CHAPTER 13

The New England Tableland Bioregion

1. Location

The New England Tableland Bioregion has an area of 3,004,202 ha of which 2,860,758 ha or 95.23% of the bioregion lies within NSW. This bioregion is one of the smaller bioregions in NSW, occupying 3.57% of the state.

The bioregion lies between the North Coast and Nandewar bioregions in northeast NSW, extending north just into Queensland. In NSW, the bioregional boundary extends from north of Tenterfield to south of Walcha and includes towns such as Armidale and Guyra, with Inverell just outside the boundary.

The bioregion includes parts of the MacIntyre, Clarence, Gwydir, Macleay, Namoi and Manning River catchments.

2. Climate

The bioregion lies mainly in the temperate to cool temperate climate zone of NSW, which is characterised by warm summers, with uniform rainfall generally occurring in summer (Bureau of Meteorology website – http://www.bom.gov.au/). A warmer, sub-humid climate is present in the northeastern edge of the bioregion on the boundary of the North Coast Bioregion. Patches of montane climate occur at higher elevations, and these are characterised by mild summers and no dry season (Stern *et al.* 2000).

3. Topography

The New England Tableland Bioregion is a stepped plateau of hills and plains with elevations between 600 and 1500m on Permian sedimentary rocks, intrusive granites and extensive Tertiary basalts. Rainfall, temperature and soils change with topography and bedrock, and the vegetation is very diverse with a high degree of endemism.

4. Geology and geomorphology

The New England fold belt in the northeast of the state is composed of sedimentary rocks of Carboniferous and Permian age that were extensively faulted during a period of rapid continental plate movement associated with granite intrusions in the late Carboniferous. Much of the bedrock is now overlain by Tertiary basalt flows rarely exceeding 100m in thickness that lie on river gravels and sands or on lake sediments. As the basalt erodes the sands are exposed and have been mined for the sapphires, diamonds, gold and tin ore that they contain.

Mean Annual Temperature	Minimum Average Monthly Temperature	Maximum Average Monthly Temperature	Mean Annual Rainfall	Minimum Average Monthly Rainfall	Maximum Average Monthly Rainfall
9 – 17°C	-3.6 – 6°C	20.8 – 31.6°C	653 – 1765mm	31 – 86mm	83 – 304mm

The geology has a strong influence on topography. The eastern edge of the bioregion is at the Great Escarpment where coastal streams have cut deep gorges below the plateau. The granite country is steep with abundant boulder outcrops and rounded tors. The basalt country is more planar, except around former eruption centres that form high peaks and the individual basalt flows are seen as distinct levels across the plains. The basalts disrupted former drainage patterns and today the pre-basalt topography has been inverted with former valley floors, becoming ridge crests and hills. Large swamps and lagoons such as Llangothlin were partly created by these topographic changes.

During the Quaternary, colder climates had a major impact on vegetation patterns and allowed the formation of wind-blown lunettes on the eastern margins of the lagoons. Sediment in the lagoon floor preserves a pollen record of these changes.

5. Geodiversity

Important features include the following:

- the Great Escarpment with deep rugged gorges such as Apsley Gorge, and steep bouldery slopes on granite on the Moonbi Range;
- granite tor landscapes in many areas throughout the bioregion;
- scree slopes from high rocky peaks such as Ben Lomond may reflect cold climates of the past;
- disrupted drainage patterns and evidence of the development of a new system after the basalt eruptions;
- shallow swamps and lagoons such as Llangothlin and Mother of Ducks Lagoon contain valuable Quaternary pollen records in their sediments;
- pseudo-karst landforms occur in granite boulder streams; and
- heritage features associated with extensive mining of gold, tin and gemstones using techniques that were not common elsewhere in the state.

6. Soils

Siliceous sands derived from granites are found among rock outcrops. Red earths and mellow texture contrast soils of relatively low fertility and poor structure are widespread across the bioregion and are prone to erosion. Soils with increased organic matter occur in swampy sedgelands in valleys. These soils support a variety of open forests and woodlands.

In basalt areas, shallow stony loams are found on steep areas and deep, red brown and brown to black, fertile, well-structured loams are found on flatter slopes. Soils are sometimes waterlogged in valley floors. Siliceous sands and red earths occur on associated Tertiary sands and gravels.

