

Bellinger Valley

BIODIVERSITY OF THE BELLINGER AND KALANG RIVER SYSTEM

What is biodiversity?

Biodiversity, short for "biological diversity", refers to the full variety of living things, encompassing not just diversity of species, but also of ecosystems and genes. Biodiversity is difficult to measure, but the number of species in an area is thought to be a useful proxy.

Biodiversity of the Bellinger-Kalang

The Bellinger-Kalang Rivers and adjacent lands are extremely biodiverse. Most properties with some native bush are home to over 100 higher plant species (there are well over 1,000 in the catchment as a whole), 8-20 species of frog, 20+ reptile species, 10-40 mammal species and over 100 bird species – not to mention invertebrates, which are poorly known. The Bellinger-Kalang includes at least one turtle species (the Bellinger River Elseya), and several species of freshwater fish (the Galaxiids of the upper Rosewood catchment), found in no other river system on earth. As well as a handful of plants and animals restricted to the local area (e.g. the Ringwood), there is a multitude of regional endemics which are confined to north-east NSW and south-east Queensland (e.g. Giant Barred Frog, Stephens' Banded Snake, Logrunner and Pale-yellow Robin). At least 10 Threatened plant species and 50 Threatened animal species occur in the Bellinger-Kalang river system and adjacent lands.

What are Threatened species?

In Australia, the term "Threatened species" refers to species listed under either state or federal legislation such as the NSW Threatened Species Conservation Act (1995) or the Commonwealth Environment Protection and Biodiversity Act (1999). The legislation lists species that are considered at risk of extinction. Within the umbrella term "Threatened", there are four main sub-classes: Vulnerable (the least serious level of threat), Endangered, Critically Endangered, and Presumed Extinct. In NSW, all native frogs, reptiles, birds and mammals (except the Dingo), together with some plants and fish, are protected by law, whether or not they are listed as Threatened. State and federal Threatened species legislation provides Threatened species, and their habitats, with additional protection.



Bellinger Valley

BIODIVERSITY OF THE
BELLINGER AND KALANG RIVER SYSTEM

FLOODPLAIN ENDANGERED ECOLOGICAL COMMUNITIES

Endangered Ecological Communities (EECs), as defined by the NSW Threatened Species Conservation Act (1995), are vegetation communities that face a very high risk of extinction in the near future. Due to extensive clearing for agriculture and grazing, all of the remaining native vegetation on coastal floodplains in NSW is considered to be Endangered. The boundaries between the five floodplain EECs of the Bellinger-Kalang (Swamp Oak Floodplain Forest, Swamp Sclerophyll Forest, Sub-tropical Eucalypt Forest, Lowland Rainforest and Freshwater Wetland) are not always clear-cut, and some areas of native vegetation may have characteristics of more than one EEC. In general, Swamp Oak Floodplain Forest occurs where there is semi-regular inundation with some salt-water influence, Swamp Sclerophyll Forest where there is semi-regular inundation with little or no salt-water influence, Sub-tropical Eucalypt Forest on loamy soils where inundation is relatively infrequent, Lowland Rainforest on silty soils where inundation is relatively infrequent, and Freshwater Wetland where inundation is frequent.

LOWLAND RAINFOREST ON FLOODPLAIN

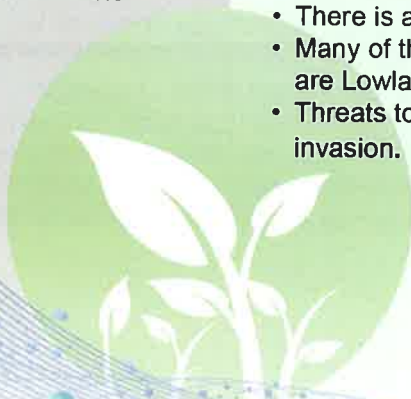
Scientific name: Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion

NSW conservation status: Endangered Ecological Community.

