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BARRINGTON TO HAWKESBURY CLIMATE CORRIDORS REPORT.2

CONNECTING REGIONAL CLIMATE CHANGE REFUGIA FOR NATIVE SPECIES' PERSISTENCE IN A WARMING WORLD

The Barrington to Hawkesbury Climate Corridor Alliance[1] *recommends urgent conservation measures to limit the significant loss of biodiversity projected for the region due to climate change.*[2]

The recommendations first set out in the report Barrington to Hawkesbury Climate Corridors: Connecting regional climate change refugia for native species' persistence in a warming world published in December 2022, are based on the climate corridors identified in 2007 by the then NSW Department of Environment and Climate Change for the Northeast and Nandewar IBRA Bioregions.[3] These climate corridors identify landscape-scale wildlife migration pathways of optimum habitat which represent a strategic approach to securing the protection of native vegetation on private and public lands that complement and connect National Parks and Conservation Reserves to ensure the NSW National Parks Estate is prepared for a range of potential climate futures.

The ongoing community management of an expanded protected areas network encompassing the climate corridors is central to the proposal.

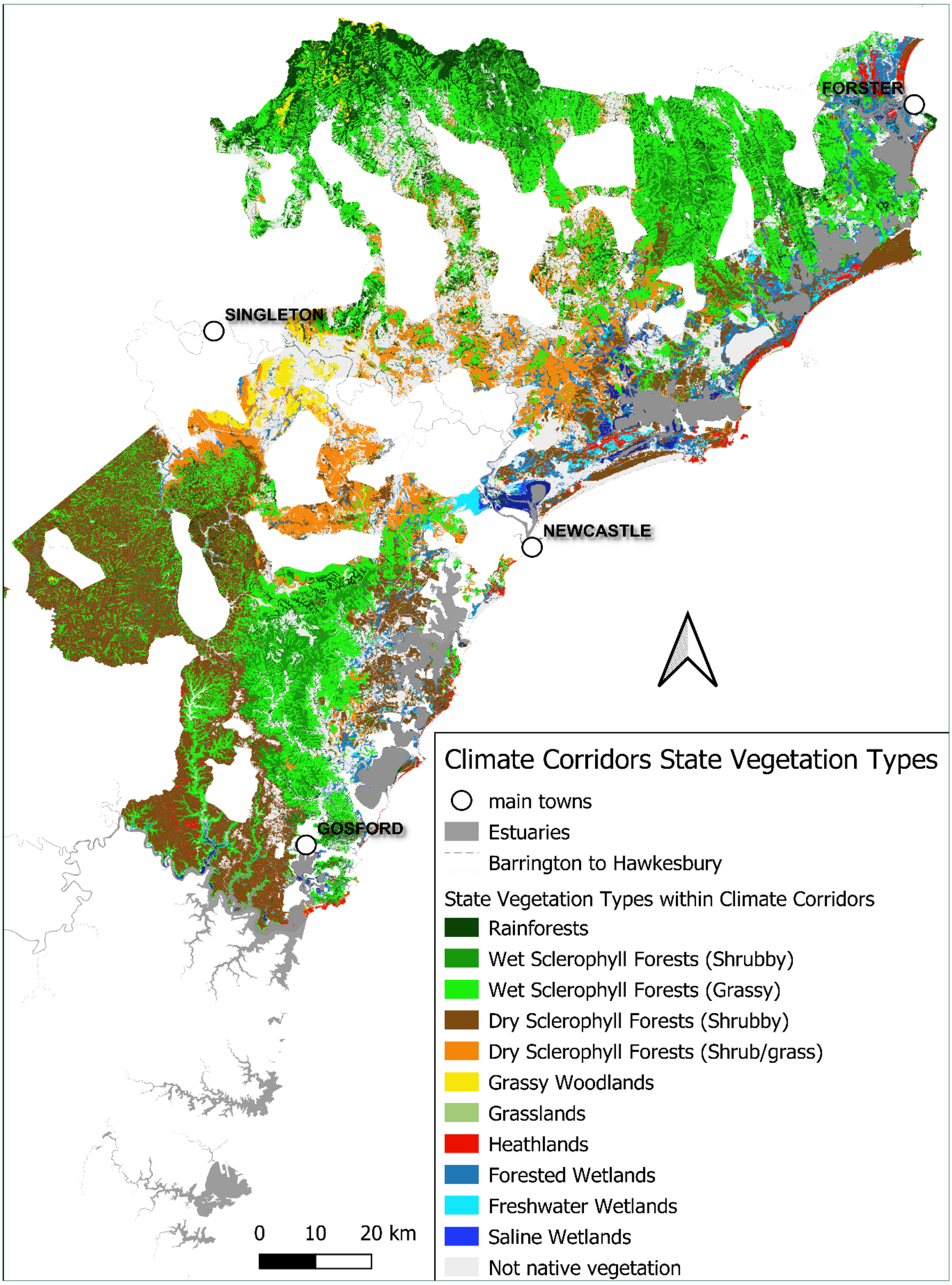
Recommendations

1. An immediate moratorium on further land clearing within identified Climate Change Corridors.
2. A specific strategy be included in both the Hunter Regional Plan 2041 and the Central Coast Regional Plan 2041 for the protection of Climate Corridors through an integrated suite of mechanisms (including development controls, major infrastructure planning, voluntary land acquisition and private land conservation).
3. The regional strategy described above be supported by detailed zoning and development guidelines under local environmental plans and development control plans administered by local councils, and also by investment programs implemented by Local Land Services.
4. Environmental Planning Instruments (EPI), including State Environmental Planning Policies (SEPP) and Local Environment Plans (LEP) be amended to conserve Climate Corridors from further development.
5. The Biodiversity Offset Scheme be radically amended to provide adequate stewardship payments to encourage landholders to protect, manage, and restore native vegetation within Climate Corridors under Voluntary Conservation Agreements or other secure conservation measures.
6. Targeted voluntary private land acquisition of large core areas of high quality habitat and essential corridors for restoration, particularly the large areas of moist forests in southern Mid-coast, and moist and dry landscapes across the Hunter River Valley through Cessnock, Singleton, and Dungog LGAs.
7. State Forests be transferred to National Park reserves as Regional Parks or other appropriate reserve category and managed by Local Communities for conservation and recreation

