Border Ranges Rainforest BMP Website July 07

Background

The Border Ranges Rainforest Biodiversity Management Plan (BMP) is part of a 3-year, $2.2 million project funded by Commonwealth Government targetting the nationally identified Border Ranges Hotspot in NE NSW and SE Qld. Other components of the project include implementation of on-ground works for a variety of threatened rainforest fauna and flora and high conservation value ecosystems and riparian systems.

Funding is administered by the Northern Rivers Catchment Management Authority, with co-ordination by the organisations listed here through a steering committee. The NSW Department of Environment & Climate Change is contracted to write the BMP, in collaboration with Queensland Environment Protection Authority, SEQ Catchments and Northern Rivers Catchment Management Authority. The plan is being prepared with support from a wide range of agencies and in consultation with the community. Community input has been recognised as a crucial component of the BMP. This has been achieved by using the networks of the NRCMA, South East Queensland Catchments, Australian Government NRM Facilitators and engaging a community representative to implement the communication strategy.

A Steering Committee oversees the BMP preparation and includes representatives from NSW Department of Conservation and Climate Change, Northern Rivers Catchment Management Authority, South East Queensland Catchments, Central Eastern Rainforest World Heritage, Australian Government Department of Environment & Water Resources and a community representative. In addition an Advisory Committee provides additional support and direction and includes representatives from the above organisations as well as the NSW National parks & Wildlife Service, Queensland Environment Protection Authority, Queensland Parks & Wildlife Service EPA, NSW Fisheries, North Coast Weeds, Local Government, scientific experts and Community Members.

Planning Area

The BMP Planning Area extends from Beenleigh to Evans Head, west to Tabulam and north to near Gatton. While the BMP targets rainforest, it also includes adjoining wet sclerophyll forest as this often provides important habitat for some target species. Camphor Laurel, which is prevalent in the Tweed and Richmond valleys, is also mapped as a type of rainforest as it provides resources such as food for rainforest frugivores.

Within the BMP Planning Area there are more than 170,000 hectares of rainforest - just over 10% of the area. Of the BMP area only 15% is National Park while private land accounts for over 75%. Significantly, over 65% of the rainforest is within National Parks while another 30% on private land. This indicates the importance of managing rainforest in national parks for threatened species and communities as well as developing and implementing strategies for managing rainforest on private land. Tables 1 to 3 below provide a breakdown of tenure, vegetation and rainforest in the BMP area.

Table 1: Land Tenure in the Border Ranges Rainforest BMP Planning Area

Tenure	Area (Ha)	% Total
*CERRA World Heritage **	108,177	7.3%
National Parks	110,281	7.4%
Gold Coast Council	2,406	0.2%
State Forests	68,700	4.6%
Crown Lands	39,305	2.6%
Commonwealth Lands	6,322	0.4%
Private Property Conservation	6,760	0.5%
Private Property Freehold	1,126,373	75.8%
Water	18,352	1.2%

* World Heritage is also National Park

Table 2: Extant Vegetation in the Border Ranges BMP Planning Area

Vegetation	Area (Ha)	% Total
Rainforest	172,365	11.6%
Wet Sclerophyll	135,731	9.1%
Dry Sclerophyll	328,246	22.1%
Other Native	31,218	2.1%
Introduced	27,074	1.8%
Camphor Laurel	11,269	0.8%
Cleared	762,418	51.3%
Water	18,351	1.2%

Table 3: Rainforest in the Border Ranges BMP Planning Area

Tenure	Area (Ha)	% Total
CERRA World Heritage	73,094	42.4%
National Parks	38,025	22.1%
Private Property Freehold	48,980	28.4%
State Forests	8,163	4.7%
Crown Lands	2,101	1.2%
Commonwealth Lands	826	0.5%
Private Property Conservation	935	0.5%
Gold Coast Council	241	0.1%

Figure 1 provides a map of Land Tenure in the Border Ranges Rainforest BMP Planning Area. Figure 2 provides a map of the distribution of broad vegetation groups in the Border Ranges Rainforest BMP Planning Area.

Rainforest Classification

There are a variety of rainforest classification systems used in the literature, as shown by Table 4 below (see References for source documents). Because of the need to integrate NSW and Qld vegetation classification systems, the descriptive terms variously described by FCNSW 1989, Floyd 1990 and Harden *et al.* 2006 have been adopted for use in the BMP. Figure 3 provides a map of the distribution of the BMP target vegetation for rainforest and wet sclerophyll forest in the BMP Planning Area.

