



CHAPTER 18

The South East Corner Bioregion

1. Location

As the name suggests, this bioregion is in the southeast corner of NSW with a total area of 2,707,639 ha that extends into Victoria. The NSW portion of the bioregion is in two parts; the main body of the bioregion is bordered by Sydney Basin Bioregion to the north and the South Eastern Highlands Bioregion to the west, while a small outlying fragment lies between the Australian Alps and South Eastern Highlands bioregions. Together these areas occupy 48.09% of the bioregion at an area of 1,302,141 ha or 1.63% of NSW.

The bioregion includes the towns of Batemans Bay, Moruya, Narooma, Bermagui, Bega, Merimbula and Eden, most of the bioregion’s population living in the towns along the coast.

The Clyde, Deua, Moruya, Buckenbowra, Brogo, Wadbilliga, Towamba, Genoa and Tuross Rivers traverse the bioregion with the main catchments being the Clyde, Deua, Tuross, Bega, Towamba and Genoa catchments.

2. Climate

The part of this bioregion that occurs in NSW is dominated by a temperate climate, characterised by warm summers and no dry season. A small patch of the bioregion in the southwest occurs in a montane climate zone. This area is in the higher country, adjacent to the Australian Alps Bioregion and is characterised by mild summers.

3. Topography

The South East Corner Bioregion is shared between NSW and Victoria. It covers the eastern fall from the Great Dividing Range across the Great Escarpment to the coast. It also includes the upper catchment of the Deddick River and Lower Snowy River gorge. Most of the bioregion is underlain by folded and metamorphosed Ordovician to Devonian sedimentary rocks that have been intruded by several granite bodies. The topography runs from plateau above the escarpment across steep hills toward the coast with short, active streams. Altitude and rainfall affects the vegetation patterns across the bioregion.

Mean Annual Temperature	Minimum Average Monthly Temperature	Maximum Average Monthly Temperature	Mean Annual Rainfall	Minimum Average Monthly Rainfall	Maximum Average Monthly Rainfall
7 – 16°C	-3.5 – 8.4°C	19.2 – 28.8°C	507 – 1523mm	29 – 102mm	58 – 155mm

4. Geology and geomorphology

Basement rocks are folded Ordovician slates, cherts, and quartzite of the Lachlan Fold Belt. Less deformed Devonian sandstones and mudstones overlie the Ordovician rocks and the whole sequence has been intruded by several major granite bodies (about 380 million years old) that now form the bedrock over half of the bioregion. Small areas of Tertiary basalt and local deposits of quartz gravel and sand occur along the coast. Quaternary sediments are relatively unimportant except for the beaches and dunes of small coastal barrier systems.

Different rock types have a strong influence on topography. The metamorphosed sediments are oriented north-south and this controls the overall direction of the coastal ranges. Granites in the Bega Valley weather faster than the surrounding metamorphosed sediments and are eroded into local topographic basins. Other granites with a higher proportion of quartz form steep country with areas of outcrop and rounded tors.

The most prominent feature of the region is the Great Escarpment, a line of steep hills and gorges on the coastal side of the Great Divide that is formed by headward erosion of streams into the continental flexure created at the time of rifting of the Tasman Sea. Most streams have their headwaters at the escarpment but some begin on the plateau above it and flow parallel to the coast for some distance before crossing the escarpment in a gorge with waterfalls. More detailed patterns of stream direction relate to smaller joints and faults in the bedrock and both dendritic and rectangular drainage patterns are present.

Soils vary with bedrock type and slope position and texture contrast profiles dominate. Metamorphic rocks weather to clay and granites weather to a mixture of sand and clay. Metamorphic rocks generally form steeper slopes and thus the soils on them are thin and stony and form a texture contrast profile with thin topsoil of fine sandy loam. The clay subsoil resists the penetration of water and most profiles, especially in lower slope positions, have a strongly bleached zone in the topsoil caused by lateral throughflow. Soils on granites are generally coarser, deeper and better drained and deliver more sandy sediment to the valley floors and the coastline.

The coastline is a mixture of rocky cliffs and small sand barriers built across the mouths of most streams. Unlike the north coast only one phase of barrier development is apparent and soils formed in the dunes are podsol profiles but these only have minimal profile development. Sediments in the estuaries are mainly sand.

5. Geodiversity

Important features include the following:

- cliffs south of Durras have exposed glacio-marine sediments and an unconformity;
- cliffs at Twofold Bay have an excellent example of a faulted fold;
- good examples of pillow lavas can be seen on Narooma Headland;
- Silurian limestone in the upper Deua Valley contains important fossils and has a karst topography;
- the Mt Dromedary monzonite is petrologically unusual;
- Montague Island is composed of monzonite with a cover of dune sand that supports an unusual vegetation community dominated by lomandra (*Lomandra longifolia*) that is apparently affected by high inputs of guano from sea birds; and
- some landscape features such as Mumbulla Mountain have cultural significance to Aboriginal people and still retain story associations.