1 NSW National Parks Association (Hunter Branch); Community Environment Network; EcoNetork Port Stephens; Hunter Bird Observers Club; Hunter Community Environment Centre.
2 See https://www.hcec.org.au/climate-corridors
3 Dept of Environment and Climate Change (2007), Wildlife Corridors for Climate Change – Landscape Selection Process, Key altitudinal, Latitudinal and Coastal Corridors, An internal report, DECC, N.S.W

Report publication date: **March 21 2023** Accessible at https://www.hcec.org.au/climate-corridors

The persistence of species throughout the climatic disruptions of the late Quaternary was likely facilitated by the persistence of remnant populations within refugia.[4]

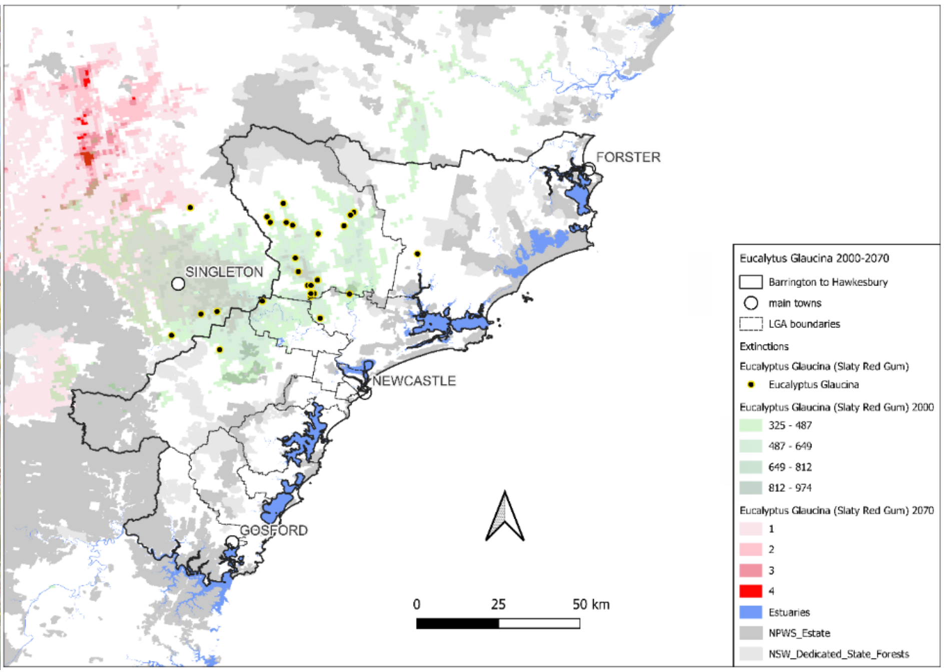


Map 1: State Vegetation Types within Barrington To Hawkesbury Climate Corridors

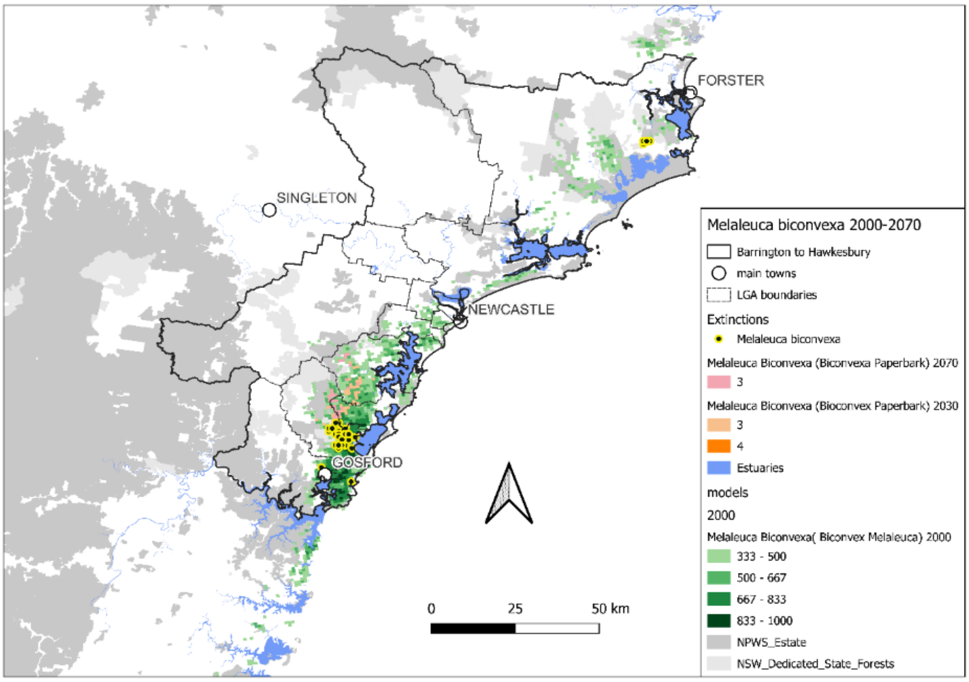
4 Correa-Metrio, Alexander, et al.(2022) "Detrended Correspondence Analysis: A Useful Tool to Quantify Ecological Changes from Fossil Data Sets." Boletín de La Sociedad Geológica Mexicana, vol. 66, no. 1, 2014, pp. 135–43. JSTOR, http://www.jstor.org/stable/24921266. Accessed 8 Oct. 2022

