environmental defender's office new south wales

Submission on the Draft Growth Centres Conservation Plan

18 April 2007

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- *the importance of fostering close links with the community*
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- *the importance of indigenous involvement in protection of the environment*
- *the importance of providing equitable access to EDO services across NSW.*

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Submission on the Draft Growth Centres Conservation Plan

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1. Introduction

The Environmental Defender's Office of NSW (EDO) is a community legal centre specialising in public interest environmental law.

The EDO welcomes the opportunity to provide comment on the draft *Growth Centres Conservation Plan* (the draft plan) and the proposal to grant biodiversity certification to the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* (the SEPP).

This submission has been prepared with input from members of the EDO's Expert Register, which is a list of scientists who have agreed to provide advice to the EDO on a pro-bono basis on various matters. Dr Sarah Bekessy (RMIT University), Dr Brendan Wintle (University of Melbourne), Georgia Garrard (RMIT University), and Dr Judy Smith (P & J Smith Ecological Consultants) have provided input into this submission. Dr Bekessy, Dr Wintle, and Ms Garrard have also prepared a separate submission, which we have forwarded along with our submission.

As the draft plan involves offsetting impacts on biodiversity via the BioBanking process, we also refer you to our two submissions on BioBanking: *Submission on "Biobanking - A Biodiversity Offsets and Banking Scheme" Working Paper* March 2006, which is available at: http://www.edo.org.au/edonsw/site/policy/biobank060405.php and *Submission on Biodiversity Certification and Banking in Coastal and Growth Areas* September 2005, which is available at: http://www.edo.org.au/edonsw/site/policy/biobank050913.php.

The EDO has significant concerns with the proposal to grant biodiversity certification to the SEPP. The focus of the draft plan is on 'improve or maintain' criteria that aim to minimise impacts on existing biodiversity values within the Growth Centres. We submit the focus of the draft plan should be on determining what habitat should be protected and restored to maintain viable populations of the widest possible range of species in the landscape in the long term.

We do not believe the draft plan adequately identifies the biodiversity values of the Growth Centres or adequately assesses the impacts of the SEPP. We are not convinced that implementation of the SEPP would improve or maintain biodiversity values. As such, we do not believe the Minister should grant biodiversity certification to the SEPP.

Our key comments and concerns relate to:

1. Lack of clear objectives and targets.

2. Adequacy of the data used to determine biodiversity values.

3. Adequacy of the criteria used to define 'improve or maintain biodiversity values'.

4. Offsetting.

We also make recommendations on how the draft plan could be improved.

2. Background

The aim of the draft plan is to provide the basis for the Minister for the Environment (the Minister) to consider whether to grant biodiversity certification to the SEPP in accordance with the *Threatened Species Conservation Act 1995* (TSC Act).

The main effect of biodiversity certification is that it removes the requirement under the TSC Act for the need to undertake threatened species assessments (such as the 'Assessment of Significance' and the 'Species Impact Statement') for proposed developments.

In making a decision, the Minister must be satisfied that the SEPP, '…in addition to any other relevant measures to be taken, will lead to the overall improvement or maintenance of biodiversity values' (TSC Act s 126(G)(1)). The Minister must also consider a number of other factors, including:

- the objects of the TSC Act, which include to conserve biological diversity and promote ecologically sustainable development, and to prevent the extinction and promote the recovery of threatened species, populations and ecological communities.

- the principles of ecologically sustainable development.

- the conservation outcomes resulting from the operation outside the area of the SEPP of strategies, plans, agreements and other instruments.

- the likely social and economic consequences of implementation of the SEPP (TSC Act s 126(G)(2)(3)).

The TSC Act does not define a geographic area or a time period within which biodiversity values must be improved or maintained.

The TSC Act defines various biodiversity terms as follows:

- 'biodiversity values 'includes the composition, structure and function of ecosystems, and includes (but is not limited to) threatened species, populations and ecological communities, and their habitats'.

- habitat means 'an area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community and includes any biotic or abiotic component'.

- population means 'a group of organisms, all of the same species, occupying a particular area' (ss 4, 4A).

The draft plan only seeks biodiversity certification for those lands where development is likely to occur. This does not include lands identified in the SEPP as zoned 'Environment Conservation', 'Public Recreation – Regional', or 'Public Recreation – Local'. Threatened species assessments will still be required for proposed developments on these lands. Also, the draft plan seeks conditional biodiversity certification for 'flood-prone' and 'transitional' lands.