Table 4: Rainforest Classification Systems

Harden *et al.*, Floyd, FCNSW	Walker & Hopkins		World Wildlife Fund
Cool Temperate Rainforests	Microphyll Vine Fern Forest	MVFF	Upland cool complex notophyll vine forests & microphyll fern forests & thickets
Warm Temperate Rainforest	Simple Notophyll – Microphyll Vine Forest	SNVF-SNMVF	Upland cool complex notophyll vine forests & microphyll fern forests & thickets
Sub-Tropical Rainforest	Notophyll - Complex notophyll vine forest	NVF-CNV	Upland cool complex notophyll vine forests & microphyll fern forests & thickets
			Lowland warm complex notophyll vine forests & araucarian notophyll vine forests,
	Simple Notophyll – Microphyll Vine Forest	SNVF-SNMVF	Notophyll & notophyll feather palm vine forests often with sclerophyll +/- araucarian emegents
Littoral Rainforest	Notophyll - Complex notophyll vine forest	NVF-CNV	Notophyll & notophyll feather palm vine forests often with sclerophyll +/- araucarian emegents
Dry Rainforest	Araucarian Notophyll – Microphyll Vine Forest	ANVF-ANMVF	Araucarian microphyll vine forests, occasionally with eucalypt emergents
Semi-Evergreen Vine-Thicket	Semi-evergreen vine thicket	SEVT	Semi-evergreen microphyll vine thickets & Acacia harpophylla open forests

Priority Species and Communities

The Border Ranges Rainforest BMP must meet the statutory obligations of the Australian Government *Environment Protection & Biodiversity Conservation Act*, the NSW *Threatened Species Conservation Act* and the *Qld Nature Conservation Act*. It must address the recovery planning requirements of all threatened rainforest species and communities listed under these acts for those species that occur within the BMP area. In addition to listed threatened species consultation with relevant experts identified additional non-threatened species that require consideration in the BMP. Such species may be endemic to the BMP area or are species of concern within the BMP area.

The priority species list includes 157 flora and 92 fauna species as well as 3 ecological communities listed as Endangered in NSW. The communities listed in NSW are Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions and Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion. Overall, 135 flora species and 65 fauna species are listed on at least one of the above acts, while non-threatened species include 27 flora species and 32 fauna species. One community covered in the BMP, Littoral Rainforest and Vine Thickets of Eastern Australia, has been nominated as Endangered Ecological Communities under the Commonwealth *Environment Protection & Biodiversity Conservation Act.*

Table 4 below provides a breakdown of the status of the species covered by the BMP. Overall, 67 species are nationally listed, 130 are listed in NSW and 124 are listed in Queensland. In addition, three Endangered Ecological Communities listed in NSW are also included. The BMP also address 59 priority species – species identified as being of conservation significance in either NSW or Qld but not listed as threatened and includes freshwater fin fish and invertebrate species. Table 5 provide the full list of priority flora covered by the BMP and Table 6 provide the full list of priority fauna species.

Table 4: Status of the priority species covered by the BMP

Conservation Status	National EPBC Act	NSW TSC Act	Qld NC Act
Flora Species			
Critically Endangered	1	0	-
Endangered	19	51	17
Vulnerable	31	34	47
Rare	-	-	26
Total	51	85	90
Fauna Species			
Critically Endangered	1	0	-
Endangered	8	16	6
Vulnerable	7	29	19
Rare	-	-	9
Total	16	45	34

Landscape-based Approach

The BMP takes a landscape approach focussing on regional scale, threat-based recovery wherever possible. Actions are tiered, according to scale they target. The scales for implementing actions range from broad regional landscapes to more localised precincts, then to areas where certain species or populations occur and finally to individual sites and key habitat features.

The intention is for actions to address multiple species across the broadest geographical extent. By seeking to implement actions to address threats, rather than actions for individual species, species with similar threats, vulnerabilities or locations will all benefit from the implementation of actions to address common threats. Species that are not covered at the broader landscape scale are then picked up at finer scale of precincts. Species, populations and habitat features that are not covered at the precinct scale are then picked up at site-based scale.

The BMP area was broken down by elevation into 3 landscapes: Lowlands (0 – 100m), Midlands (100 – 600m) and Uplands (600m +). Figure 4 provides a map of these landscapes within the Border Ranges BMP. The extent of national park reservation differs vastly between landscapes. Lowlands has only 4% national parks, midlands around 12% while uplands has over 51% reservation.