- Lowland Rainforest on Floodplain grows along riverine corridors and alluvial flats with rich, moist silts.
- Prior to clearing, much of the vegetation along the Bellinger and Kalang Rivers would have been Lowland Rainforest.
- Lowland Rainforest on Floodplain supports a rich diversity of plants and animals. Typical tree species in the community include Strangler Figs (*Ficus macrophylla*, *F. obliqua* and *F. watkinsiana*), Bangalow and Cabbage-tree Palms (*Archontophoenix cunninghamiana* and *Livistona australis*), and Brush Cherry (*Syzygium australe*). Animals present include fruit-eating rain forest pigeons, Noisy Pitta, Australian Brush-turkey, pademelons, flying-foxes, skinks and the Giant Panda Snail.
- Even small stands have conservation value.
- There is a good example of Lowland Rainforest on Bellingen Island.
- Many of the native plants found along creeks and regenerating riverbanks are Lowland Rainforest species.
- Threats to the survival of this community include clearing, burning and weed invasion.



photography
Brian Hawkins





Bellinger Valley

BIODIVERSITY OF THE
BELLINGER AND KALANG RIVER SYSTEM

SALTMARSH

Scientific name: Coastal Saltmarsh

NSW conservation status: Endangered Ecological Community.

- Occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea; frequently found (as at Urunga Lagoon) on the landward side of mangrove stands.
- Characteristic plants are small, salt-tolerant sedges, grasses and succulents such as *Baumea juncea*, *Juncus krausii*, *Sarcocornia quinqueflora*, *Sporobolus virginicus*, *Isolepis nodosa* and *Zoysia macrantha*. Occasionally mangroves are scattered through the saltmarsh.
- Saltmarshes play an important role as a juvenile habitat for species such as bream and mullet. Crabs are common in saltmarsh and are a significant food for many fish species.
- Saltmarshes also act as a buffering and filtration system for sediments and nutrients.
- Threats to Saltmarsh survival include infilling, weed invasion, water pollution, changes to tidal flows and invasion by mangroves.



photography
Brian Hawkins

FRESHWATER WETLAND

Scientific name: *Freshwater Wetlands on Coastal Floodplains*

NSW conservation status: Endangered Ecological Community.

- Occurs where floodplains are periodically or permanently inundated by fresh water.
- Has very few woody species. The structure and composition of the community varies depending on the flood regime: for example, grasses, sedges and rushes occur where submersion is not prolonged, while aquatic herbs dominate where semi-permanent or permanent standing water is present.
- Even degraded wetlands qualify as Endangered Ecological Communities.
- Wetlands are often called 'nature's kidneys' because they improve water quality by filtering sediment and pollutants, and reduce erosion by slowing the movement of water across the landscape during storms and floods.
- Freshwater Wetland is critically important to many species, including Threatened plants, fish and birds such as the Brolga and Black-necked Stork (Jabiru).
- Many areas of Freshwater Wetland can be seen from the Waterfall Way between Bellingen and the Pacific Highway
- Threats to its survival include clearing, draining, grazing, pollution and weed invasion.



photography
Brian Hawkins



Bellinger Valley

BIODIVERSITY OF THE
BELLINGER AND KALANG RIVER SYSTEM



photography
Brian Hawkins

SWAMP SCLEROPHYLL FOREST

Scientific name: Swamp Sclerophyll Forest on Coastal Floodplains

NSW conservation status: Endangered Ecological Community.

- Occurs on waterlogged or periodically flooded areas on coastal floodplains.
- Swamp Sclerophyll forest in the Bellinger and Kalang valleys is dominated by the Broad-leaved Paperbark (*Melaleuca quinquenervia*); Swamp Mahogany (*Eucalyptus robusta*) is also common.
- Good examples occur along the Waterfall Way between Bellingen and the Pacific Highway.
- Broad-leaved Paperbark and Swamp Mahogany flower in winter, a time when there is often very little nectar available in south-eastern Australia, and attract animals such as flying-foxes, honeyeaters and parrots from thousands of kilometres away.
- Threats to the survival of Swamp Sclerophyll Forest include clearing, draining, grazing, pollution and weed invasion.



photography
Brian Hawkins

SWAMP OAK FLOODPLAIN FOREST

Scientific name: Swamp Oak Floodplain Forest

NSW conservation status: Endangered Ecological Community.