Harsh texture contrast soils in the bioregion derived from Permian sedimentary rocks are generally yellow, thinner and stonier on steep slopes. Some areas of slightly saline soils also occur.

7. Biodiversity

7.1 Plant communities

Granitic soils derived from the prominent New England batholith support a variety of open forests and woodlands. These mainly consist of silver-top stringybark (*Eucalyptus laevopinea*), Blakely's red gum (*Eucalyptus blakelyi*), Youman's stringybark (*Eucalyptus youmanii*), yellow box (*Eucalyptus melliodora*), apple box (*Eucalyptus bridgesiana*), rough-barked apple (*Angophora floribunda*), black cypress pine (*Callitris endlicheri*), manna gum (*Eucalyptus viminalis*) and snow gum (*Eucalyptus pauciflora*).

Photo: Murray Robinson

The western slopes are dominated by tumbledown gum (*Eucalyptus dealbata*), western New England blackbutt (*Eucalyptus andrewsii*), Caley's ironbark (*Eucalyptus caleyi*), red stringybark (*Eucalyptus macrorhynca*), McKie's stringybark (*Eucalyptus mckiena*), white cypress pine (*Callitris glaucophylla*) and black cypress pine, rough-barked apple and silver-leaved ironbark (*Eucalyptus melanophloia nophloia*).

Areas at higher altitudes comprise vegetation communities dominated by messmate (*Eucalyptus obliqua*) and mountain gum (*Eucalyptus dalrympleana ssp. heptantha*), with snow gum, black sallee (*Eucalyptus stellulata*) and ribbon gum (*Eucalyptus nobilis*). Orange gum (*Eucalyptus prava*) and black cypress pine are widespread in rocky outcrops in the north of the bioregion. Protected high rainfall areas near the Great Escarpment display cool temperate rainforest elements, including Beech (*Notofagus moorei*) forests. River oak (*Casuarina cunninghamiana*) lines rivers and streams in the western part of the bioregion below an elevation of 800 m, with sedgelands found in some of the smaller streams.

Vegetation found on basalt-derived soil consists of open forests and woodlands of manna gum, snow gum and black sallee. Cold-air drainage inverts the tree patterns in wide valleys, as the distribution of these species is largely determined by climate parameters. Vegetation communities growing on basaltic soils consist of New England stringybark (*Eucalyptus calignosa*) New England blackbutt (*Eucalyptus campanulata*), and narrow-leaved peppermint (*Eucalyptus radiata*) on the hills, with yellow box, wattle-leaved peppermint (*Eucalyptus acaciiformis*), New England peppermint (*Eucalyptus nova-anglica*), snow gum, black sallee and ribbon gum in the valleys.

Open forest of New England stringybark, yellow box, Blakely's red gum and rough-barked apple occurs on Tertiary sands.

Vegetation growing on soils derived from Permian sedimentary rocks in the west is dominated by white box (*Eucalyptus albens*), grey box (*Eucalyptus moluccana*), yellow box and Blakely's red gum, with localised occurrences of mugga (*Eucalyptus sideroxylon*) on stony ridges. Youman's stringybark, tumble down gum and black cypress pine also occur on sediments with silver-leaved ironbark, white cypress pine and the occasional kurrajong. Snow gum and black sallee dominate the coldest ridges while ribbon gum, mountain gum, silver-top stringybark, New England blackbutt and narrow-leaved peppermint dominate moist areas on higher ground. New England stringybark, ribbon gum, and cool temperate rainforest elements are found in moist, sheltered gullies.

7.2 Significant flora

The New England Tableland Bioregion is botanically significant due to its high plant species diversity and high level of endemism. For instance, more than 70 species of Eucalyptus occur on the tablelands, about a third of which are endemic or near endemic to the bioregion. The New England Tableland Bioregion provides habitat for 68 species listed in the schedules of the TSC Act. Thirty of these species are listed as endangered, 39 are listed as vulnerable and one species, *Euphrasia arguta*, is considered extinct in the bioregion (NSW NPWS 2001).

Several of these species are also endemic to the bioregion. These include *Micromyrtus grandis* and *Pimelea venosa*. *M. grandis* has been recorded in the Severn River National Park growing in low exposed heath and woodland. It is also listed as endangered on Schedule 1 of the Commonwealth Endangered Species Protection Act 1992. *P. venosa* is also listed under the NSW TSC Act 1995, and has been recorded in granite country from Deepwater to Tenterfield in the north of the bioregion, but has not been found in recent years.