Photo: M. Van Ewijk

6. Soils

Typical soils found across the South East Corner Bioregion are texture contrast profiles with their properties differing with rock type. Well-drained coarse granite soils are found in the lower Snowy River valley.

7. Biodiversity

7.1 Plant communities

The diversity in topography, rainfall and temperature across the bioregion is reflected in the diversity of vegetation communities across the bioregion.

The coastal headlands support heaths dominated by hakea (*Hakea sericea*), melaleuca (*Melaleuca armillaris*), coast rosemary (*Westringia fruticosa*) and dwarfed red bloodwood (*Corymbia gummifera*). These heath communities occupy shallow soils subject to high salt spray input and frequent fire.

Moving inland, vegetation changes markedly with altitude. Red bloodwood and spotted gum (*Eucalyptus maculata*) forests dominate to an altitude of about 100-200m. Above 200m, yellow stringybark (*E. muellerana*), grey ironbark (*E. paniculata*) and woollybutt (*E. longifolia*) associations are found, with brown barrel (*E. fastigata*), blue-leaved stringybark (*E. agglomerata*), messmate (*E. obliqua*) and monkey gum (*E. cypellocarpa*) associations occurring to about 900m. Narrow-leaved peppermint (*E. radiata*) and snow gum (*E. pauciflora*) are common at the highest altitudes.

Latitude differences are also evident, with Sydney peppermint (*E. piperita*), large-fruited red mahogany (*E. pellita*), Sydney blue gum (*E. saligna*) and spotted gum being found in the northern part of the region. Blue box (*E. bauerana*), bangalay (*E. botryoides*), coastal grey box (*E. bosistoana*) and woollybutt are found further to the south. Granite areas commonly support forest red gum (*E. tereticornis*) and blue gum (*E. globulus*), while black ash (*E. sieberi*) can be found in almost all forest environments.

In the lower Snowy River valley the steep slopes, well-drained coarse granite soils and low rainfall support very different vegetation. Vegetation communities here are dominated by white box (*E. albens*), black cypress pine (*Callitris endlicheri*), and scattered kurrajong (*Brachychiton populneum*). Towards the top of the steeper slopes with northerly aspects, soils derived from volcanic and sedimentary rocks support very rare acacia dry scrub communities dominated by *Acacia silvestris* and *Eriostemon trachyphyllus*. These scrubs are dependent on periodic intense fire for their long-term survival.

Small patches of temperate rainforest with sassafras (*Doryphora sassafras*) and lilly pilly (*Acmena smithii*) occur in gully heads and as a gallery forest along major streams in sheltered locations. River oak (*Casuarina cunninghamiana*) is also present along most steams.

The coastal dune pattern is much the same as elsewhere in NSW with an inland forest of various banksia, bangalay (*E. botryoides*) and blackbutt (*E. pilularis*). Estuaries support small areas of stunted mangrove (*Avicennia marina*) and salt marsh, with a fringe of swamp oak (*Casuarina glauca*).

7.2 Significant flora

Forty-four species from the NSW part of the South East Corner Bioregion are listed in the schedules of the TSC Act (NSW NPWS 2001). Of these, 17 are listed as endangered, 26 are listed as vulnerable and one species, *Prostanthera marifolia*, is considered extinct in the bioregion.

In the outlying portion of the South East Corner Bioregion tall woodland dominated by *E. albens* and *Callitris spp.* is found along dry and exposed aspects of the Snowy River. It is the only occurrence of this association east of the Snowy Mountains and hence a significant one. It is protected in Kosciuszko National Park (NSW NPWS 1988). Another significant association known as the “black scrubs”, consisting of a coastal remnant rainforest species, *Acacia silvestris*, an inland wattle *A. doratoxylon* and a shrub *Eriostemon trachyphyllus*, can also be found in the outlying part of the bioregion (NSW NPWS 1988).

7.3 Significant fauna

Eighty-eight fauna species from the NSW part of the South East Corner Bioregion are listed in the schedules of the TSC Act (NPWS 2001). Of these, 19 are listed as endangered and 69 are listed as vulnerable. Of particular note is the endangered long-footed potoroo (*Potorous longipes*), the only occurrence of which in NSW is in this bioregion. It has been recorded in the South East Forests National Park and nearby state forests (NSW NPWS 1999).

Compared to other bioregions the South East Corner is reasonably intact, with just under 20% of its native canopy having been cleared, but the bioregion is considered to be in the intensive use zone and many forests in the bioregion have been logged intensively (Australian Terrestrial Biodiversity Assessment 2002).