Flora & Fauna Assemblages

To identify similar vulnerabilities to threats amongst flora and fauna, a series of assemblages were developed. These were based on the landscape that they mostly occur within and their primary habitat preference by vegetation type – rainforest or wet sclerophyll. In addition, for flora, trait- based groups were derived to place species into functional groups. The traits included physical traits such as seed size, seed dispersal (wind, fleshy fruits, gravity) and reproductive ability (seed or resprouting). For fauna, the classification by the biogeographic biota were used to further group priority species (see Fauna Biogeographics below). Table 7 provides the flora assemblages used in the BMP and Table 8 provides the fauna assemblages.

These assemblages, in combination with the ranking of threats, allow a clearer picture of which activities are most threatening rainforest, where these activities are most likely to occur and their severity and irreversibility. Special features that couldn't be classified by landscape and habitat such as Flying-fox camps are treated separately.

Threats Analysis

Over 120 threat activities affecting rainforest were identified from a range of databases, published literature and expert knowledge. These were grouped in 11 broad threat groups as follows:

1. Climate change
2. Habitat loss
3. Habitat degradation
4. Weed invasion
5. Inappropriate fire regime
6. Dieback & human disturbance
7. Chemical use
8. Introduced herbivores
9. Introduced predators
10. Fauna disease
11. Small population size

Bureaucratic processes was also identified as a broad threat group but was not ranked.

Table 9 provides an overview of the threat groups. Each threat activity was classified upon its impact upon species and communities, based on the four primary stresses affecting biodiversity - habitat loss, habitat modification, loss of individuals and loss of genetic integrity. The 120 threats were reviewed to assess their geographical extent, severity, contribution to the four stresses and the irreversibility of their impact. The impacts of each threat was then ranked at a range of geographic scales and scored against the flora & fauna assemblages and priority species to identify those activities that threaten either individual or multiple assemblages and species. From this analysis, recovery actions have been developed to address these activities at the most effective and appropriate scale.

Actions to address threats

A comprehensive recovery action table is under development to identify actions to address the threat activities impacting upon either multiple or individual flora and fauna assemblages and priority species. This table, an example of which is provided in Table 10, provides a description of the threat activities affecting rainforest in the planning area and details the actions to address each of these threats. It includes the geographic scale at which the actions should be implemented, with those identified at the planning area scale representing threats that are generally not spatially distributed or require implementation across the entire planning area. Details are provided on priorities for implementation where appropriate.

At the next scale, the table ranks the priority for implementing actions within particular landscapes and where appropriate identifies particular assemblages for targeting implementation of the action. That is, some actions may be broken down by habitat type at the landscape scale for implementation. For actions implemented at these scales, there may be a large area (eg midlands landscape) identified for implementation and the BMP provides details for selecting priority locations based on computer modelling, community consultation, biogeography and existing recovery and threat abatement programs. These priorities are identified by precincts, specific localities where actions should be targeted, in an appendix to the BMP and are described in the following section.

Finally, the recovery action table identifies where actions require implementation for particular species, populations, sites or features where these are not adequately addressed by implementing actions at the planning area or landscape scales. This requires the implementation of specific actions to address threat activities that are unique to the particular species or site and are in addition to actions identified at the planning and landscape scales.

As well as providing a table that identifies at which scale and where actions need to be implemented, the BMP will also provide details on how each action is to be implemented. These tasks will describe the type of action required and specific details on how it should be implemented. For some actions there will be only one task, while for more complex actions there may be numerous tasks that require co-ordinated implementation to achieve the action successfully.

Precincts

Precincts are the next scale down from landscapes and are areas that have similar features or themes. They are used to prioritise localities for implementing planning area or landscape scale actions and thus provide a range of options for implementing such actions across the planning areas. Priority Precincts have been identified through computer modelling (Biodiversity Forecasting Tool), habitat corridors, biogeographic refugia, community consultation, cultural heritage, fire risk and existing recovery or threat abatement programs. In some instances, specific precincts have been identified for locality features such as the Big Scrub remnants and others are still being identified as a result of ongoing community consultation.

Computer Modelling

Computer modelling was used to predict Rainforest and adjacent Wet Sclerophyll Forest areas with a high priority for recovery actions. This involved developing Geographic Information System (GIS) layers for vegetation type and condition and six mappable future threats of clearing, grazing, human disturbance, logging, predator pests and weed invasion. A brief explanation of the derivation of these GIS layers is as follows.

Vegetation communities were used as a surrogate for biodiversity and were derived from combining the best available mapping for NSW and Qld using the Qld Regional Ecosystem classification. The current and pre-1750's vegetation extent within the Planning Area and the broader region (SE Qld & NE NSW) were used to obtain estimates of the extent of clearing for each Regional Ecosystem. Vegetation condition was derived from using Aerial Photograph Interpretation of growth stage and disturbance mapping where available. Where API mapping was not available, a combination of logging and fire history, slope, geology and tenure where used as surrogates. Estimates of condition contained maximum & minimum values to reflect the reliability of the estimates.