Threatened Flora between Barrington and Hawkesbury

While our analysis of the data specific to the Barrington to Hawkesbury region presented by Beaumont et al (2019) reveals that suitable habitat for fauna species will be severely degraded by the effects of climate change, particularly should we experience a warmer drier future, flora species will likely suffer far greater extinctions and range contractions.



Eucalyptus glaucina (Slaty Red Gum) 2000-2070. Sighted since 2000. Regional extinction by 2070 under all 4 climate futures.



Melaleuca biconvexa 2000-2070. Sighted since 2000. Regional extinction by 2070 under all 4 climate futures.

Overall, Beaumont et al (2019) identifies suitable habitat for 204 Threatened NSW plant species, 74 of which had suitable habitat modelled within the Barrington to Hawkesbury region in 2000. Of these

74 Barrington to Hawkesbury species:

- **64 (86%) suffer significant range contractions by 2070**
- **38 (51%) having no suitable**
- **27 species (11 with recorded sightings since 2000) experience significant range contractions**
- **10 species (4 with recorded sightings since 2000) experience range expansions under a worst case climate scenario**

Summary of predicted habitat suitability for Threatened Flora by 2070 due to Climate Change

1. Predicted regional extinctions – Recorded sightings since 2000 (R) with no suitable habitat predicted in the region by 2070

1. *Allocasuarina defungens (Dwarf Heath Cassuarina) R*
2. *Asperula asthenese (Trailing Woodruff) R*
3. *Cryptostylis hunbteriana (Leafless Tongue Orchid) R*
4. *Coastesi paniculata (Axe Breaker) R*
5. *Eucalyptus glaucina (Slaty Red Gum) R*
6. *Grevillia guthereana R*
7. *Grevillea parviflora subsp. Supplicans R*
8. *Kunzea rupestris (Rocky Kunzea) R*
9. *Leucopogon fletcheri subsp. Fletcheri R*
10. *Melaleuca biconvexa (Biconvex Paperbark) R*
11. *Persoonia hirsuta (Hairy Geebung) R*
12. *Tylophora woolsii R*
13. *Zerira involucrate R*

2. No suitable habitat predicted by 2070 – no sightings but modelled habitat in 2000 with no suitable habitat predicted by 2070

1. *Acacia courtii (Northern Brother Wattle)*
2. *Acronychia littoralis*
3. *Allocasuarina simulans*
4. *Archidendron henersonii (White Lace Flower)*
5. *Caesalpinia bonduc (Fever Nut)*
6. *Caladena concolor (Crimson Spider Orchid)*
7. *Darwinia penduncularis*
8. *Exacris purpurascens (Port Jackson Heath)*
9. *Eucalyptus sp. Cattai*
10. *Eucalyptus langleti (Green Malee Ash)*
11. *Eucalyptus sturissiana (Ettreema Malee)*
12. *Hibbertia puberula*
13. *Hibbertia stricta subsp. Furcaluta*
14. *Irenepharsus typherus (Illawarra Irene)*
15. *Leucopogon exolasius (Woronoa Beard Heath)*
16. *Lindernia alsinoides (Noahs False Chickweed)*