- Occurs on coastal floodplains where groundwater is saline or sub-saline and soils are periodically or permanently waterlogged
- Has a dense to sparse tree layer in which *Casuarina glauca* (Swamp Oak) is the dominant species. The understorey is characterised by frequent vines (e.g. Common Silkpod, Scrambling Lily and Snake Vine), a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter.
- Threats to the survival of Swamp Oak Floodplain Forest include clearing, draining, grazing, pollution and weed invasion.



Bellinger Valley

BIODIVERSITY OF THE
BELLINGER AND KALANG RIVER SYSTEM

THREATENED SPECIES



photography
Sally Hawkins

RINGWOOD or ANISEED MYRTLE

Scientific name: *Anetholea anisata*

NSW conservation status: Unprotected.

- This uncommon rainforest tree is found only in the Bellinger and Nambucca river valleys, usually near streams.
- The leaves have an aniseed smell and can be used in cooking.



photography
Mark Price

SEAGRASSES

NSW conservation status: Protected.

- The only flowering plants that can live underwater (seaweeds are algae and do not produce flowers); seagrasses evolved from grasses on land
- The most common seagrass in the Bellinger-Kalang estuary is Eelgrass (*Zostera capricorni*). Another present particularly around Urunga Island is Paddleweed (*Halophila* sp.)
- Seagrasses are crucial to marine ecosystems: they provide habitat and food for fish (especially juveniles) and other aquatic fauna, they reduce erosion and improve water quality.
- Forty times more animals are found in seagrass beds than in adjacent bare sand.
- Threats to seagrass include dredging, sedimentation and water pollution.



photography
Brian Hawkins

BEACH STONE CURLEW

Scientific name: *Esacus neglectus*

NSW conservation status: Critically Endangered

- Found exclusively along the coast; forages for invertebrates such as crabs in the intertidal zone of beaches and estuaries.
- Extremely rare in NSW, with surveys in 2000 counting only 16 birds.
- Active mainly at dawn, dusk and at night.
- The nest is a shallow scrape in the sand just above high-tide level; known to breed in the Bellinger-Kalang estuary.
- Recreational activities such as four-wheel-driving, boating and the walking of dogs can cause significant disturbance to this species, leading to desertion of nests. The birds are also vulnerable to predation by foxes, pigs, dogs and cats.



Bellinger Valley

BIODIVERSITY OF THE
BELLINGER AND KALANG RIVER SYSTEM



photography
Ian Kethel

BLACK BITTERN

Scientific name: *Ixobrychus flavicollis*

NSW conservation status: Vulnerable

- A thick-necked, skulking heron, dark grey to black. The colour alone readily distinguishes it from the other two much paler bittern species (Brown Bittern and Little Bittern).
- Has a distinctive booming call heard mainly heard during the breeding season (December to March).
- Inhabits both freshwater and estuarine wetlands, generally in areas of permanent water with dense vegetation.
- Feeds on frogs, reptiles, fish and invertebrates, mostly at dusk and at night. During the day, Black Bitterns roost in trees or on the ground amongst dense reeds.
- Nests are located on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks. Between three and five eggs are laid and both parents incubate and rear the young.
- Known from Urunga Lagoon, Hydes Creek and the lower reaches of the Bellinger and Kalang Rivers.
- Threats to its survival include clearing of riparian vegetation and predation on eggs and juveniles by foxes and cats.



photography
Terry Evans

BLACK-NECKED STORK ("JABIRU")

Scientific name: *Ephippiorhynchus asiaticus*

NSW conservation status: Vulnerable

- The only species of stork in Australia. It stands about 1.3 m tall and has a wingspan of around 2 m.
- The name "Jabiru" properly refers to a South American stork species. It appears likely that the Australian form of the Black-necked Stork (which also occurs in South-east Asia) will soon be treated as a separate species and renamed the "Satin Stork".
- Black-necked Storks are most often seen in shallow freshwater wetlands (such as at Camerons Corner on the Waterfall Way) or near estuaries.
- They forage in shallow, still water, and take a variety of prey, including eels and other fish, frogs, turtles, snakes, and small invertebrates.
- In NSW, Storks usually make a large platform style nest in a tall, isolated paddock tree.