The bioregion supports several threatened bird species, including the vulnerable mainland subspecies of ground parrot (*Pezoporus wallicus*), the southern subspecies of eastern bristlebird (*Dasyornis brachypterus*) in coastal heaths and the eastern subspecies of hooded plover (*Thinornis rubricollis*) on beaches.

The ranges of birds in the bioregion tend to be fairly restricted and, contrary to national trends, a decline in species of forest birds is evident, particularly cockatoos, owls and treecreepers, as well as many smaller bush birds (Australian Terrestrial Biodiversity Assessment 2002). Declines in woodland, ground-feeding insectivores and some grassland birds are also evident. On a more encouraging note, species such as the white-headed pigeon (*Columba leucomela*) and spotted turtle-dove (*Streptopelia chinensis*) seem to have increased in number in the bioregion (Australian Terrestrial Biodiversity Assessment 2002).

7.4 Significant wetlands

There were no bioregionally significant wetlands recorded in the NSW part of the South East Corner Bioregion (Australian Terrestrial Biodiversity Audit 2002). A number of wetlands in the bioregion are regarded as nationally important and listed in the Directory of Important Wetlands in Australia (ANCA 1996).

These wetlands are exposed to a variety of threats including runoff from surrounding urban areas, impacts from feral animals and exotic weeds, grazing pressure, pollution from recreational boating and storm water runoff. Other impacts include increasing fragmentation due to development, changed hydrology from barrage construction, soil erosion from tracks and roads, increasing development and population, construction of marine structures e.g. groynes, professional fishing and recreational four-wheel driving.

8. Regional history

8.1 Aboriginal occupation

The Aboriginal people of the South East Corner Bioregion referred to themselves as “Katungal” which distinguished them from those who occupied the inland and mountain areas (HO and DUAP 1996). The river basins of the Towamba and Bega Rivers were occupied by the Taua and Djiringanj groups respectively, while the Walbanga people considered their territory to be the valleys north of the Tuross and Moruya Rivers (HO and DUAP 1996). In essence, these four main waterways were home to the three Aboriginal groups of the bioregion and because all three groups were confined to the coast by the mountains in the west they led a largely coastal lifestyle (HO and DUAP 1996). Since the coast offered plentiful food supplies and the groups occupied fairly small homelands, the Aboriginal communities of the South East Corner Bioregion were relatively less mobile compared to those groups of the inland areas of the south (HO and DUAP 1996).

In the early 1800s, as explorers and, subsequently, early settlers began to encroach on the homelands of the Aboriginal people, violence and altercations occurred. The peaceful coastal life of the Katungal people became more and more disrupted.

8.2 European occupation

The 1820s saw the advent of the agricultural era with the arrival of cattlemen and their stock, and the 1830s and 40s marked the start of increasingly permanent European settlement in the bioregion (HO and DUAP 1996). During this time European settlers used the best land for agriculture and the best fishing locations for themselves, preventing the local Aboriginal people from using these resources in their traditional ways (HO and DUAP 1996). Hence in the 1840s many Aboriginal people sought work with the new settlers, men undertaking sheep washing or agricultural labour while women worked as domestic servants.

In these early years of European settlement, the pastoral industry developed slowly due to infrequent communications with the colony in Sydney, but soon after a significant whaling industry developed in Twofold Bay, near the present site of Eden (HO and DUAP 1996). Whaling, which occurred from the 1830s to the 1920s, involved and depended on the local Aboriginal community, many of whom played an essential role in the industry as a significant component of the labour force. Despite this integration into the workforce and although they built good working relationships with the Europeans while managing some “continuity of traditional culture and social structure” (HO and DUAP 1996), the Aboriginal people were unable to wholly preserve their traditional way of life.

Mining also played a part in the history of the South East Corner Bioregion, with many prospectors finding gold, silver and, fleetingly, arsenic in the wooded hills of the area between Batemans Bay and Eden (HO and DUAP 1996). Gold was first recorded in 1852 and has been mined in the area since then, although there are currently no active gold mines in the area (NSW Department Mineral Resources website – <http://www.minerals.nsw.gov.au/>). The mining industry became the basis for numerous towns, which prospered with populations of hundreds until the end of the frenetic periods of mining, then gradually faded as the prospectors departed.

The forests of the bioregion were logged to resource the construction of houses, wharves and the railway system, although the most controversial large-scale logging of the bioregion has occurred in more recent years (HO and DUAP 1996).

While beef cattle and sheep farming was the original intent of many landholders in the region, dairy farming soon surpassed these ventures as the principal agricultural industry of the area. By the twentieth century, the Bega Valley was the dominant milk and cheese producer of southern NSW and Canberra, although the region has always produced more butter than cheese (HO and DUAP 1996). The dairying industry in the area was not achieved without vast clearing of the natural woodland that covered the region previously.