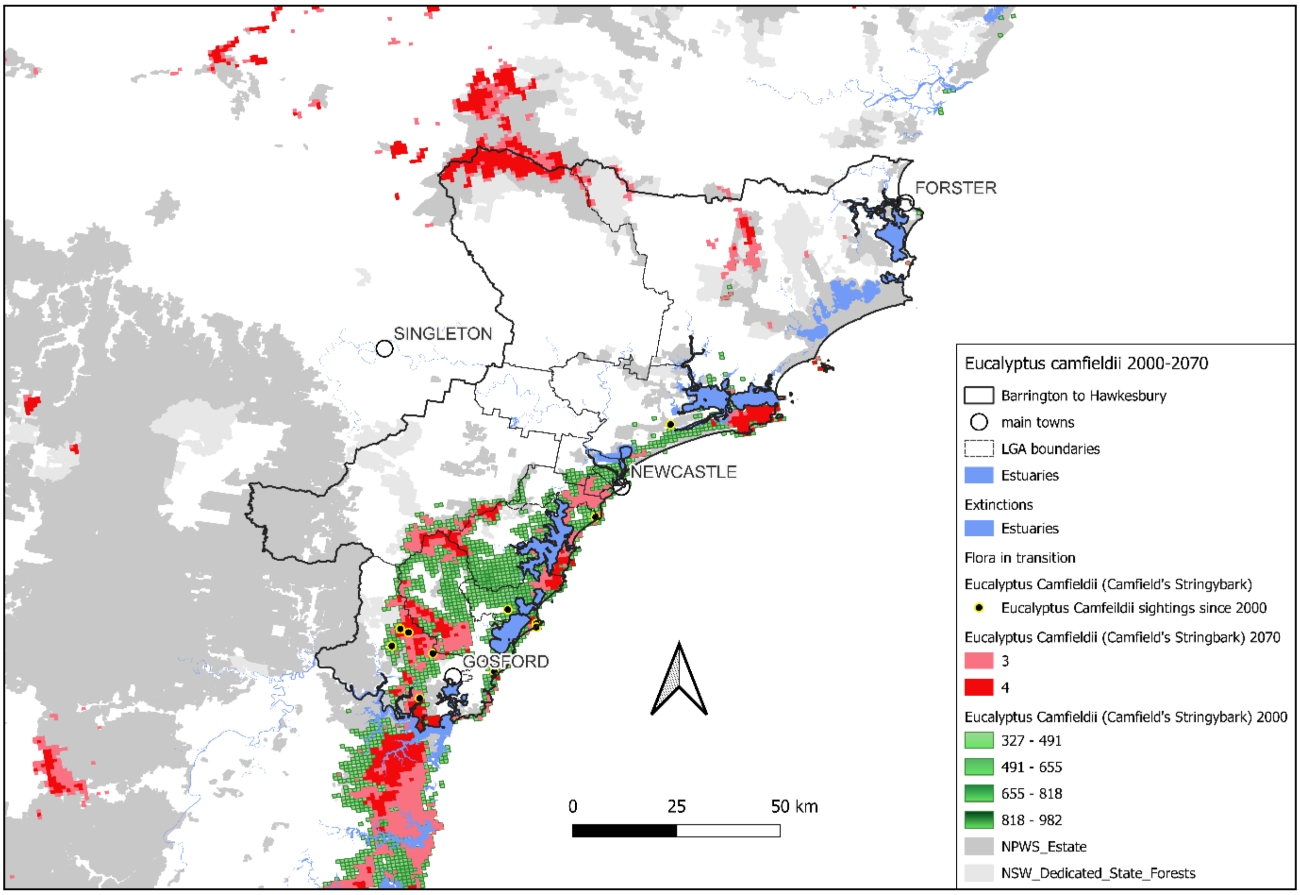
17. *Persicaria elatior (Tall Knotweed)*
18. *Phaius australis (Lesser Swamp Orchid)*
19. *Pimelea spicata (Spike's Rice Flower)*
20. *Pterostylis cobarensis (Greenhood Orchid)*
21. *Senecio spathulatus (Coastal Groundsel)*
22. *Symplococ Beauerlenii (Small Leafed Hazelwood)*
23. *Triplarina nowraensis (Nowra Heath Myrtle)*
24. *Xylosome terrae-reginae*

3. Range contractions predicted by 2070

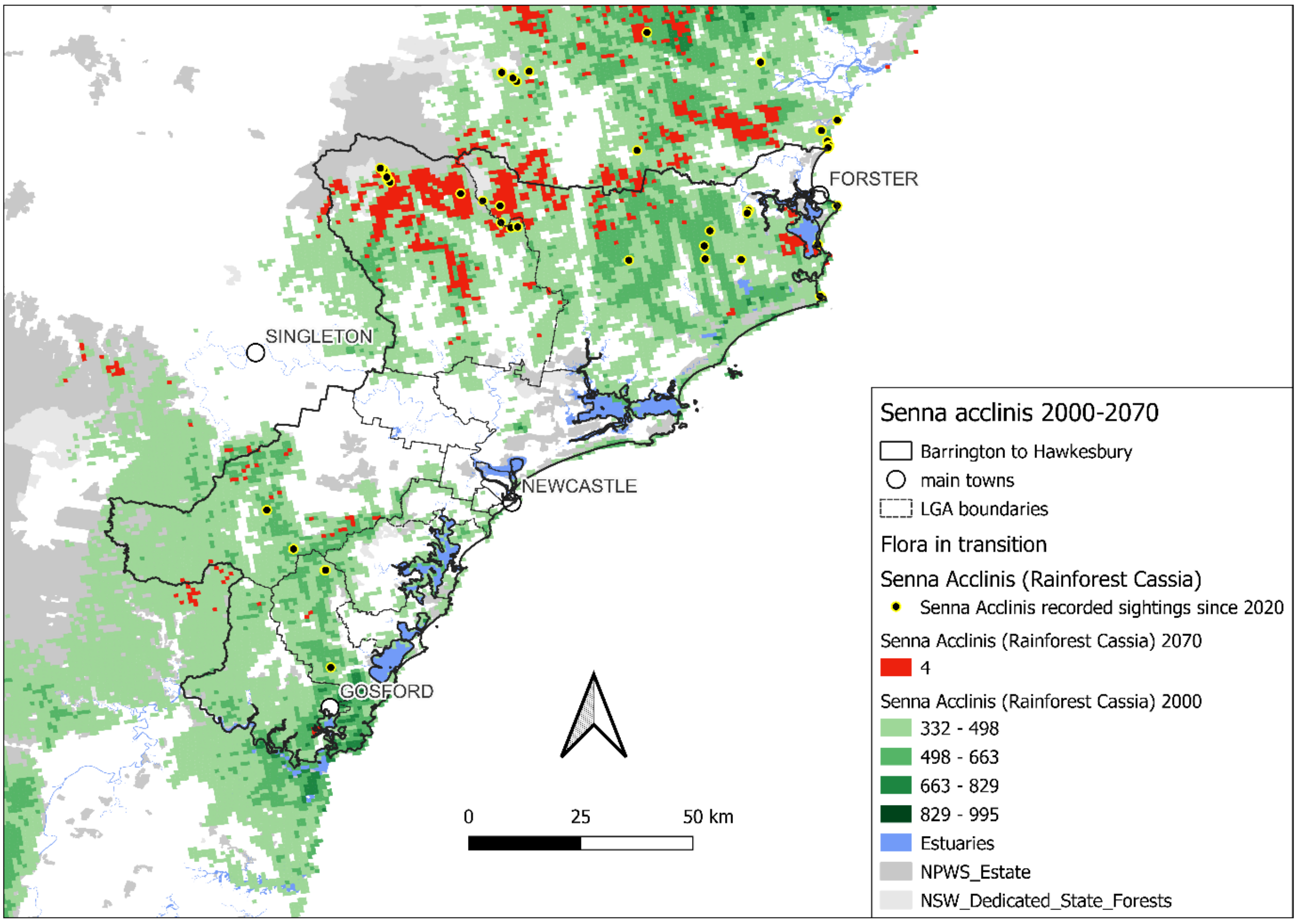
1. *Acacia pubescens*
2. *Acacia terminalis (Sunshine Wattle) R*
3. *Astrotrichia crassifolia R*
4. *Callocephalon fimbriatum*
5. *Chthonicola sagittata*
6. *Darwinia biflora*
7. *Diurius praecox (Rough Doubletail) R*
8. *Eleocharis tetraqueta*
9. *Eucalyptus camfieldii (Camfiel's Stringy Bark) R*
10. *Eucalyptus largeana (Craven Gray Box) R*
11. *Genoplesium baueri (Bauer's Midge Orchid)*
12. *Grevillea hilliana (White Silky Oak)*
13. *Hibbertia sp backstown*
14. *Lasiopetalum joyce R*
15. *Malaleuca deanei (Deans Paperbark) R*
16. *Melichris hirsuitus*
17. *Micromtus blakelyi R*
18. *Myriophyllum implicatum*
19. *Olearia cordata R*
20. *Persoonia mollis subsp. Maxima*
21. *Phyllanthus microcladus*
22. *Pultenea maritima (Coastal Headland Pea)*
23. *Senna acclinis (Rainforest Cassia) R*
24. *Syzigium paniculatum (Magenta Lilly Pilly) R*
25. *Tinospora tinosporoides (Arrow Head Vine)*
26. *Uromytrus australis (Peach Myrtle)*
27. *Wilsonia backhousei*