We note that several species and communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are present in the Growth Centres. This presents the possibility of a development being deemed a "controlled action" if the Federal Environment Minister is of the opinion that the development is likely to have a significant impact on listed species. If so, the development will also need the consent of the Federal Minister in addition to consent under the *Environmental Planning and Assessment Act 1979*. He may consider biodiversity certification of the Growth Centres in determining the impact on threatened species but may also require separate environmental assessments to assist in determining whether to approve the action. If the Federal Minister refuses development consent, then the development cannot go ahead even if consent under the *Environmental Planning and Assessment Act 1979* is obtained.

3. Lack of clear objectives and targets

The conservation objective that applies to the draft plan is to improve or maintain biodiversity values. Additional objectives for any conservation plan should include: representativeness – the goal of protecting the full variety of biodiversity; and persistence – the goal of ensuring the long-term survival of ecological functions and populations.[1] The draft plan does not translate broad objectives into specific conservation targets. No quantitative targets have been set in relation to any of vegetation extent, vegetation condition, vegetation types, habitat types, habitat quality, threatened species, specific landscape features, or off-reserve management targets, although some targets (eg. minimum patch size, landscape connectivity) may be indirectly reflected in the 'improve or maintain' criteria for vegetation and flora and fauna. We believe there is a need for targets in the draft plan to fit within and contribute to broader regional biodiversity objectives and targets.

4. Adequacy of the data used to determine biodiversity values

The biodiversity values of the Growth Centres are determined using two surrogates:

[1] C. Margules and R. Pressey (2000) 'Systematic conservation planning' *Nature* v 405 pp 243-253

1) The types and extent of endangered ecological communities (EECs). This is determined by the Native Vegetation Maps of the Cumberland Plain Western Sydney (NPWS, 2002). This project mapped (at 1:25,000 scale) all vegetation patches >0.5 ha on the Cumberland Plain using 1:16,000 aerial photograph interpretation, 600 survey sites (including ground-truthing surveys), and analysis of the survey data to delineate vegetation types and model their extent across the Cumberland Plain.

2) The known locations of threatened species. This is determined by records held under the NPWS NSW Wildlife Atlas records (Atlas records) and the existing knowledge of ecologists.

We do not believe this information is adequate to determine the biodiversity values of the Growth Centres. This undermines the ecological validity of the draft plan. Our reasons are set out below:

- Threatened species are of limited value as a surrogate for biodiversity value.[2] There is little evidence in the scientific literature that the presence of a threatened species indicates the presence of a wider range of species or represents overall biodiversity. Threatened species lists are typically biased towards certain species – invertebrates and non-vascular plants are typically underrepresented – and this further limits their usefulness as a surrogate for overall biodiversity.[3]

- Knowledge of the occurrences of threatened species in the Growth Centres is likely to be very incomplete. The Atlas records provide a very incomplete picture of the occurrence of threatened species in NSW as they represent 'ad-hoc' surveys and not systematic surveys. There are likely to be more populations of threatened species located within the Growth Centres than indicated by the Atlas records. It seems unlikely that existing knowledge held by ecologists would fill any gaps in the Atlas records, as the records are already likely to reflect this knowledge.

- Atlas records provide no indication of the size of the flora and fauna populations in the Growth Centres, and the draft plan indicates that the size of many populations is not known or needs to be confirmed. Knowledge of population sizes is required to determine the local and regional significance of populations. It is important to protect large populations in high quality habitats as these may act as 'source' populations that sustain 'sink' populations in lower quality habitats.[4] The draft plan identifies that one site containing *Dillwynia tenuifolia* has a population size in the '1,000's', but it is unclear whether this population will be protected.

- Vegetation types are a more useful surrogate for biodiversity value and are often used in conservation planning. However, this surrogate often lacks precision and we often do

[2] H. Possingham et al (2002) 'Limits to the use of threatened species lists' TRENDS in Ecology & Evolution v 17(11) pp 503-506.
[3] H. Possingham et al (2002) 'Limits to the use of threatened species lists' TRENDS in Ecology & Evolution v 17(11) pp 503-506.
[4] C. Margules and R. Pressey (2000) 'Systematic conservation planning' *Nature* v 405 pp 243-253

not know the relationship between vegetation types and a range of other factors that determine biodiversity value. This surrogate may not provide adequate information on:

- The condition of vegetation patches in the Growth Centres. It is valuable to consider vegetation condition because it may be used as an indictor of the quality, health, viability, resilience, and conservation significance of vegetation, and can direct conservation priorities and actions. The draft plan used crown cover projection density as a measure for vegetation condition, which may not be an adequate surrogate for many other condition attributes (eg. number of vegetation strata, cover of exotic species, number of trees with hollows, etc).