Clearing threats were based on the land use zoning (local government plans) and tenure. Grazing threats were based on a combination of slope and geology as well as state forests permits and tenure. Human disturbance threats was based on proximity to infrastructure such as roads and on-park facilities. Logging threats were based on current forestry exclusions and land tenure. Predator pest threats were based on proximity to existing roads, railways, powerlines and cleared land. Weed threats were based on proximity to existing infestations, roads, railways, powerlines and cleared land as well as stream order drainage patterns. For each of the different types of threat layers the expected long-term consequence upon overall biodiversity and annual probability of that consequence occurring were estimated.

These GIS layers were analysed by the Biodiversity Forecasting Tool (BFT) software package developed by DECC's Spatial Information & Analysis Section. The vegetation condition and threat layers provide an estimate of future condition, while analysis of their spatial configuration provides a measure of the effective habitat area. These are then combined with the vegetation (representing a surrogate for biodiversity) layer to derive the predicted persistence of biodiversity and the relative Conserve and Repair priorities.

Conserve & Repair Precincts

The Conserve priorities provide an indication of those areas, that if cleared or degraded, would have the greatest negative impact on biodiversity. It reflects those areas that are in relatively good condition. The Repair priorities provides an estimate of how rehabilitation of key areas would provide the greatest overall biodiversity conservation improvement. It includes poorly conserved and over cleared vegetation communities in low to moderate condition.

The higher Repair and Conserve priorities within Rainforest and adjacent Wet Sclerophyll Forest were selected as the most important. Conserve priorities were restricted areas outside of national parks as

these areas are already conserved. Repair actions where not restricted by land tenure type as areas of Rainforest within National parks may require actions to improve their habitat values.

Clusters of priority areas for conserve and repair actions were identified into discrete precincts. The Conserve Priority Precincts are shown on Map 5 and the Repair priority Precincts are shown on Map 6. Each precinct has been displayed according to which landscape(s) it predominantly occurs within. The plan presents these precincts as priority areas where planning and landscape scale actions should be implemented according to the Threat Action table described above (Table 8).

Specific areas of priority within each precinct have not been displayed as this level of detail makes the maps difficult to interpret. More detailed maps will be provided in the BMP. While there are some areas of high Conserve and Repair priority outside of the identified precincts, these areas are generally isolated from other areas and are therefore regarded as an overall lower priority than the clusters of high priorities contained with the identified precincts. The selection of these priority precincts does not necessarily preclude actions being undertaken in other areas, but does seek to provide priorities to assist NRM and land managers.

Fauna Biogeographic Refugia

All five of the Australian palaeogeographic terrestrial fauna biotas (Schodde and Calaby 1972, Schodde and Faith 1991, Schodde 1991) are represented in the BMP Planning Area, with, most species from the Torresian, Bassian and Tumbunan biotas (Landmark *et al*. 1999). The Torresian and Bassian biotas merge in the area, recognised as the McPherson-Macleay overlap zone (Burbidge 1960), but probably the most important of the three from a regional perspective is the Tumbunan (Landmark et al. 1999).

The Tumbunan biota comprises the subtropical rainforest biota, which was formerly distributed continuously across the continent during wetter periods (Schodde and Calaby 1972, Schodde and Faith 1991, Schodde 1991). The Tumbunan fauna is now essentially relictual, having contracted to two main cores centred on Mt Warning between the Richmond and Mary River and the Herbert - Daintree uplands of North East Queensland. It is characterised by species with restricted distributions and specialised ecological requirements and although some species now extend into peripheral wet eucalypt forests typical of the Bassian fauna, they are causally Tumbunan in origin (Tanton 1996, Landmark et al. 1999). Because of the relictual nature of the Tumbunan biota, refugia for these species have been identified through consultation with experts and identification of clusters of records for these species within the BMP Planning Area and are shown in Map 7.

The Bassian biota is the fauna of the eucalypt-dominated forests of southern Australia and is widespread in the BMP Planning Area down to about 200m where it mingles with the Torresian biota (Tanton 1996). The Torresian biota extends from the tropical, grassy savannah woodlands of northern Australia and is the prevailing non-rainforest biota at low altitudes up to 200m (Tanton 1996). The other two biota comprise a much smaller complement of fauna. The Irian biota extends from the lowland rainforests and savannah woodlands of New Guinea. The Eyrean biota of arid central Australia are recent colonists which have taken advantage of habitats associated with human settlement (Landmark *et al*. 1999).