4. Range expansions predicted by 2070

28. *Acacia gordonii*
29. Angophora exul (Dwarf Apple)
30. *Caesalpinia bonduc* (Fever Nut)
31. *Chamaesyce psammogeton* (Sand spurge) R
32. *Diurius arenaria (Sand Doubletail) R*
33. *Grevillea caleyi (Claey's Grevillia)*
34. *Pimelea curviflora R*
35. *Quassia sp. Mooney Creek*
36. *Sophora tomentose* (Necklace Pod)
37. *Tetratheca glandulosa* (Glandular Pink Bell) R

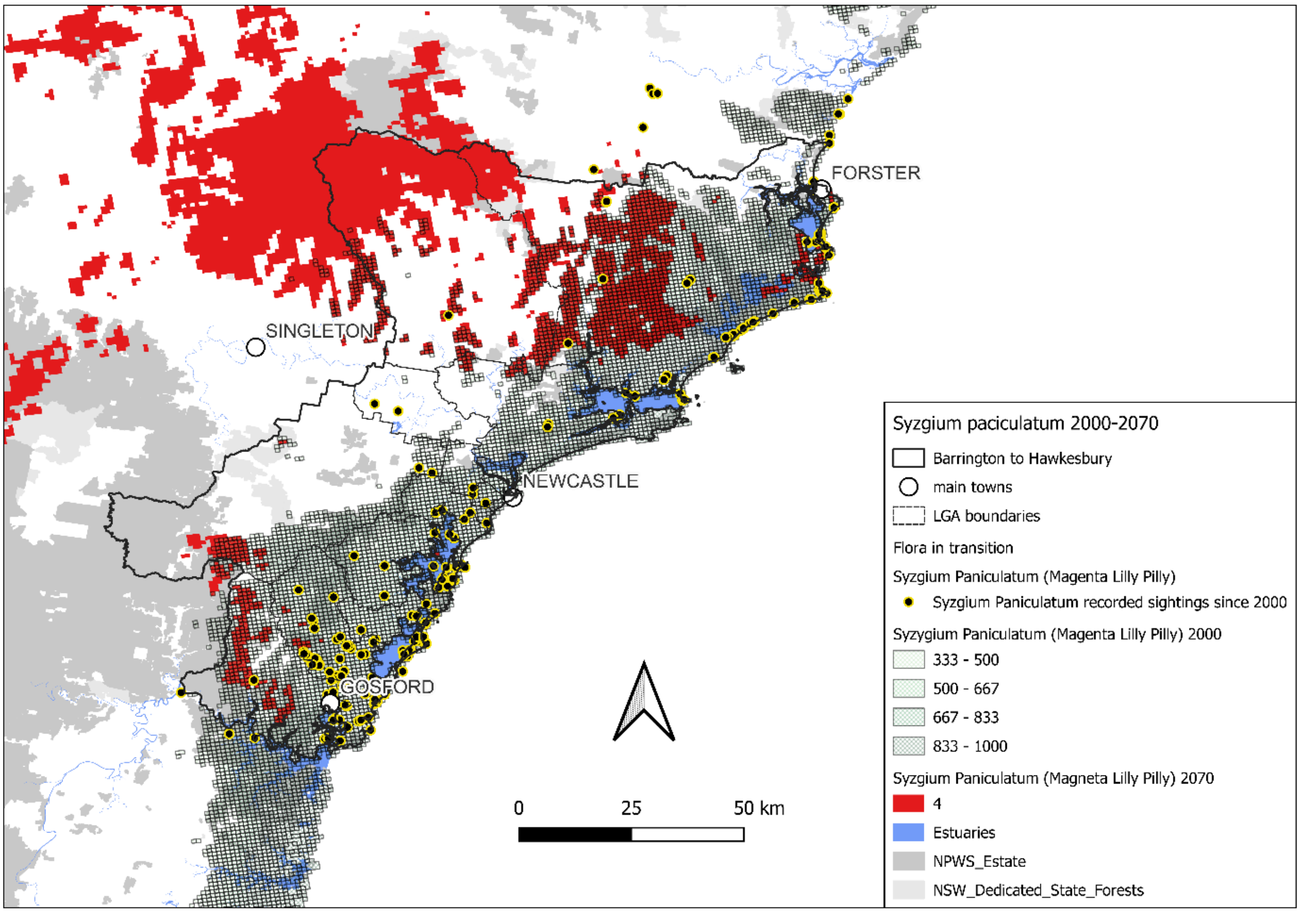


Map 26. Eucalyptus camfieldii (Camfiel's Stringy Bark) 2000-2070. Sighted since 2000. Range contractions by 2070 under all 4 climate futures.



Map 63. Senna acclinis (Rainforest Cassia) 2000-2070. Sighted since 2000. Range contraction by 2070 under all 4 climate futures.

Senna acclinis (Rainforest Cassia)

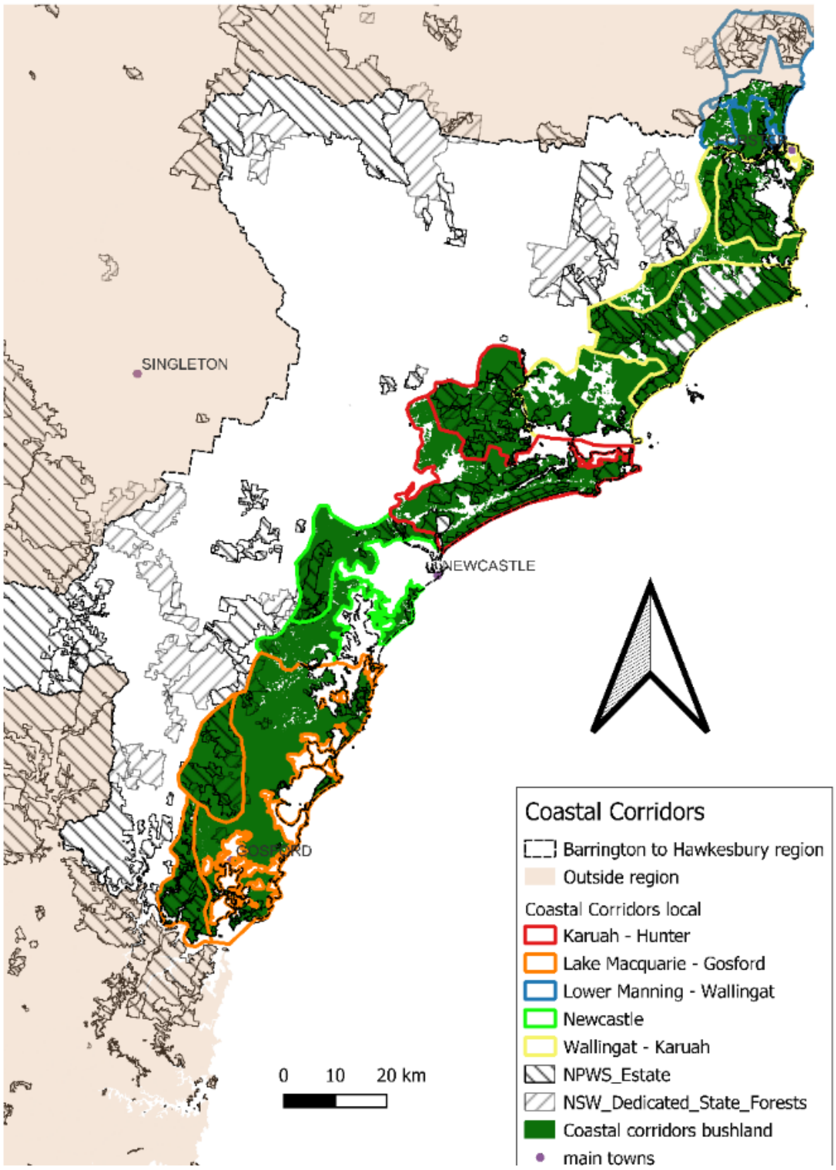


Map 66. Syzigium paniculatum (Magenta Lilly Pilly) 2000-2070. Sighted since 2000. Range contraction by 2070 under all 4 climate futures.

Climate Corridors

Regional scale corridors are particularly important to connect habitat refugia that may be critical to species' survival. Corridors can promote the movement of individuals between different populations, increasing gene flow and reducing genetic bottlenecks and drift associated with isolated populations, increasing the resilience of species to adapt to climate change.