Other important industries include pig farming, maize and sorghum production and fishing.

9. Bioregional-scale conservation

The South East Corner Bioregion is managed in conservation tenures that together occupy about 561,434.41 ha or 43.31% of the bioregion.

There are 18 national parks, 12 nature reserves and 2 Crown reserves wholly or partly in the bioregion, and together these occupy 547,079.38 ha or 42.20% of the bioregion. Nine wilderness areas (Brogo, Bedewing, Burra Oulla, Byadbo, Genoa, Nadgee, Pilot, Woila Deua, and Yowrie) occupy much of the reserved area of the region, together occupying about 224,602 ha or 17.25% of the bioregion. Davidson Whaling Station Historic Site occupies 15.98 ha, a small percentage of the bioregion, and there are no Aboriginal areas, no karst areas, no state recreation areas and no regional parks in the bioregion.

NPWS-managed Crown reserves under the Crown Lands Act occupy 848.48 ha or 0.07% of the bioregion.

Some landholders in the bioregion have entered into private land conservation agreements under the provisions of the NPW Act 1974 or the NVC Act 1997. In recent years, landholders have entered into 26 voluntary conservation agreements, which together occupy about 711 ha or 0.05% of the bioregion. Landholders on 9 properties also hold wildlife refuges which occupy 1205.43 ha or 0.09% of the bioregion (updated mapping, being undertaken at the time of writing, is likely to increase this figure). In addition there are 4 property agreements in the bioregion under the NVC Act 1997 which occupy about 143.42 ha or 0.01% of the bioregion. Together these areas of private land conservation total 2059.94 ha or 0.16% of the South East Corner Bioregion.

Seventeen flora reserves managed under the provisions of the Forestry Act 1916 occupy 8,576.25 or 0.66% of the bioregion and these contribute towards biodiversity conservation. In addition the bioregion includes State forests which are managed primarily for forestry activities under the Forestry Act 1916 and occupy 323,757.86 ha or about one quarter (24.86%) of the bioregion.

Land given protection by State Environmental Planning Policies in the bioregion includes 5,844.66 ha (0.45%) of SEPP 14 coastal wetlands, 3.01 ha (0.0002%) of SEPP 26 Littoral Rainforests and 16,505.23 ha or 1.27% of SEPP 58 (Protecting Sydney’s Water Supply).



Photo: I. Brown

10. Subregions of the South East Corner Bioregion

(Morgan 2001)

Subregion	Geology	Characteristic landforms	Typical soils	Vegetation
Bateman	Tightly folded fine grained Ordovician metamorphic rocks with several intrusions of granite. Western margin is a tight synclinal fold in Devonian sandstone and siltstone. Small areas of Tertiary basalt and quartz sands behind the coastal headlands. Quaternary alluvium on main valley floors and in the estuaries.	Steep hills below the Great escarpment oriented north-south and controlled by rock structure. Lines of hills become lower toward the coast with a slight up turn along the coastal margin. Coastal barrier systems are small and estuarine fills limited.	Mostly texture contrast soils. Red clay subsoils with thin topsoil on metamorphic rocks, deeper coarser grained profiles on granite. Red brown structured loams on basalt and deep siliceous sands with some podsol development on Tertiary sands and coastal dunes.	Hakea, melaleuca, coast rosemary and dwarfed red bloodwood heath on headlands. Red bloodwood and spotted gum forests to 300 m. Yellow stringybark, grey ironbark and woollybutt to 550 m. Brown barrel, black ash, Sydney peppermint, large-fruited red mahogany, Sydney blue gum and monkey gum to 900 m, then snow gum.
East Gippsland Uplands	Extensive areas of granite amongst Ordovician and Silurian metamorphosed sedimentary and volcanic rocks; slates, chert, quartzites. Gently folded red and purple Devonian sandstones and shales, limited areas of Tertiary basalt and sand deposits. Quaternary coastal sediments and small areas of alluvium.	Very abrupt margin on the Great Escarpment. Deep gorges with rapids and waterfalls in the main streams including the lower Snowy River. Extensive subdued basin with rolling hills on the Bega granite with steep hillslopes at the contact aureole. Streams carry large volumes of sand to valley floors and estuaries. Small beach, dune, lagoon barrier systems.	Coarse texture contrast soils on granite, thinner profiles on metamorphics with red and yellow clay subsoils. Deep coarse sands in granite derived alluvium often deposited in swampy valley flats. Deep fine sands in dunes. Peaty sands in lagoons and swamps.	Red bloodwood and spotted gum forests to 300 m. Spotted gum less common in the south. Yellow stringybark, grey ironbark, black ash, yertchuk and woollybutt to 550 m. Brown barrel, black ash, large-fruited red mahogany, and monkey gum to 900 m, then snow gum.
East Gippsland Lowlands	Granites in the head of the Genoa River. Small areas of Devonian sandstone overlain by Tertiary sands and Quaternary coastal dunes near Cape Howe.	Low rounded coastal hills on granite, higher and steeper on Devonian sandstones. Beach, dune and lagoon barrier development on the main streams with dunes some distance inland at Cape Howe.	Coarse texture contrast soils on granite, subject to high rates of erosion even under forest cover. Deep sands in dunes. Peaty sands in lagoons and swamps.	Coastal sequence on dunes with thickets of coast tea-tree and sedge communities around swamps. Stunted black ash and red bloodwood clumps close to the coast becoming taller inland with bangalay, rough-barked apple, river peppermint, coast grey box, black she-oak and blue gum.