- The types of habitat for flora and fauna in the Growth Centres. There is a need to consider habitat types because many species rely on specific habitats for survival. Also, it is important to identify and protect the habitat types that support the widest possible range of species within the landscape. However, EECs may not be a good surrogate for habitat types and the draft plan does not set representativeness targets for vegetation types. As such, how do we know we are protecting an adequate amount of swift parrot feed trees or powerful owl nest sites?

- The potential habitat for flora and fauna in the Growth Centres – only known habitat is considered. Metapopulation theory suggests there is a need to retain patches of potential habitat (and that may be currently unoccupied) in order to protect biodiversity at a landscape scale.[5] Also, the TSC Act defines biodiversity values as including the habitats of threatened species and populations and defines habitat as including areas only periodically or occasionally occupied.

- The quality of habitat for flora and fauna in the Growth Centres. It is important to consider habitat quality because patterns of habitat loss are not random and do not result in a uniform level of habitat quality (or types) in remaining vegetation patches.[6] High quality habitats may contribute significantly to the maintenance of biodiversity at a landscape scale.[7]

We understand that additional existing data comprising systematic flora and fauna surveys undertaken within the region is available, which would add greatly to the ecological information on which the draft plan is based (S. Bekessy, pers. com). It is unclear why data obtained by these surveys has apparently not been used.

5. Adequacy of the criteria used to define 'improve or maintain biodiversity values'

The draft plan interprets the meaning of 'improve or maintain biodiversity values' as defined under the TSC Act by applying three sets of criteria to vegetation, threatened flora species,

[5] C. Margules and R. Pressey (2000) 'Systematic conservation planning' *Nature* v 405 pp 243-253
[6] D. Lindenmayer and M. Burgman (2005) *Practical Conservation Biology* CSIRO Publishing, Victoria
[7] C. Margules and R. Pressey (2000) 'Systematic conservation planning' *Nature* v 405 pp 243-253

and threatened fauna species. These criteria aim to ensure biodiversity values are improved or maintained, and are as follows:

For vegetation, the draft plan states that 'improve or maintain biodiversity values' will be achieved if:

- Higher Long Term Management Viability (HMV) vegetation is included in 'protected lands'.

- Lower Long Term Management Viability (LMV) vegetation is offset. We discuss offsetting below.

HMV vegetation is vegetation that meets all of the following criteria:

- An EEC, as identified by the Native Vegetation Maps of the Cumberland Plain Western Sydney.

- An EEC in good condition, as determined by the Native Vegetation Maps of the Cumberland Plain Western Sydney, which uses crown cover projection density as a measure of vegetation condition.

- An EEC in a patch > 4 ha, as determined by the Native Vegetation Maps of the Cumberland Plain Western Sydney.

- An EEC in a landscape with 'good connectivity'. This is defined in the draft plan as a landscape with ≥ 30% vegetation cover within both a 0.55 km and 1.75 km radius of the patch.

- An EEC not in a patch with 'high edge/area ratio'. This is defined as a patch with a perimeter/area ratio > the perimeter/area ratio of a 100 m wide polygon equivalent.

- An EEC not in a patch that is adjacent to an area proposed for development and that becomes < 4 ha when a 50 m 'edge effects' buffer is applied to it.

LMV vegetation is all other vegetation within the Growth Centres (ie. vegetation types that are not EECs, vegetation in patches < 4 ha, etc).

For threatened flora and fauna species, the draft plan states that 'improve or maintain biodiversity values' will be achieved if species are likely to persist at the sub-regional level. The draft plan assumes that this will occur if the loss of habitat occupied by known populations of species is offset by including habitat within 'protected lands' or by securing and protecting habitat outside the Growth Centres.

We discuss the 'improve or maintain' criteria below.

