provide details on gaps in the understanding of the SBB biology, habitat use and response to disturbance. Seek linkage with learning institutions to facilitate post graduate student projects.	Year 1	FNSW & DEC
Data Analysis and Reporting	Compile reports following each survey episode, incorporating analysis of outcomes as appropriate.	Years 1-3	FNSW
Annual report and review forum	Prepare an annual report on progress and outcomes of SMP actions and meet with DEC to discuss refinements id required.	Years 1-3	FNSW & DEC
SMP Review	Review direction of, and results obtained from, surveys outlined in SMP.	Year 3	FNSW & DEC

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APPENDIX 1.

SCHEDULE 1 – AMENDMENTS TO THE INTEGRATED FORESTRY OPERATIONS APPROVAL FOR THE EDEN REGION

[1] Clause 10 (13) Definition of relevant exclusion zone

Insert, in appropriate order, the following matter in the definition of “relevant exclusion zone” in clause 10 (13):

condition 6.2A (“Giant Burrowing Frog (Interim arrangement)”)
condition 6.5A (“Southern Brown Bandicoot (Interim arrangement)”)
condition 6.8A (“Smoky Mouse (Interim arrangement)”)

Southern Brown Bandicoot excerpt:

[6] Condition 6.5A

Insert after condition 6.5:

6.5A Southern Brown Bandicoot *Isoodon obesulus* (Interim arrangement)

Note: The following condition (condition 6.5A) was developed as a result of a review of the operation of condition 6.5 in the Eden Region, which provides for the establishment of exclusion zones for the protection of the Southern Brown Bandicoot. (Forests NSW may request such a review under conditions 2.1 (b) and 6.5 (e).) Condition 6.5A operates for about two years only, while a species management plan is being developed for the Southern Brown Bandicoot. The condition identifies those areas of land that are to be set aside as exclusion zones for the protection of the Southern Brown Bandicoot. It is envisaged that the terms of the licence will be amended before the expiry of the condition to reflect the provisions of the species management plan.

- a) This condition (condition 6.5A) has effect on and from its commencement until 29 February 2008. Condition 6.5 has no effect during that period.
- b) A Southern Brown Bandicoot Exclusion Zone is to be established for any area of land:
 - i. depicted in the Geographic Information System theme in ESRI shapefile format called “Southern Brown Bandicoot Exclusion Zones”, in the sub-directory called “Southern Brown Bandicoot Exclusion Zones” on the CD-Rom, lodged with the Department of Natural Resources and having the volume label “060210_1106” dated 10 February 2006; and
 - ii. further described in the corresponding metadata on the CD-Rom.
- c) The boundary of a Southern Brown Bandicoot Exclusion Zone (as required to be established in accordance with condition 6.5A (b)) is to be adjusted in the field, if necessary, so that it reflects the extent of the potential habitat of the Southern Brown Bandicoot. Accordingly, if 80% or more of the basal area of any stand of trees (including any stand that is located only partially within the area described on the relevant CD-Rom referred to in condition 6.5A (b)) is made up of trees of the species *Eucalyptus consideriana* or *Eucalyptus ovata*, the land on which that stand is located is to be included in the Exclusion Zone.

Note: The purpose of condition 6.5A (c) is to ensure that a Southern Brown Bandicoot Exclusion Zone is established for an area where the Bandicoot's potential habitat is located. The existence of that potential habitat is indicated by the dominance of the overstorey by E. consideriana or E.ovata of the overstorey. (Note that condition 6.5A (c) requires dominance by trees of these species to be determined by reference to the proportion of the basal area they occupy). The relevant floristic assemblages or forest types where E.consideriana or E. ovata respectively may dominate the overstorey have been variously described in:

- *Keith and Bedward (1999)* which describes “Timbillica Dry Scrub Forest” (where E. consideriana may dominate) and “Swamp Forest” (where E. ovata may dominate) and*
- *Research Note 17 lists Forest Type 102, “Yerchuk”, as dominated by E. consideriana and Forest Type 143, “Swamp Gum etc”, as dominated by E. ovata.*

** Keith D.A. and Bedward M. (1999) Native Vegetation of the South East Forests region, Eden, New South Wales. Cunninghamia 6 (1):1-281.*

- d) If the boundary of a Southern Brown Bandicoot Zone is adjusted under condition 6.5A (c), Forests NSW is to prepare a map showing the adjustment made to the boundary or a written description of the adjustment made. A copy of the map or description is to be kept at the office of Forests NSW responsible for managing land in the Eden Region and is to be provided to the Department of Environment and Conservation at its request.
- e) The boundary of a Southern Brown Bandicoot Zone is not required to be marked in the field before a harvesting operation is carried out (despite the requirements of condition 5.1).
- f) Despite conditions 7 and 8:
 - i. surveys in accordance with condition 8.8 (and, in particular, conditions 8.8.7, 8.8.8 and 8.8.10) are not required for or in relation to the Southern Brown Bandicoot before a harvesting operation is carried out; and
 - ii. the identification and recording of indications of the Southern Brown Bandicoot in accordance with condition 8.6 (Incidental Threatened Flora and Fauna Records) is not required.
- g) For the purposes of this condition:
 - i. The basal area of a tree is the cross-sectional area of its trunk measured at 1.3 metres above ground level (that is, at breast height over bark), and
 - ii. the basal area of a stand of trees is the sum of the basal areas of the trees in that stand, expressed in square metres per hectare, and
 - iii. in calculating the basal area of a stand of trees, only the basal areas of living trees that have a diameter of at least 10 cm measured at 1.3 metres above ground level (that is, at breast height over bark) are to be taken into account.