11. References

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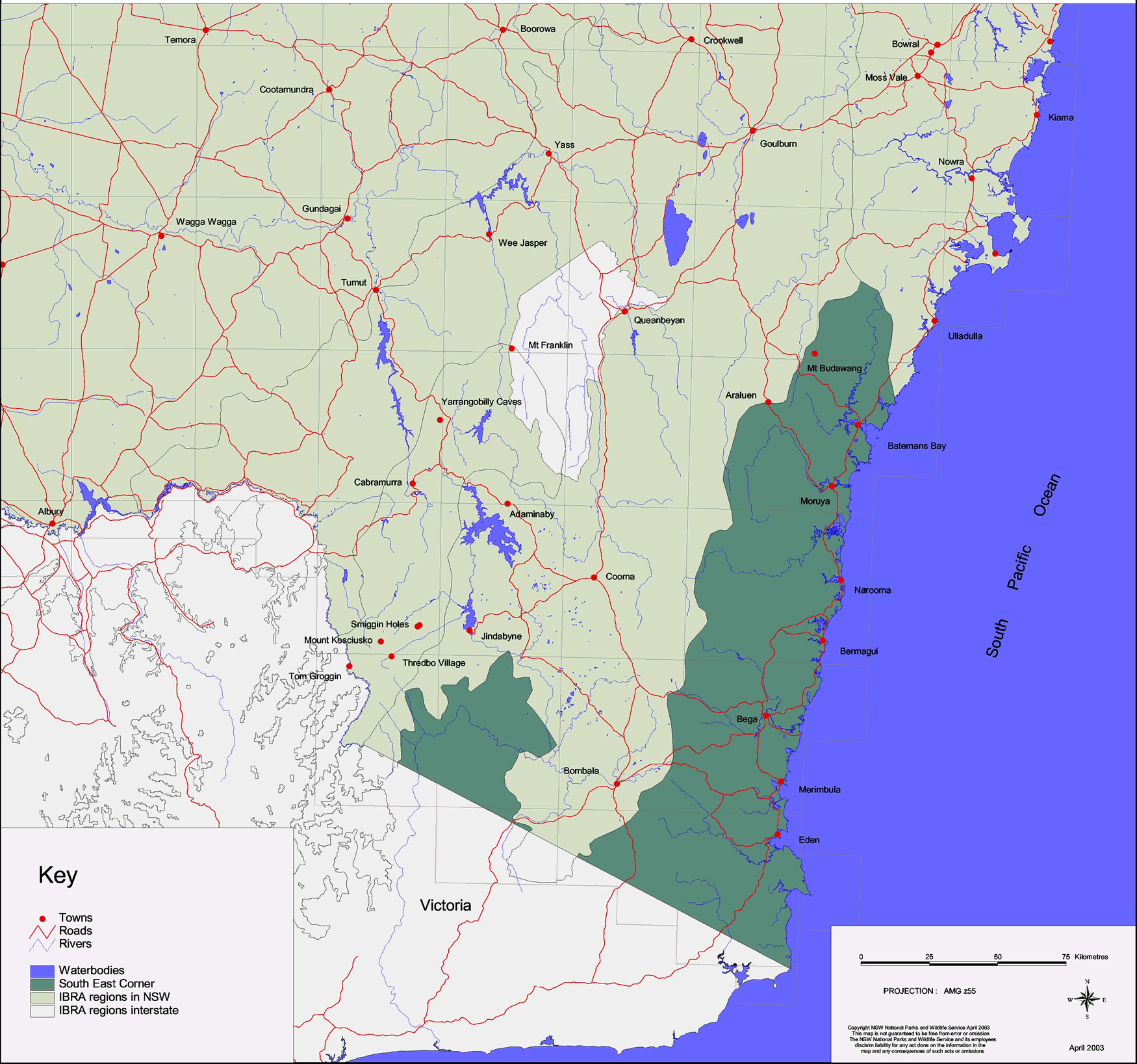
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Website