If we are to provide the greatest chance for native species to survive the ravages of climate change, these connected habitats must be protected from further fragmentation and degradation



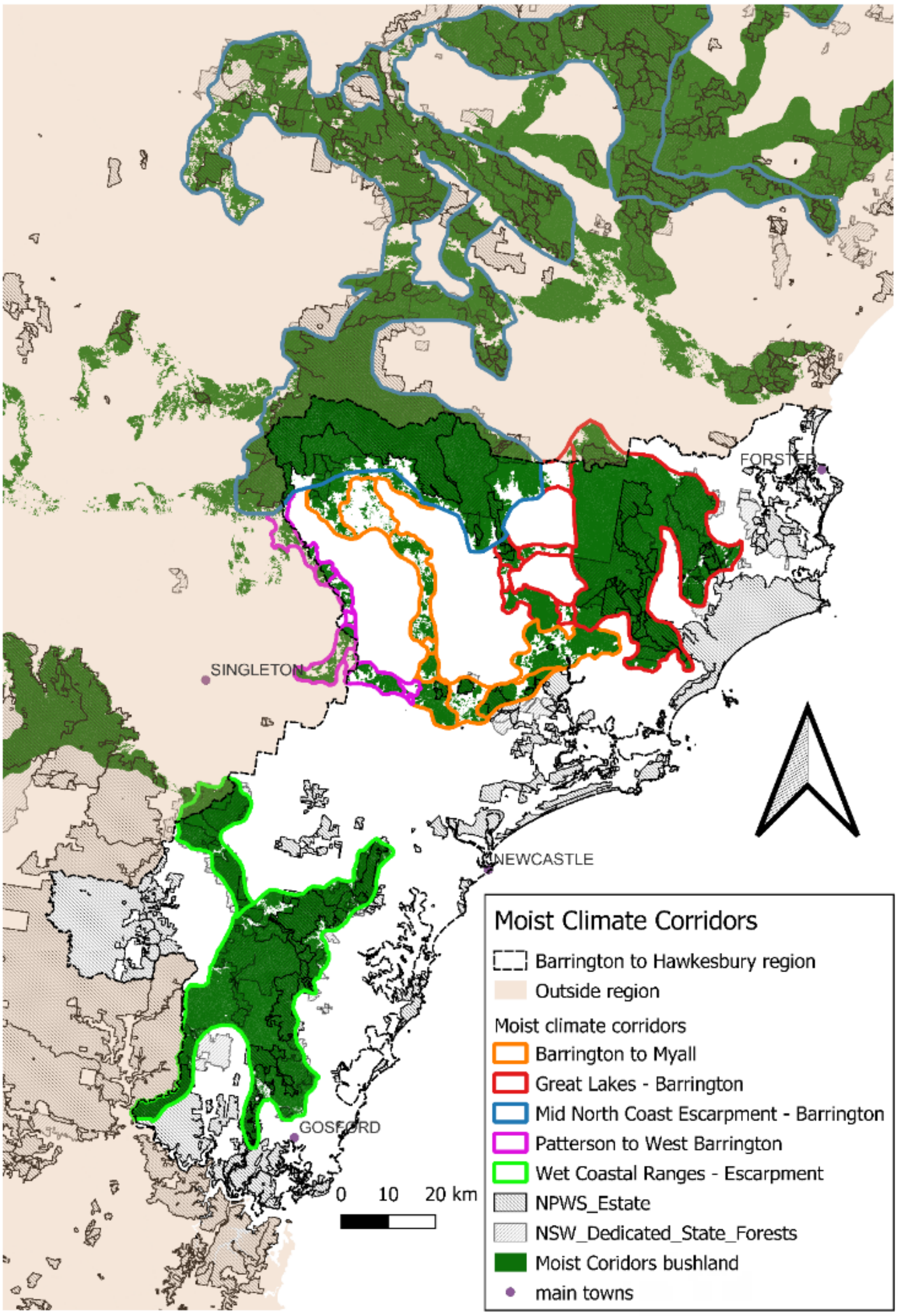
Five Coastal Climate Corridors, twelve Dry Climate Corridors, and five Moist Climate Corridors identified in 2007 by NSW Government (810,000 ha total) are recommended for protection from further regional bushland loss and degradation.

The five described Coastal Climate Corridors will improve reserve buffers, and provide links from the coast to the hinterland as well as between coastal habitats.

Key faunal species of these Climate Corridors include the Koala, Squirrel Glider, and Brush-tailed Phascogale with important populations in the coastal forests throughout this area, however much of the habitat is fragmented.

Map 4: Proposed protected Barrington to Hawkesbury Coastal Climate Corridor[5]

5 Dept of Environment and Climate Change (2007), Wildlife Corridors for Climate Change – Landscape Selection Process, Key altitudinal, Latitudinal and Coastal Corridors, An internal report, DECC, N.S.W. Datasets: State Government of NSW and Department of Planning and Environment (2010a). Climate Change Corridors (Coastal Habitat) for North East NSW. https://datasets.seed.nsw.gov.au/dataset/climate-change-corridors-coastal-habitat-for-north-east-nsw