7.3 Significant fauna

The New England Tableland Bioregion, like the Nandewar Bioregion, supports a considerable proportion of the endangered regent honeyeater (*Xanthomyza phrygia*) population in woodland fragments. Numbers of grassland and ground-feeding insectivorous birds have declined in the bioregion, as have some temperate woodland and forest species, mainly due to changes caused by agriculture (eg. land clearing and habitat fragmentation), a trend which is likely to continue and has occurred across temperate Australia (Australian Terrestrial Biodiversity Assessment 2002).

Ninety-two fauna species listed in the schedules of the TSC Act have been recorded in the New England Tablelands Bioregion (NSW NPWS 2001). Of these, 18 are listed as endangered, 72 are listed as vulnerable and a number of species are considered extinct in the bioregion. This includes the recent extinctions of 2 frog species, *Litoria castanea* and *Litoria piperata*.

7.4 Significant wetlands

Little Llangothlin Lagoon is at the headwaters of the Oban River and much of the lagoon's catchment is within Little Llangothlin Nature Reserve. The lagoon is considered to be in good condition, although incurring pollution from nearby agricultural lands (Australian Terrestrial Biodiversity Assessment 2002), and supports many waterbirds including ducks, ibis, egrets and even the white-breasted sea eagle (*Haliaeetus leucogaster*) along with vulnerable and rare species including the comb-crested jacana (*Irediparra gallinacea*) and the blue-billed duck (*Oxyura australis*) in times of drought (ANCA 1996).

The New England wetlands are representative of shallow, temporary upland lagoons and are considered to be in good condition, despite urban development at nearby Mother of Ducks lagoon. They have a fluctuating water regime, which is important for ecosystem function, and sometimes support the rare stonewort (Charophyte), *Nitella hookeri*. The wetlands also provide important habitat for migratory birds and include parts of Little Llangothlin, Mother of Ducks and Dangars Lagoon Nature Reserve. Upland wetlands of the New England Tableland are now listed under the TSC Act as an endangered ecological community.

Round Mountain is in Cathedral Rock National Park and is a representative example of an upland swamp in the New England Tablelands. The swamp is dominated by sedge and like the other wetlands in this bioregion suffers from feral animals and exotic weeds, including blackberry (*Rubus* sp.).

8. Regional history

8.1 Aboriginal occupation

The Aboriginal language groups whose traditional lands lie in the New England Tablelands Bioregion include the Anaiwan (the area around Armidale) and the Kwaimbul in the north, while the Banbai inhabited areas around Ben Lomond and Mt Mitchell at the centre of the region. Bundjalung people also inhabited the north-eastern side and Ngarrabul people were located from Glencoe, north to Bolivia then slightly east to the Bundjalung border and west to take in the Beardy plains and the top of the Seven River area. The area around Kingsplains, Wellingrove and Strathbogie stations have also been home to the Ngarrabul.

Aboriginal people used the landscape as both a natural and cultural resource and there is a strong oral history indicating seasonal movement of Aboriginal people through the rugged gorge system, between the coastal plains and tablelands. The tablelands were occupied during summer and autumn, communities moving either to the coast or the western river systems for winter.

Archaeological evidence suggests the tableland Aborigines traded with groups on the Western slopes and that a range of stone tools such as jagged spears, boomerangs and waddies were developed with local and traded stone and local hardwood. Mammals such as kangaroo and possum were used for food, clothing and decoration. The region is also known for ornately carved trees, ceremonial bora grounds and art sites, indicating an intimate spiritual, as well as a physical, attachment to the sacred landscape the Aboriginal people inhabited.

Aboriginal people of the New England Tablelands worked as stockman on stations such as Strathbogie, Wellingrove and Kingsplains. Generally, they had a good relationship with most station managers and the women were engaged in domestic duties.

8.2 European occupation

John Oxley first visited the New England Tablelands Bioregion in 1818 during his early explorations of northern NSW. Squatters began to occupy the area in the 1830s, seeking suitable land for grazing (NSW NPWS 1991). Robert McKenzie occupied the land in the bioregion's north in 1839, where the township of Tenterfield now stands (NSW NPWS 1991), while Glen Innes had similar beginnings as a 25,000-acre station which was acquired by Major Innes of Port Macquarie in 1844. The station at Tenterfield was surveyed in 1851 and incorporated as a municipality in 1872. The railway reached Glen Innes in 1884 and Tenterfield in 1886 (NSW NPWS 1991).