5.1 Vegetation to be protected

Under the draft plan, non-EECs are automatically identified as LMV vegetation and may be cleared and offset either within or outside the Growth Centres. It is unclear how much non-EECs contribute to vegetation extent within the Growth Centres, although the draft plan indicates that most (but not all) vegetation types are EECs. However, we do not believe that the conservation status of vegetation should be used to exclude some vegetation patches from protection for the following reasons:

- Conservation status reflects risk of extinction and is not necessarily an indicator of the biodiversity value of a patch of vegetation. Patches of non-EEC vegetation may contribute significantly to the maintenance of biodiversity at a landscape scale.

- The TSC Act defines biodiversity value as not only including threatened species, etc, but also including the composition, structure and function of ecosystems and the habitats of threatened species. Non-EECs may contribute significantly to the maintenance of ecosystem functions and provide important habitat for threatened species.

5.2 Vegetation condition

Vegetation condition is an important consideration in conservation planning. The draft plan used crown cover projection density as a measure for vegetation condition. As identified, this may not be an adequate surrogate for vegetation condition. Also, many threatened ecological communities that may contribute significantly to the maintenance of biodiversity values at a landscape scale exist only in a degraded state. As such, we believe use of this criterion to exclude vegetation patches from protection is problematic, particularly on the Cumberland Plain.

5.3 Vegetation patch size

Under the draft plan, all EECs < 4ha are automatically identified as LMV vegetation and may be cleared and offset either within or outside the Growth Centres. The draft plan justifies this patch size threshold by reference to a study by Drinnan[8], which found that bird and frog species richness declined rapidly in patches < 4 ha and plant and fungal species richness declined rapidly in patches < 2 ha in a southern Sydney suburb.

We do not believe that a threshold of 4 ha should be used to exclude vegetation patches from protection. The focus on thresholds should not be on the point where a rapid decline in species richness occurs, but rather on the point where most species are able to maintain viable populations in the landscape in the long term.[9] Our reasons are set out below:

- The issue of ecological thresholds is subject to substantial scientific debate. While the Drinnan study found a relationship between patch size and species richness, there is very little other empirical evidence of ecological thresholds and scientific studies have shown

[8] I. Drinnan (2005) 'The search for fragmentation thresholds in a Southern Sydney Suburb' *Biological Conservation* v 124 pp 339-349

[9] D. Lindenmayer and G. Luck (2005) 'Synthesis: Thresholds in conservation and management' *Biological Conservation* v 124 pp 351-354

conflicting results.[10] Lindenmayer[11] cautions against the use of thresholds in conservation planning, including because: 1) the diversity of results in scientific studies; 2) the difficulty in making predictions due to the multiple interacting landscape processes that affect species responses; 3) the likelihood that species and groups of species will respond differently to thresholds due to different life history attributes (eg. see Gibb and Hochuli)[12]; 4) the likelihood that species responses will depend on the quality of habitat that remains.

- The draft plan places much weight on the effects of habitat fragmentation on biodiversity values. However, it is likely that habitat loss will have significantly greater impacts on biodiversity values than habitat fragmentation.[13] Fahrig[14] undertook a review of the effects of habitat fragmentation and found that most scientific studies do not adequately distinguish between habitat loss and habitat fragmentation per se, which she defines as the 'breaking apart of habitat'. She concluded that the empirical evidence to date suggests that habitat loss has far greater negative effects on biodiversity than habitat fragmentation per se, which has effects that are as likely to be positive as negative. This suggests that the draft plan should place more weight on the effects of habitat loss relative to habitat fragmentation.

- Small patches may have significant biodiversity value both in themselves and as part of a larger network of patches. While many species require large patches to maintain viable populations, small patches may be important in maintaining populations of some species in highly fragmented landscapes.[15] Many studies indicate that the nature of the landscape surrounding a patch, including the amount of habitat and the nature of the non-habitat area, or 'matrix', is important in maintaining populations in the patch.[16] Many rare species occur only in small patches and many other species such as birds and bats utilize a network of small patches.[17] In a study at Tumut (NSW),[18] Fischer and Lindenmayer found that many bird species occurred in small patches, which they inferred may be used as part of a larger network of patches – 30 species of birds (37% of total number of bird species recorded) were found in patches of up to 1 ha. We are aware of many small patches (< 4 ha) that contain good floristic diversity and threatened flora species (eg. small patches in Rookwood Cemetery support threatened species such as *Acacia pubescens* and *Epacris purpurascens var purpascens*). We are also aware of a number of threatened fauna

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[10] D. Lindenmayer and G. Luck (2005) 'Synthesis: Thresholds in conservation and management' *Biological Conservation* v 124 pp 351-354