NSW Department Mineral Resources – <http://www.minerals.nsw.gov.au/>

South East Corner Biogeographic Region (IBRA) - Location



Key

- Towns
- Roads
- Rivers
- Waterbodies
- South East Corner
- IBRA regions in NSW
- IBRA regions interstate

0 25 50 75 Kilometres

PROJECTION: AMG z55

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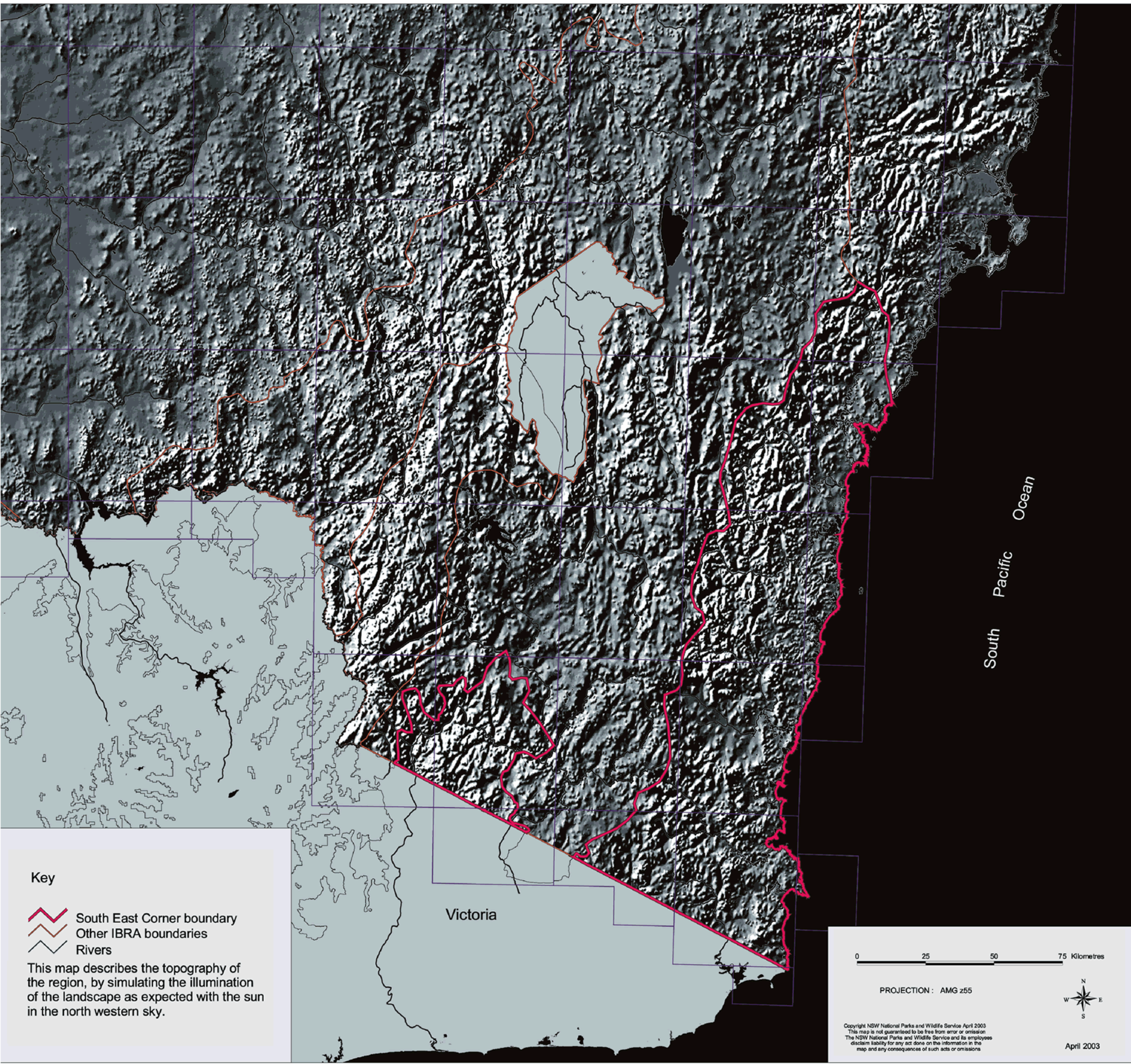


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South East Corner Biogeographic Region (IBRA) - Rivers



South East Corner Biogeographic Region (IBRA) - Topography



Key

- South East Corner boundary
- Other IBRA boundaries
- Rivers

This map describes the topography of the region, by simulating the illumination of the landscape as expected with the sun in the north western sky.