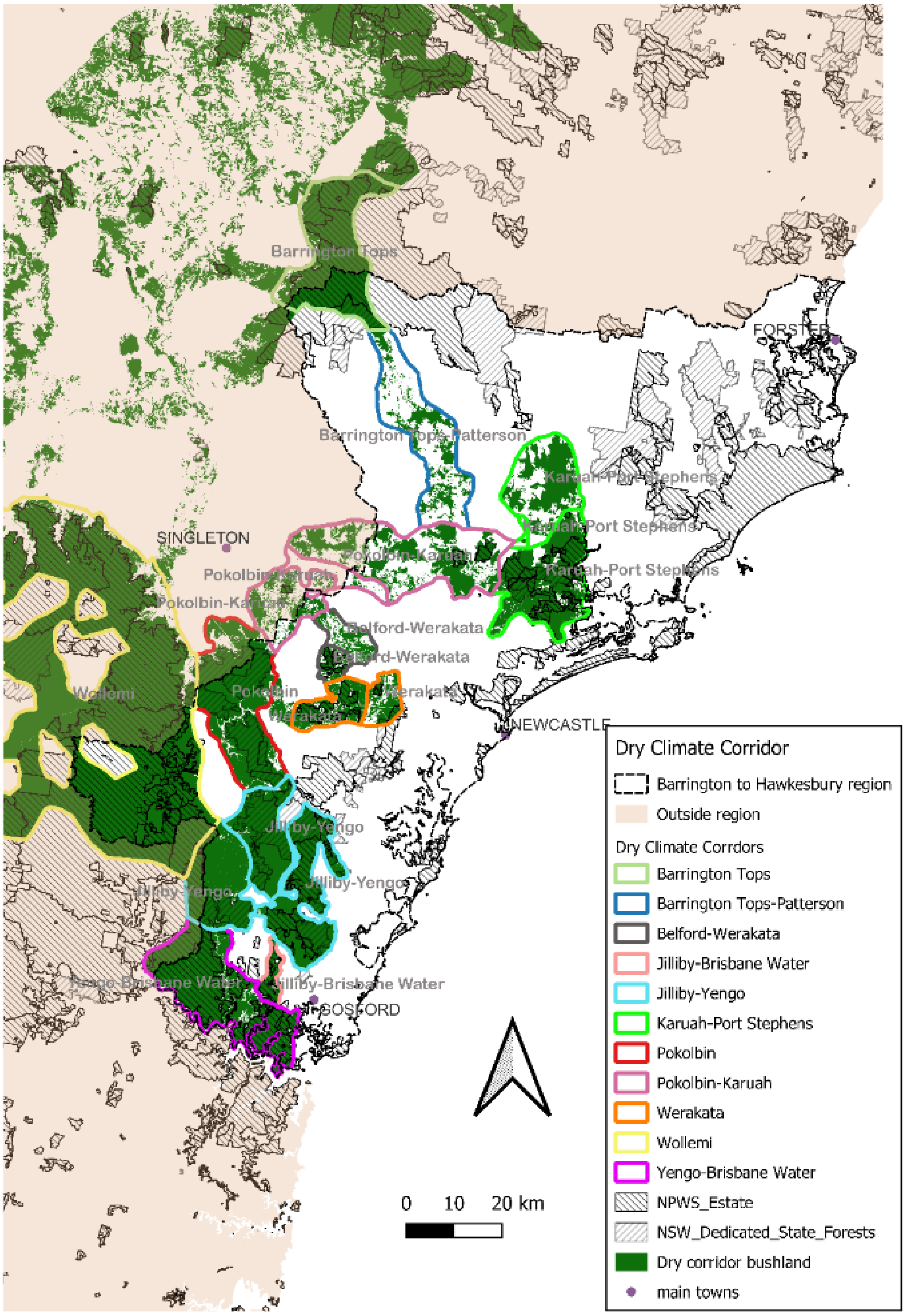


Map 5: Proposed protected Barrington to Hawkesbury Moist Climate Corridor[6]

The five Moist Climate Corridors link high altitudinal rainforest and wet sclerophyll and moist eastern foothills forests and link contiguous areas of forest across altitudinal and latitudinal gradients. However, they do not connect across the Hunter Valley representing a barrier for many moist habitat species.

These Moist Climate Corridors encompass critical habitat for almost 60 percent of the species projected to decline to 2070 in the region.

6 State Government of NSW and Department of Planning and Environment (2010b). Climate Change Corridors (Moist Habitat) for North East NSW. https://datasets.seed.nsw.gov.au/dataset/climate-change-corridors-moist-habitat-for-north-east-nsw



Map 6: Proposed protected Barrington to Hawkesbury Dry Climate Corridor[7]

There is a strong network of twelve Dry Climate Corridors and associated key habitats for dry habitat assemblages across the Hunter Valley in locations where moist habitat assemblages are absent. These Dry Climate Corridors encompass projected critical habitat for 40 percent of the species projected to decline by 2070.

These 22 Climate Corridors incorporate about 74 percent of the region. However, Climate Corridors that extend outside the region along the region's western boundary within Singleton LGA, provide vital linkages across the Hunter Valley.

7 State Government of NSW and Department of Planning and Environment (2010). Climate Change Corridors (Dry Habitat) for North East NSW. https://datasets.seed.nsw.gov.au/dataset/climate-change-corridors-dry-habitat-for-north-east-nswf5a7e

The pace of the changing climate is intensifying existing threats to native species, and is likely to become the greatest threat to native species in the coming decades.

Suitable habitat for no less than 204 Threatened NSW plant species occurs in the Barrington and Hawkesbury region, with the Hunter Valley at its centre and the Great Dividing Range providing a link between coastal and inland NSW, representing an important overlap between tropical and temperate zones, where the geographic limits of suitable habitat for many species are found.[8]

The region supports 255 Plant Community Types (PCT) within 11 Vegetation Formations (See Map1), and the is of immense ecological significance, supporting four features of high international conservation value including: Myall Lakes and Hunter Estuary - Ramsar Convention on Wetlands, Part Greater Blue Mountains World Heritage Area and Part Barrington Tops World Heritage Area [9]

If we wish to minimise native species' extinction, climate refugia and identified Climate Corridors must be legally protected and these connected habitats spared from further fragmentation and degradation now.


Cryptostylis Hunteriana, Eyeweed, 2009

8 Australian Government, 2018. Bioregional Assessment Hunter subregion.
9 ibid