Armidale had a population of only 76 in 1846, but even so it was already serviced by a post office, court house, flour mill, church and several inns. Five years later the population had reached more than 500 and became the central administrative town of the bioregion (HO and DUAP 1996). By 1861 the population of Armidale was 4,200 people and the town grew substantially over the next 40 years, becoming an established centre for education and strengthening its position as a regional capital by the 1890s.

Gold was discovered at Rocky River just southwest of Armidale in 1851 and soon 3,400 miners were there searching for the precious ore. By 1855 this number had grown to 5,000 people. Another goldfield northeast of Glen Innes, with a population of 400 miners including many Chinese settlers, was active throughout the 1850s (HO and DUAP 1996). Further gold and other metals were discovered in the bioregion in the 1870s, 80s and 90s. Tin deposits found at Elsmore in 1871 and Emmaville in 1872 prompted commercial developments and stimulated townships based on eager miners

in their hundreds (NSW NPWS 1991). Tin was discovered throughout the bioregion, advancing towns like Glen Innes and swelling the populations of smaller towns such as Tingha (meaning "the flat place" in the local Aboriginal language) that was largely abandoned after 1900 (HO and DUAP 1996).

Towns like Walcha, Armidale and the nearby Hillgrove gained economic boosts from finds of gold and antimony, while gold and tin mining also occurred in the far north of the bioregion on the upper reaches of the Clarence River (HO and DUAP 1996). The area near what is now Bald Rock Nature Reserve (dedicated in 1906) on the Qld border was declared the Boorook and Lunatic goldfield in 1872 (NSW NPWS 1991). Tenterfield received a boost from the discovery of gold, silver and copper at nearby fields in the adjacent North Coast Bioregion in the 1880s. Bismuth, molybdenite, manganese and sapphires were all mined in the region, with gemstone mining developing only in the 1920s and expanding into the 1960s (NSW NPWS 1991). Many mining relics still remain in the bioregion today, such as the boilers used in quartz crushing that were found in Boonoo Boonoo National Park north of Tenterfield (NSW NPWS 1991).

Cattle grazing was the dominant land use of the bioregion in the early days of European settlement but by the end of the 1800s sheep grazing was expanded due to improved pastures and better fencing (NSW NPWS 1991). The government established an experimental farm at Glen Innes in 1902.

As in the Nandewar Bioregion, softwood timber was abundant but difficult to retrieve. Many forests were dedicated as state forests around 1900 and most are still managed by State Forests of NSW (NSW NPWS 1991).

9. Bioregional-scale conservation

About 220,481.15 ha or 7.7% of the New England Tablelands Bioregion is managed as conservation tenures.

The system of national parks and nature reserves is the major contributor in terms of area and security of protection. National parks and nature reserves (NPW Act 1974) occupy the largest proportion of this area, managing a total area of 182,049.64 ha, or about 6.36% of the bioregion. Approximately 50,927.48 ha of the area of national parks and nature reserves is also wilderness (Wilderness Act 1987), and occupies about 1.78% of the bioregion. Other lands managed under the provisions of the NPW Act 1974 comprise the Stonewoman Aboriginal Area, occupying 1.88 ha or 0.0001% of the bioregion, and the Torrington State Recreation Area which occupies 29,530.78 ha or 1.03% of the bioregion. Reserves also being managed by the National Parks and Wildlife Service under the Crown Lands Act 1989 occupy 219.44 ha or 0.01% of the bioregion.

Some landholders in the bioregion have entered into private land conservation arrangements under the provisions of the NPW Act 1974. These include 7 properties managed by covenants under the voluntary conservation agreement program (occupying about 597 ha or 0.02% of the bioregion) and 8 properties with wildlife refuges comprising an area of 6,239.96 ha or 0.22% of the bioregion.

Landholders on 16 properties also hold property agreements under the provisions of the NVC Act 1997. The conservation zones of these occupy about 1,046.91 ha or 0.04% of the bioregion.