Bellinger Valley

BIODIVERSITY OF THE
BELLINGER AND KALANG RIVER SYSTEM

BELLINGER RIVER ELSEYA

Scientific name: *Eelseya georgesii*
NSW conservation status: Protected



- One of two short-necked turtles in the Bellinger and Kalang Rivers. Can be distinguished from the other short-necked turtle, the Bellinger River Emydura by the presence of dark, "dirty", lines between the shell-plates on the belly.
- Lays 10-15 eggs on the river-bank between October and December.
- Feeds on invertebrates and some plant material.
- Found only in the Bellinger and Kalang Rivers, where it is common.

photography
markspencer.com

BROLGA

Scientific name: *Grus rubicunda*
NSW conservation status: Vulnerable



- One of Australia's largest birds – stands 1.3 metres tall and has a wingspan of nearly 2.5 metres.
- The only crane found in NSW.
- Brolgas have nested in wetlands to the north of the river in the past few years. The nest is a platform of grasses and sticks built on the ground near or in water. Two eggs are laid during winter or autumn.
- Forages for food across a variety of landscapes including wetlands, grass lands and paddocks.
- Feeds using heavy straight bill as a 'crowbar' to probe the ground for roots and tubers. Also eats large insects, crustaceans, molluscs and frogs.
- The main threats to its survival are draining of its wetland habitat, and disturbance of nesting birds.

photography
Brian Hawkins

EASTERN WATER DRAGON

Scientific name: *Physignathus lesueurii lesueurii*
NSW conservation status: Protected



- A day-active semi-aquatic lizard growing to over a metre.
- Feeds on insects, small reptiles and frogs, and plant material including fruit.
- Can remain under water for up to an hour.
- Hibernates over winter.
- Adult males can be distinguished by the blood-red colouring on the chest; they are territorial and signal to rivals by waving their arms.
- Egg-laying occurs between October and December; the mother Water Dragon excavates a 10-15 cm deep burrow in soft or sandy soil in a sunny spot and lays 6-18 eggs. Burrow temperature determines the sex of the hatchlings, which appear in February and March and are around 5 cm long (snout to vent).

photography
Ian Kethel



Bellinger Valley

BIODIVERSITY OF THE
BELLINGER AND KALANG RIVER SYSTEM



photography
Michael Pennay

FISHING BAT or SOUTHERN MYOTIS

Scientific name: *Myotis macropus*

NSW conservation status: Vulnerable

- This microbat weighs up to 15 grams and has disproportionately large feet.
- Feeds at night on aquatic insects and small fish caught from streams, dams or lakes. It catches prey by raking the water with the curved claws on its large feet.
- Generally roosts in groups of 10-15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges or in dense foliage.
- Females have one young each year – usually in November or December.
- Threats to its survival include reduction in water quality, loss of roosting sites, clearing and pesticide use.



photography
Brian Hawkins

GIANT BARRED FROG

Scientific name: *Mixophyes iteratus*

NSW conservation status: Endangered

- A large tan frog up to 115mm in length, with distinct barring on the limbs and golden eyes with vertical pupils. Of the three similar Barred Frog species found in the area, the Giant Barred Frog is the only one with golden eyes.
- The call is a soft, deep 'Woh'.
- Reasonably common on vegetated banks of the Bellinger and Kalang Rivers and their tributaries, even in the middle of Bellingen. The area is a strong hold for the species.
- Forages for large insects amongst deep, damp leaf litter in rainforests and eucalypt forests; rarely travels more than 50 m away from a water-course.
- Breeds along rivers and permanent creeks from late spring to summer. Females lay eggs on moist banks or rocks above water level. The large tadpoles, which take up to 14 months before metamorphosing into frogs, may be seen in the water all through winter.
- Threats to its survival include sedimentation and pollution of streams, removal of riparian vegetation, use of chemical sprays near water-courses and the lethal Chytrid fungus, which can spread via mud or damp soil.