[11] D. Lindenmayer and G. Luck (2005) 'Synthesis: Thresholds in conservation and management' *Biological Conservation* v 124 pp 351-354

[12] H. Gibb and D. Hochuli (2002) 'Habitat fragmentation in an urban environment: large and small fragments support different arthropod assemblages' *Biological Conservation* v 106 pp 91-100

[13] D. Lindenmayer and M. Burgman (2005) *Practical Conservation Biology* CSIRO Publishing, Victoria; L. Fahrig (2003) 'Effects of habitat fragmentation on biodiversity' *Annu. Rev. Ecol. Syst.* v 34 pp 487-515

[14] L. Fahrig (2003) 'Effects of habitat fragmentation on biodiversity' *Annu. Rev. Ecol. Syst.* v 34 pp 487-515

[15] Eg see J. Fischer and D. Lindenmayer (2002) 'Small patches can be valuable for biodiversity conservation: two case studies on birds in southeastern Australia' *Biological Conservation* v 106 pp 129-136

[16] Eg see L. Fahrig (2001) 'How much habitat is enough?' *Biological Conservation* v 100 pp 65-74

[17] R. Howe (1984) 'Local dynamics of bird assemblages in small forest habitat islands in Australia and North America' *Ecology* v 65 pp 1585-1601

[18] J. Fischer and D. Lindenmayer (2002) 'Small patches can be valuable for biodiversity conservation: two case studies on birds in southeastern Australia' *Biological Conservation* v 106 pp 129-136

species that utilize small patches, including the Glossy Black-Cockatoo, Grey-headed Flying Fox, Gang-gang Cockatoo and Koala. There are many other examples.

- We make the following comments on the Drinnan study:

    - The study does not infer that small patches in a fragmented landscape are not important in protecting biodiversity at the landscape scale and it does not infer anything about the viability of populations within small patches. It should not be assumed that the lower species richness in small patches is due to species extinctions – it may simply be that the patch is smaller and therefore supports fewer species. While small patches are less likely to support viable populations on their own, without knowledge of species distributions across patches, it is not possible to know which species are persisting in small patches.

    - The study was conducted in vegetation types found on sandstone geology, while the Growth Centres area largely comprises different vegetation types found on shale geology. We do not believe it is scientifically valid to extrapolate results from a sandstone area to a shale area. It would generally be inadequate to conduct an ecological experiment that placed a control site in an area that was geologically distinct from the treatment site. Also, large scale vegetation surveys generally involve stratified random sampling, with geology normally being a key factor in the stratification process.

    - Surveys undertaken for the study appear to be limited and may not provide an adequate picture of the flora and fauna in small patches in the study area. Bird and frog surveys were undertaken over a brief period (over one month in 1999) and do not appear to have been replicated. This may be reflected in the number of bird species recorded, which appear to be very low (eg. 15 species for a patch > 40 ha).

    - The study found that plant and fungal species richness declined rapidly in patches < 2 ha. If the draft plan is to apply a patch size threshold, this suggests that it should be at <2 ha and not < 4 ha to minimize loss of plant and fungi species.

5.4 Connectivity and edge/area ratios

Landscape connectivity is critical for protecting biodiversity values and may include habitat corridors linking vegetation patches (continuous habitat) or 'stepping stones' (non-continuous habitat).[19] Many studies have identified the importance of habitat corridors in maintaining populations in fragmented landscapes.[20] Drinnan[21] found that habitat corridors positively correlated with bird, frog and plant species richness.

[19] D. Lindenmayer and M. Burgman (2005) *Practical Conservation Biology* CSIRO Publishing, Victoria

[20] Eg see A. Bennet (1990) 'Habitat corridors and the conservation of small mammals in a fragmented forest environment' *Landscape Ecology* v 4 pp 109-122; I. Drinnan (2005) 'The search for fragmentation thresholds in a Southern Sydney Suburb' *Biological Conservation* v 124 pp 339-349

The draft plan undervalues the importance of habitat corridors to landscape connectivity. Landscape connectivity was only considered in relation to vegetation extent in the area around the patch and no consideration was given to whether a patch was linked to other patches by habitat corridors. In addition, the high edge/area ratio criterion means that many habitat corridors, which are usually long and thin, will not be protected in the Growth Centres. While habitat corridors are important, there are also strong ecological arguments for protecting isolated vegetation patches.[22]