There are 4 flora reserves (Forestry Act 1916) contributing particularly towards flora conservation in the bioregion. These occupy about 795 ha or 0.03% of the bioregion.

State forests (under the provisions of the Forestry Act 1916) occur in the bioregion. Each has various degrees of zoning from commercial forestry to conservation. They occupy about 136,064.91 ha or 4.76% of the bioregion.

The only Indigenous Protected Area in NSW (under the Indigenous Protected Area Program, Environment Australia) is located in the bioregion and occupies 480 ha or 0.02% of the bioregion.

Photo: NPWS

10. Subregions of the New England Tableland Bioregion

(Morgan and Terrey 1992)

Subregion	Geology	Characteristic landforms	Typical soils	Vegetation
Bundarra Downs	Lower Carboniferous mudstones, lithic sandstones and conglomerates.	Upper catchment of the Gwydir River undulating to low hilly country with dendritic drainage pattern. Hills rise to the east on granite metamorphic contact ridges.	Harsh texture contrast soils, generally yellow, thinner and stonier on steep slopes. Some areas of slightly saline soils.	In the west: white box, grey box, yellow box and Blakely's red gum with mugga on stony ridges and river red gum along streams. In the east: broad-leaved stringybark, Youman's stringybark, tumble down gum, white box, yellow box, black cypress pine and kurrajong.
Beardy River Hills	Fine grained Permo-Carboniferous sedimentary rocks with little distortion	Rocky hills and steep gorge of the Beardy River.	Thin stony soils on most slopes. Yellow, harsh texture contrast soils where better developed.	White box, tumble down gum, Caley's ironbark, mugga, Youman's stringybark, and some yellow box. Silver-leaved ironbark with white cypress pine and occasional kurrajong in gorge country.
Walcha Plateau	Faulted inliers of Devonian and Carboniferous sandstone, conglomerate, minor limestone, slate, schist, amphibolite and volcanics. Small stock of granodiorite and central peak and ridge top fingers of Tertiary basalt.	Eastern and southern margin is the Great Escarpment. High central plateau capped by basalts. General topography undulating with small rugged areas often related to geology.	Mellow and harsh texture contrast soils on sediments and granite. Red brown to black structured loams on basalt, thin in places and often stony.	Snow gum and black sallee on coldest wet ridges. Ribbon gum, mountain gum, silver-top stringybark, New England blackbutt, narrow-leaved peppermint, in moist high areas. New England stringybark, ribbon gum, and cool temperate rainforest elements in moist sheltered gullies.
Armidale Plateau	Fine grained Permo-Carboniferous sedimentary rocks, granites and multiple Tertiary basalt flows.	Undulating to hilly plateau at 1100 m. Stepped landscape across basalt flows, broad valleys, steepening to the east at the head of Great Escarpment gorges.	Texture contrast soils on sedimentary rocks and granite, mellow (soft and friable) and well drained on upper slopes, harsh and poorly drained on lower slopes. Variable stony loams to deep black earths in valley floors on basalt. Deep, dark loamy alluvium in swampy valleys.	Open ribbon gum forest and woodland with snow gum and black sallee on basalt. Cold air drainage influence inverts the tree patterns in wide valleys. Yellow box, Blakely's red gum, rough-barked apple, apple box on sedimentary rocks. Silver-top stringybark, New England stringybark on dry aspects, Blakely's red gum, yellow box and apple box on moist, well-drained slopes, and New England peppermint with ribbon gum on flats.
Wongwibinda Plateau	Fine grained Permian sedimentary rocks with small areas of granite and basalt.	Hilly plateau 900-1500 m. Rainfall and temperature decrease to the west. Stepped slopes on basalt. Streams run to steep gorges on the edge of the great Escarpment.	Red and yellow, mellow, texture contrast soils on sedimentary rocks and granites. Shallow stony loams on steep areas of basalt with deep, dark loams on flatter slopes.	Highest areas on basalt; snow gum, black sallee and ribbon gum woodland. Western areas; New England stringybark, narrow-leaved peppermint on hills, yellow box, wattle-leaved peppermint and New England peppermint with snow gum, black sallee and ribbon gum in valleys. Eastern areas above gorges; New England blackbutt, New England stringybark, silver-top stringybark, ribbon gum, narrow-leaved peppermint, yellow box, snow gum and black sallee.