Bellinger Valley

BIODIVERSITY OF THE BELLINGER AND KALANG RIVER SYSTEM

GREY-HEADED FLYING FOX

Scientific name: Pteropus poliocephalus
NSW conservation status: Vulnerable

- Bellingen Island has been used as a maternity camp by Grey-headed Flying-foxes for many generations; other nearby camps at Urunga, Pine Creek and Dorrigo are occupied only occasionally.
- Flying foxes eat nectar and fruit and will commute up to 50 km in a night to feed.
- When certain eucalypt species (e.g. Pink Bloodwood) come into flower, Flying-foxes from all over eastern Australia congregate in Bellingen. At such times there may be hundreds of thousands of animals in the camp; at other times, the local population is much less. Very rarely – usually in late winter – the camp may empty completely.
- Births in the Bellingen camp occur in October, with each mother rearing only a single young.
- Threats to its survival include clearing, shooting by orchardists, electrocution by power-lines and entanglement on barbed wire.



photography
Vivien Jones

OSPREY

Scientific name: Pandion haliaetus
NSW conservation status: Vulnerable

- A large and distinctive bird of prey. Perched, the upper parts are dark brown and the underparts are white. In flight, the wings are bowed, dark brown above and barred underneath.
- Found in coastal areas, especially around the mouths of large rivers, lagoons and lakes, where it hunts fish.
- Hunts by diving spectacularly feet-first into the water, plunging its talons into the back of a fish. The bird must then struggle into flight, carrying its prey beneath it.
- There are at least three local Osprey nests, including on top of the Railway bridges at Urunga and Repton.
- World-wide Osprey populations declined dramatically in the 1950s and 60s, due to the toxic effects of the insecticide DDT. Poisoned insects were eaten by fish which were then ingested by Ospreys, causing eggshell thinning which led to very low breeding success. Osprey populations have recovered since the banning of DDT in the 1970s.
- Threats to the Osprey's survival include water pollution and removal of large nesting trees.



photography
Brian Hawkins



Bellinger Valley

BIODIVERSITY OF THE
BELLINGER AND KALANG RIVER SYSTEM



photography
Vivien Jones

PINK UNDERWING MOTH

Scientific name: *Phyllodes imperialis* southern subspecies
NSW conservation status: Endangered

- A large brown moth with pink patches on the back wings.
- Known from only a handful of locations – the Bellinger Valley is one of them.
- Breeding habitat is restricted to areas where the caterpillar's food plant, the rainforest vine *Carronia multiseppalea*, occurs.
- Threats to its survival include clearing and weed invasion.



photography
Sandy Carol

PLATYPUS

Scientific name: *Ornithorhynchus anatinus*
NSW conservation status: Protected.

- One of only three species of egg-laying mammal (together with the two types of Echidna).
- Mainly active around dawn and dusk, when it forages in the water for shrimp and other invertebrates.
- Uses its electro-sensitive bill to home in on electrical discharges produced by the muscles of prey.
- Can remain under water for around 10 minutes.
- Each Platypus uses several short (3-5 m) resting burrows to shelter from predators and temperature extremes; nesting burrows tend to be longer and more elaborate.
- Male Platypuses have poisonous spurs on their hind legs; the venom is powerful enough to kill a dog, but not as yet a human being.
- Restricted to fresh water in rivers, streams and lakes; reasonably common in the Bellinger and Kalang Rivers, but not often seen due to its shyness and inactivity during the middle of the day.

FURTHER READING

Department of Environment, Climate Change and Water- Threatened Species Website

<http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>

PLANT NET – Sydney Royal Botanic Gardens Flora Online Site

<http://plantnet.rbgsyd.nsw.gov.au/floraonline.htm>

Australian Museum Website - animals

<http://australianmuseum.net.au/animals>

Department of Primary Industries NSW- Factsheets on Agriculture, Fishing, Minerals and Forests

<http://www.dpi.nsw.gov.au/aboutus/resources/factsheets>

Acknowledgements: Prepared by Flametree Ecological Consulting with assistance by Bellinger Landcare Inc. A joint funded project by Bellinger Shire Council and Department of Environment, Climate Change & Water under the Estuary Management Program: Developing capacity building and education strategies to address future impacts of climate change and manage and improve the health of the Bellinger and Kalang Rivers.