Community Consultation

As a result of community consultation, a number of precincts have been identified with either specific conservation values or an overall high conservation value. Examples include unmapped rainforest in gullies along the lower Richmond Range in the Mallanganee – Upper Mongogarie area in the south-west of the planning area, Springbrook where a Rainforest Rescue program is being undertaken and Nicholls and Barrs Scrubs in south-east Queensland. Map 8 shows the location of these precincts and further precincts are likely to be included as a result of ongoing consultation.

Existing Programs

The BMP has identified a range of existing programs that target rainforest for recovery actions and integrates their implementation to improve cost-effectiveness and the overall outcomes and efficiency. Examples include the NSW Threat Abatement Plan for Bitou Bush that targets Endangered Littoral Rainforest and the Bell Miner Associated Dieback program in the hinterland. Management strategies for weeds, wild dogs and dingoes, cane toads and other pest species that are being implemented by National Parks and Wildlife Service, NRCMA, Rural Lands Protection Board, North Coast Weeds and

Byron Council's Biodiversity Management Strategy are also included. Map 9 shows the precincts where these programs and strategies are being implemented (based on available mapping).

Aboriginal Cultural Heritage

The BMP has used a variety of different mechanisms to engage the Aboriginal community about the cultural values of rainforests. It was a priority for the BMP to ensure effective integration of cultural and biodiversity values. To achieve this, a dedicated Aboriginal project officer oversees the community engagement, with the consultation strategy prepared by Aboriginal organisations and community members contracted to consult with elders. Information from this process is still being collated.

Other mechanisms include the preparation of Property Management Plans for Aboriginal Community held lands to identify and protect their cultural and biodiversity values. The Property Management Plans areas prepared to date are shown on Map 10 and negotiations are continuing to prepare other Property Management Plans. Additionally, a computer modelling tool is being trialled to identify areas likely to contain important cultural heritage sites and cultural biodiversity sites.

Big Scrub Remnants

The Big Scrub rainforest is an area that once covered 75,000 hectares of fertile basalt-derived soils between the Nightcap Range and the Richmond River but has now been reduced to less than 1% of its original size. Only about 50 small, scattered remnants of Rainforest remain and these are shown in Map 11. Restoration activities occur in many of these remnants and have very high conservation value.

Corridors

Corridors for fauna have been identified at a range of scales, from State significance in Queensland to Local significance in Byron Shire. These represent important movement pathways for fauna and in some cases include areas of cleared land that would provide the most benefit for fauna if they were to be revegetated. Map 12 shows the location of existing mapped corridors in the planning area by their significance level. The BMP is currently identifying a regional corridor of rainforest and wet sclerophyll from the uplands in the west to the coast. This corridor is intended to emphasise the need for vegetation connectivity to mitigate the long-term changes to vegetation due to climate change. A preliminary corridor of rainforest and wet sclerophyll from the uplands in the west to the coast is shown in Map 13.

Fire Risk

Rainforest is one of the few vegetation communities that is not adapted to fire. Through computer modelling based on the type of adjacent broad vegetation community (wet sclerophyll, dry sclerophyll, wetlands, woodlands, heath) and size, a map of those rainforest areas predicted to be at a low risk of being subject to burning was developed. Map 14 shows those areas where refugia from fire for rainforest species are most likely to exist.

Species-specific and site-specific locations

The BMP is currently identifying key species, populations, sites and habitat features that aren't adequately addressed by actions at the planning area, landscape and precinct scale. Such species and sites will require the implementation of specific actions at locations where the species, population or community is known to occur.

Examples of fauna species include the Eastern Bristlebird in the Border Loop - Mt Gipps area and the disjunct population of Albert's Lyrebird population in the south-east of the BMP area. Examples for flora include species that have only one or two known locations (eg, *Myrsine richmondensis*) and the fragmented rainforest remnants on the Tweed Caldera lowlands that include numerous priority species not found elsewhere and are located in small rainforest patches that are often too small to identify on maps. Other features covered at this scale include Flying-fox camps and habitat for the Critically Endangered Mitchell's Rainforest Snail.

Ongoing Consultation

The BMP will be placed on public exhibition once it has been reviewed by the Federal, NSW and Queensland Governments and this is likely towards the end of 2007. In the meantime, if you have any information you believe needs to be considered in the BMP or know of any special sites or features that

require special attention, please either respond through this website or send an email to either Lynn Baker, Shane Ruming or Geoff Lundie-Jenkins at the following addresses:

Lynn.Baker@environment.nsw.gov.au

Shane.Ruming@environment.nsw.gov.au

Geoff.LundieJenkins@env.qld.gov.au

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