10. Subregions of the New England Tableland Bioregion *CONTINUED*

Subregion	Geology	Characteristic landforms	Typical soils	Vegetation
Deepwater Downs	Permian diorite, acid volcanics and small areas of shales.	Hilly to undulating with broad valleys, elevation 950 m.	Harsh red and yellow texture contrast soils with thin gritty topsoils.	Woodland of Blakely's red gum, apple box, New England stringybark, narrow-leaved peppermint, New England peppermint, rough-barked apple and bull oak.
Glen Innes-Guyra Basalts	Extensive Tertiary basalt flows. Small enclosed areas of granite and fine grained Permian sedimentary rocks. Quaternary sediments in swamps and lagoons.	Stepped plateau from 700-1500 m. Undulating to low hilly. Swamps and lagoons with evidence of past higher water levels and lunettes. Wide valleys in an evolving drainage system.	Deep red brown and brown to black, fertile and well structured loams on basalt. Thinner and stony on steep slopes, waterlogged in valley floors. Harsh, yellow texture contrast soils on granites and minor sedimentary rocks.	High areas have woodland of snow gum, black sallee and ribbon gum. Silver-top stringybark, New England peppermint at lower levels on basalt. White box woodland with rough-barked apple, ribbon gum and yellow box in lowest western areas. Narrow-leaved ironbark on sedimentary rocks.
Ebor Basalts	Tertiary basalt with minor trachyte.	Hilly benched plateau 1200-1500 m. Highest and steepest above the Great Escarpment with 2000 mm rainfall.	Deep, brown well structured loams with high organic content. Stony profiles on trachyte. Waterlogged clayey peats in some valleys.	Snow gum, black sallee woodland with New England peppermint, messmate, ribbon gum, shining gum, and brown barrel. Sphagnum peats in high valleys, Barren Mountain mallee heaths on siliceous soils.
Moredun Volcanics	Lower Permian acid volcanics with minor granite and Tertiary basalts.	Undulating plateau at 1100 m with steep western slope and rugged hills falling to 850 m.	Harsh yellow texture contrast soils with stony brown loams on basalts.	Open forest and woodland of snow gum, black sallee, New England stringybark, McKie's stringybark, silver-top stringybark, ribbon gum, yellow box, and some black cypress pine on the plateau. Mugga, Caley's ironbark, tumbledown gum, white box, yellow box and Youman's stringybark on western slopes.
Severn River Volcanics	Permian mixed volcanics and fine sedimentary rock. Granite intrusions and ridge top patches of Tertiary basalt with underlying sand and gravel.	Undulating to hilly and rugged, elevation range 600 -1200 m. Well developed dendritic drainage with rocky gorges. Rock outcrop common on steep slopes.	Shallow stony sandy loams on steep slopes, harsh texture contrast soils with gritty topsoils common, structured brown loams on small areas of basalt. Some evidence of salinity.	Low western slopes; woodland or heath of orange gum, Caley's ironbark, tumbledown gum, and black cypress pine. Woodlands and forest of red stringybark, western New England blackbutt, narrow-leaved ironbark, white box, yellow box and rough-barked apple. Highest eastern slopes; open forest of New England stringybark, Tenterfield wollybutt, yellow box, narrow-leaved ironbark, apple box, Blakely's red gum with orange gum in rocky outcrops.