5.5 Buffer for 'edge effects'

The criterion for buffer zones has the effect of reducing the number of vegetation patches that are slightly larger than 4 ha in size to be protected within the Growth Centres. It is normal practice to create buffer zones around the outside of existing patches and not to include buffer zones within existing patches.[23]

5.6 Improve or maintain criteria for flora and fauna

Under the draft plan, a vegetation patch that does not meet the landscape connectivity criteria is assumed not to be of value to threatened fauna species categorized as being sensitive to fragmentation. The criteria includes only vegetation patches with a canopy cover >10%. These thresholds were derived by measuring the landscape connectivity of vegetation patches that still contain populations of those fauna species that have declined on the Cumberland Plain. We do not agree with this approach for the following reasons:

- As identified, knowledge of the occurrences of threatened species in the Growth Centres is likely to be very incomplete.

- There is no indication of how large populations had to be before they were considered in the analysis.

- Areas of sparse canopy cover (< 10%) may not be 'fragmented' for all threatened species. We are aware that important habitat for some small mammals, reptiles, and birds may include only a few overstorey trees and a moderate cover of understorey vegetation. A number of bird species may nest in patches as small as single paddock trees provided these contain suitable hollows for breeding.[24]

We do not believe that the cumulative impacts of the SEPP on flora and fauna have been adequately assessed. No analysis has been undertaken on the probability of persistence of

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[21] Drinnan (2005) 'The search for fragmentation thresholds in a Southern Sydney Suburb' *Biological Conservation* v 124 pp 339-349

[22] Eg see A Lammi et al. (1999) 'Genetic diversity, population size, and fitness in central and peripheral populations of a rare plant Lychnis viscara' *Conservation Biology* v 13(5) pp 1069-1078

[23] Eg see Duerkesen et al (1997) *Habitat protection planning: where the wild things are.* American Planning Association, Chicago

[24] J. Fischer and D. Lindenmayer (2002) 'Small patches can be valuable for biodiversity conservation: two case studies on birds in southeastern Australia' *Biological Conservation* v 106 pp 129-136

priority or focal flora and fauna species based on the habitat loss predicted to occur in the Growth Centres. Tools for implementing such analyses have existed for many years.[25]

5.7 Summary

We believe it is likely that some vegetation patches able to be cleared under the 'improve or maintain' criteria are important in maintaining biodiversity at a landscape scale, and that by applying the criteria, biodiversity values will not be improved or maintained. Indeed, the draft plan notes that some LMV vegetation should actually be considered as HMV and be protected because the criteria for identifying HMV vegetation is likely to need to be supplemented by other ecological considerations. It is unclear how such LMV vegetation will be identified and protected under the draft plan.

6. Offsetting

The draft plan relies heavily on offsetting to maintain or improve biodiversity values. Offset mechanisms comprise:

- Including lands in 'protected lands' within the Growth Centres, which will be subject to zoning provisions and development controls.
- Purchase and reservation of land to be added to the existing system of reserves. Land would typically be purchased on a voluntary basis on the open market.
- Other private land conservation measures, such as establishing conservation agreements on private land.
- Purchase and retiring of BioBanking credits.

The draft plan indicates that most offset areas may be located outside the Growth Centres. The limit of the area within which offsetting can take place will be determined by the distribution of the vegetation types and species that will be impacted within the Growth Centres. Offsetting will be undertaken in accordance with general principles set out in the plan and assessment methodologies that are currently being developed.

The draft plan has made a preliminary assessment of the likely adequacy of the offsetting program by running a series of scenarios. The assessment involved categorising each vegetation type within the Growth Centres and in potential offset areas outside the Growth Centres as high, medium, or low conservation value, using three criteria: 1) the extent of vegetation type protected in reserves; 2) the extent of vegetation type cleared compared to its pre-1750 distribution; 3) the number of ha of the vegetation type remaining.

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[25] Eg see H Akcakaya et al (2005) 'Viability of Bell's sage sparrow (Amphispiza belli ssp. Belli): Altered fire regimes'. *Ecological Applications* v 15 pp 521-531; B. Wintle et al (2005) 'Fauna habitat modelling and mapping: a review and case study in the Lower Hunter Central Coast region of NSW' *Austral Ecology* v 30 pp 719-738; B Wintle et al (2005) ''Utility of dynamic landscape metapopulation models for sustainable forest management' *Conservation Biology* v 19 pp 1930-1943

We have previously made submissions on offsets generally, in which we supported the general principles for offsetting set out in the NSW Government's paper "*Green Offsets for Sustainable Development - Concept Paper*", April 2002. As identified, we have also previously made submissions on offsets in relation to BioBanking. We make the following additional comments:

- According to the draft plan clearing of Patch X + protection of Patch Y = maintain or improve biodiversity values. While protecting existing good quality habitat may achieve a biodiversity outcome by preventing it from being cleared, the result of clearing Patch X in exchange for protecting Patch Y is a net loss of habitat in the landscape. It appears that the improve or maintain biodiversity values objective may only be achieved by improving existing habitat or creating new habitat through landscape rehabilitation and restoration.