Victoria

South Pacific Ocean

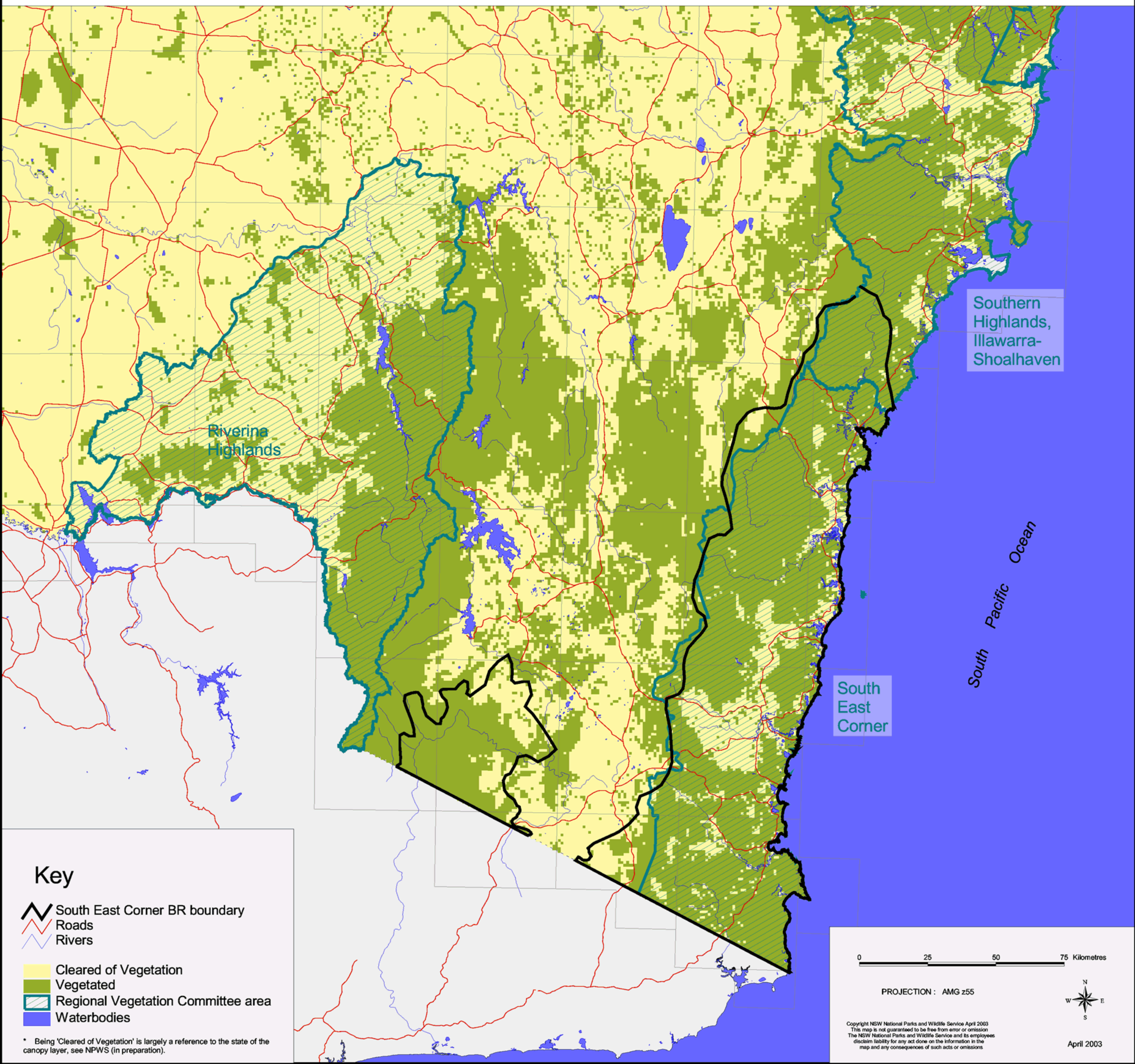
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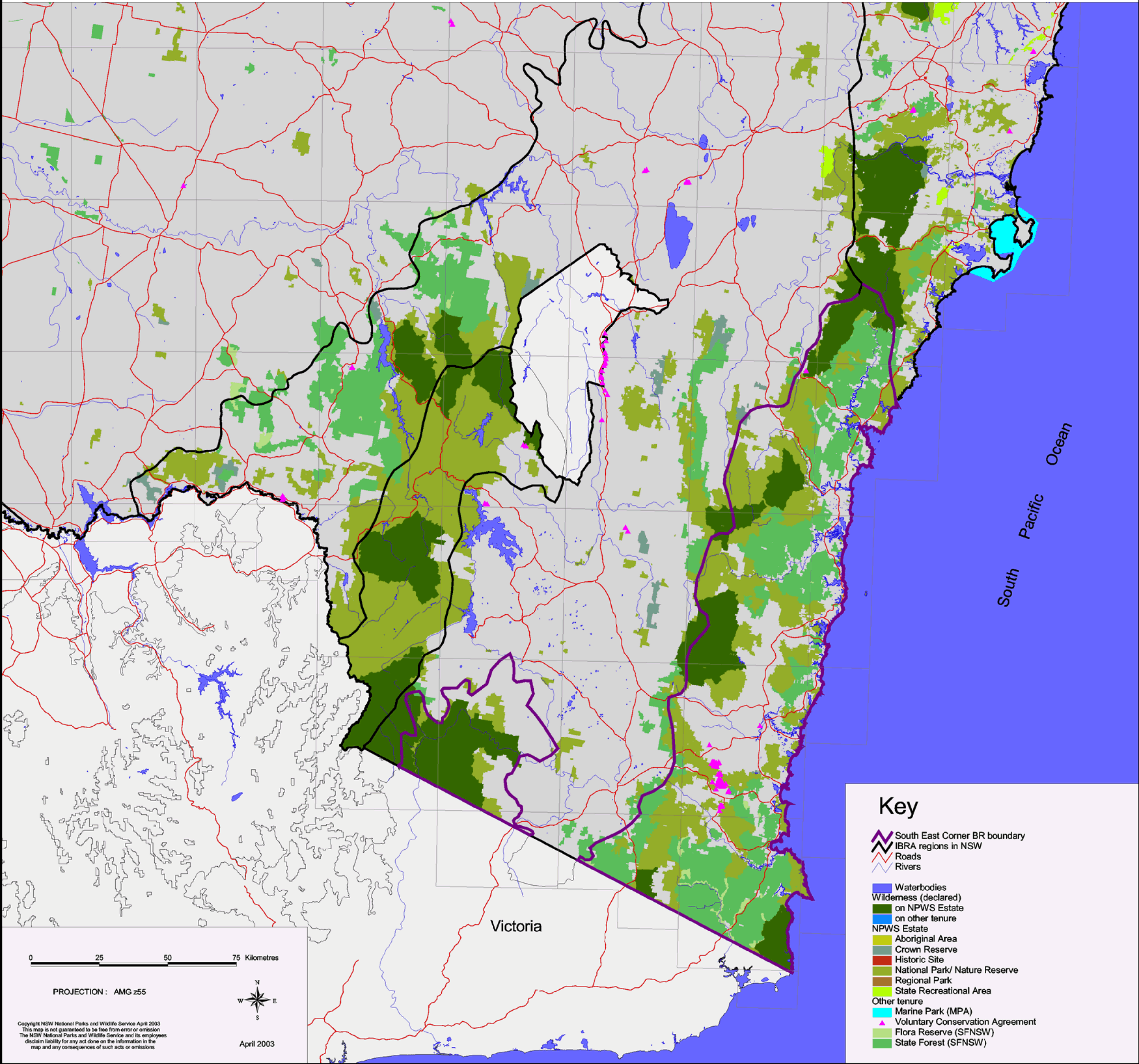
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South East Corner Biogeographic Region (IBRA) - Vegetation