10. Subregions of the New England Tableland Bioregion *CONTINUED*

Subregion	Geology	Characteristic landforms	Typical soils	Vegetation
Northeast Forest Lands	Permian fine grained sedimentary rocks, and large areas of granite.	Hilly plateau 950-1500 m. Swampy valleys on some granites.	Deep siliceous sands merging to poorly developed harsh texture contrast soils and areas of red sandy loams to structured sandy clay loams. Most soils prone to surface wash and gully erosion.	Open forest of New England blackbutt, diehard stringybark, Youman's stringybark and messmate. Snow gum and black sallee in cold air pockets, patches of rainforest with Deane's gum in sheltered gullies. White ash adjacent to rock domes, New England mallee and heath on rocky outcrops of Gibraltar Range with wet heath and sphagnum bogs in valleys.
Tenterfield Plateau	Wide range of Permian granites and areas of acid volcanics.	Undulating to hilly variable plateau 500 - 1200 m.	Shallow gritty sands on steep slopes to harsh texture contrast soils. Some evidence of salinity.	Bolivia Range; open forest of New England stringybark with yellow box, rough-barked apple, apple box, kurrajong, black cypress pine and mugga. Considerable local variation with aspect. Remainder of area; woodland of New England peppermint, New England stringybark, Blakely's red gum, yellow box, apple box, rough-barked apple, broad-leaved apple, fuzzy box and bull oak.
Yarrowyck-Kentucky Downs	Permian granites.	Undulating to hilly, general slope northwest 750-1100 m. Areas of rocky outcrop and granite tors.	Mellow texture contrast soils on drained slopes, harsh texture contrast soils on lower slopes. Coarse sandy topsoils prone to erosion and some evidence of salinity in subsoils.	Woodland of Blakely's red gum, New England peppermint, yellow box, rough-barked apple, New England stringybark. Tumbledown gum and black cypress pine on rocky hills. River oak along main streams.
Binghi Plateau	Permo-Carboniferous shales, slates quartzites, and widespread granites.	Rugged rounded hills and valleys. 700-1200 m. Streams more deeply incised at lower levels.	Shallow gritty soils amongst rock outcrop and patches of harsh yellow texture contrast soils on lower slopes and valley floors.	Woodland to open forest of tumbledown gum, New England stringybark, Youman's stringybark, western New England blackbutt, yellow box, apple box, Blakely's red gum, black cypress pine and widespread orange gum.
Stanthorpe Plateau	Fine grained carboniferous sediments and granites.	Low hills to mountains across the Great Dividing Range, elevation from 600-1200 m. Large areas of rock outcrop and granite tors.	Shallow loams and siliceous sands in steep rocky areas, yellow to grey, mellow texture contrast soils on slopes and valley floors.	Complex mixtures of tumbledown gum, Blakely's red gum, western New England blackbutt, New England stringybark, forest red gum, fuzzy box, Caley's ironbark, with angophora, ribbon gum and yellow box. Patches of low rainforest elements on sheltered slopes and limited sedgelands in valleys.

10. Subregions of the New England Tableland Bioregion *CONTINUED*

Subregion	Geology	Characteristic landforms	Typical soils	Vegetation
Eastern Nandewars	Several intrusions of granites each of slightly different composition.	Western edge of the tablelands sloping down to merge with the North West Slopes. 500-1100 m. Hilly with broad valleys and rugged granite outcrops with tors.	Siliceous sands amongst rock outcrops. Widespread mellow texture contrast soils of relatively low fertility and poor structure, prone to erosion.	Open forest and woodland of silver-top stringybark, Blakely's red gum, Youman's stringybark, yellow box, apple box, rough-barked apple with black cypress pine, ribbon gum and some snow gum. Western slopes; tumbledown gum, western New England blackbutt, Caley's ironbark, white cypress pine and black cypress pine, rough-barked apple and silver-leaved ironbark.
Tingha Plateau	Granites with some fine sedimentary rocks and large areas of Tertiary sands and gravels with remnant patches of basalt.	Undulating plateau at 850 m. Steeper western and southern edge to 650 m. Creek lines and lower slopes very disturbed by mining, extensive gully erosion.	Siliceous sands, red earths and mellow texture contrast soils.	Open forest of New England stringybark, yellow box, Blakely's red gum, and rough-barked apple on Tertiary sands. Open forest of red stringybark, McKie's stringybark, silver-top stringybark, mugga, Caley's ironbark and black cypress pine elsewhere.
Nightcap	Permian granites.	Plateau with undulating hills at 1100-1450 m. Broad gentle valleys, massive rock outcrop in some areas.	Sandy yellow and grey, mellow texture contrast soils. Increased organic matter in swampy sedgelands in valleys.	Open forest of narrow-leaved peppermint, New England stringybark, messmate, ribbon gum, snow gum and black sallee. New England mallee on rock outcrops. Sedgeland in some stream lines.
Round Mountain	Permian granites and minor Tertiary basalt.	Plateau with low hills at 1050-1500 m. Broad swampy valleys.	Mellow yellow texture contrast soils overall, small areas of red loams on basalt.	New England stringybark shrubby open forest with western New England blackbutt, wattle-leaved peppermint, narrow-leaved peppermint, and mountain gum. Messmate and ribbon gum with cool temperate rainforest elements and some snow gum Sedgelands in swampy valleys.

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