- The preliminary assessment of the adequacy of any offsetting program was undertaken using very crude measures of biodiversity value and involved much speculation, particularly in relation to the availability and cost of suitable land, etc. The biodiversity values in the Growth Centres were not quantified and compared against quantified values in the potential offset areas. This makes it very uncertain that any offsetting program will maintain or improve biodiversity values.

- It is unclear how any gain in biodiversity values achieved by including lands within 'protected lands', or purchasing and reserving lands, or by other private land conservation measures, will be measured against the loss of biodiversity values due to vegetation clearance within the Growth Centres. It does not appear that the BioBanking assessment methodology is capable of measuring this.

- It is unclear how lands within 'protected lands', or purchased and reserved lands, or land subject to other private land conservation measures, will be protected and managed to maintain or improve biodiversity values. Also, it is not clear whether monitoring of vegetation patches or priority or focal species will be undertaken to indicate whether biodiversity values are being improved or maintained.

- We note that a recent case in the Land and Environment Court *Sanctuary v Baulkham Hills Shire Council (2006)* has shown that the Court will take a strict stance when construing offsets. In that case, Jagot J found that offset lands 12 km distant from the development site, in another local government area, and involving a different endangered ecological community, were not adequate to compensate for loss of vegetation.

7. Recommendations

We make the following recommendations to improve the draft plan:

- Set quantitative conservation targets for aspects of biodiversity value such as vegetation types, habitat types, or priority or focal species that fit within and contribute to broader regional biodiversity objectives and targets.

- Utilise existing data from the systematic flora and fauna surveys that have been undertaken within the region.

- Undertake a gap analysis of existing flora and fauna data and carry out additional flora and fauna surveys within the Growth Centres if required (eg. see Lower Hunter and Central Coast Regional Environmental Management Strategy).

- Undertake habitat modelling and develop habitat maps for priority or focal flora and fauna within the Growth Centres. Wintle *et al.*[26] has reviewed methods for habitat modelling and provided a case study on the central coast of NSW for the purpose of informing conservation planning. The review included recommendations for habitat modelling using presence-only data (ie. data obtained from Atlas records).

- Analyse the representativeness of vegetation types in 'protected lands' and consider the irreplaceability and complementarily of vegetation patches within and outside the Growth Centres.

- Using existing tools, model the persistence probabilities of priority or focal flora and fauna species based on the habitat loss predicted to occur in the Growth Centres.[27]

- Identify areas critical for protection and restoration (eg. habitat for priority or focal flora and fauna species, important habitat corridors) and specific management and monitoring actions to ensure the persistence of vegetation patches and priority or focal flora and fauna species.

- Apply the precautionary principle and clearly acknowledge uncertainties and assumptions. This would mean, for example, increasing minimum patch sizes and other thresholds and assuming threatened species are present on all suitable habitats.

Thank you again for the opportunity to make this submission. Should you have any queries, please do not hesitate to contact us on 02 9262 6989.

Yours sincerely,
Environmental Defender's Office

Tom Holden
Scientific Director

Jeff Smith
CEO

[26] B. Wintle et al (2005) 'Fauna habitat modelling and mapping: a review and case study in the Lower Hunter Central Coast region of NSW' *Austral Ecology* v 30 pp 719-738

[27] Eg see H Akcakaya et al (2005) 'Viability of Bell's sage sparrow (Amphispiza belli ssp. Belli): Altered fire regimes'. *Ecological Applications* v 15 pp 521-531; B. Wintle et al (2005) 'Fauna habitat modelling and mapping: a review and case study in the Lower Hunter Central Coast region of NSW' *Austral Ecology* v 30 pp 719-738; B Wintle et al (2005) ''Utility of dynamic landscape metapopulation models for sustainable forest management' *Conservation Biology* v 19 pp 1930-1943