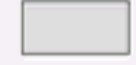


South East Corner Biogeographic Region (IBRA) - Tenure/Reserves





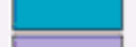




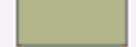
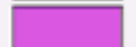

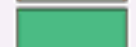










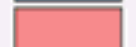














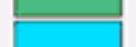









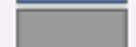











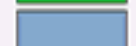







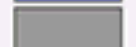


South East Corner Biogeographic Region (IBRA) - Subregions and Landscapes (NPWS, in preparation)

Key

-  Subregions (IBRA)
-  South East Corner
-  IBRA regions in NSW
-  IBRA regions interstate

Landscapes

	943		1064		1132
	944		1065		1133
	946		1076		1134
	947		1084		1135
	948		1085		1136
	949		1090		1140
	966		1092		1141
	1008		1093		1143
	1012		1094		1145
	1013		1095		1146
	1014		1096		1151
	1015		1097		1153
	1016		1098		1155
	1017		1099		1156
	1025		1100		1157
	1035		1102		1158
	1036		1104		1159
	1045		1107		1161
	1047		1109		1162
	1057		1110		1163
	1060		1112		1164
			1128		1165
			1129		1166
			1130		1167

* A description of each landscape, identified by these landscape codes, is available in 'State Conservation Monitoring Project - Monitoring NSW Environments' (NPWS, in preparation)

0 25 50 75 Kilometres

PROJECTION : Lamberts

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