Department of Water
Government of Western Australia
Australian Government

Water notes

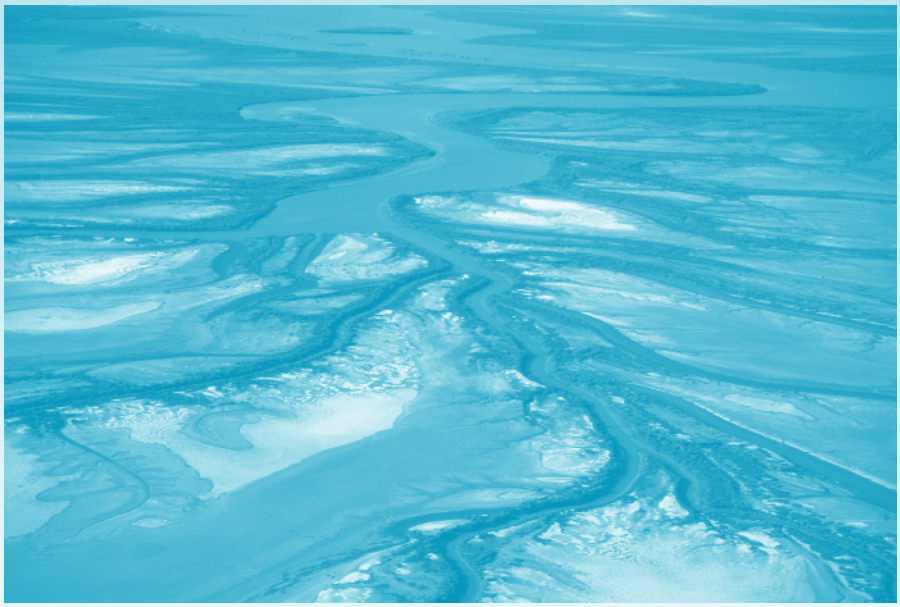
WN35 August 2008

Water notes for river management

Advisory notes for land managers on river and wetland restoration

Rivers of the Kimberley

About the Kimberley rivers



The Fitzroy River by Luke Pen

Western Australia's Kimberley region has approximately 30 major rivers and many more tributaries and tidal creeks. Kimberley rivers are unique because of their relatively pristine nature. Unlike rivers in many other parts of Australia and the world, most Kimberley rivers are free flowing, their riverside vegetation is relatively intact, and water is not highly extracted or contaminated. In a few cases entire river catchments remain in an almost natural condition, free from significant human disturbance. Many Kimberley rivers are unique and represent important examples of some of Australia's, and the world's, last remaining natural river systems. They are, however, under increasing pressure from threats such as weeds, overgrazing, new roads, tourism, feral animals, increasing mining activity and inappropriate use and development.

This water note describes eleven Kimberley rivers, providing information about their landscape, ecology, cultural significance and other notable features.

Aboriginal people and the Kimberley rivers

Aboriginal people have lived in the Kimberley region for at least 40 000 years. Almost half of the Kimberley's population is Aboriginal, with many people living within their traditional homelands in small-medium sized communities. Maintaining their responsibilities for country, maintaining clean and healthy water and preserving areas of cultural and conservation significance are important to Kimberley Aboriginal people.

Waterways are an integral part of Aboriginal life and culture. Permanent and semi-permanent pools form a network of vital water resources for traditional and contemporary Aboriginal groups. Much of the information regarding the cultural significance of these pools is not well documented in western scientific literature but still remains strong in some language groups oral histories, rock art and dreaming stories.

Rivers and billabongs are used for meeting points for recreation, family interactions, food collection, ceremonial and law activities. Such sites provide shade and abundant bush food, such as waterfowl, turtles, fish, bulbs and roots. Rivers, wetlands, pools and other waterways still remain an important source of food and water.

Many cultural beliefs and stories are focused on rivers and more broadly water. Spirit beings, often in the form of snakes or rainbow serpents, are said to inhabit certain watercourses and waterholes. Many river reaches and waterholes are significant sites for spiritual or ceremonial reasons, and some have nearby rock paintings and artefacts. Deep pools and waterfalls can have special spiritual significance and swimming, unless welcomed and permitted by the traditional owners, can be considered inappropriate disrespectful.

Some Aboriginal people understand the nature and variability of Kimberley rivers and floods in the intimate way of the long-term observer and have strongly felt custodial responsibilities for their maintenance. Scientists and government departments are realising how important it is for this knowledge to be incorporated into environmental management plans and used to monitor and report on river condition. Traditional owners are working with others to preserve and care for the Kimberley's resources so that everyone can enjoy them.

West Kimberley rivers

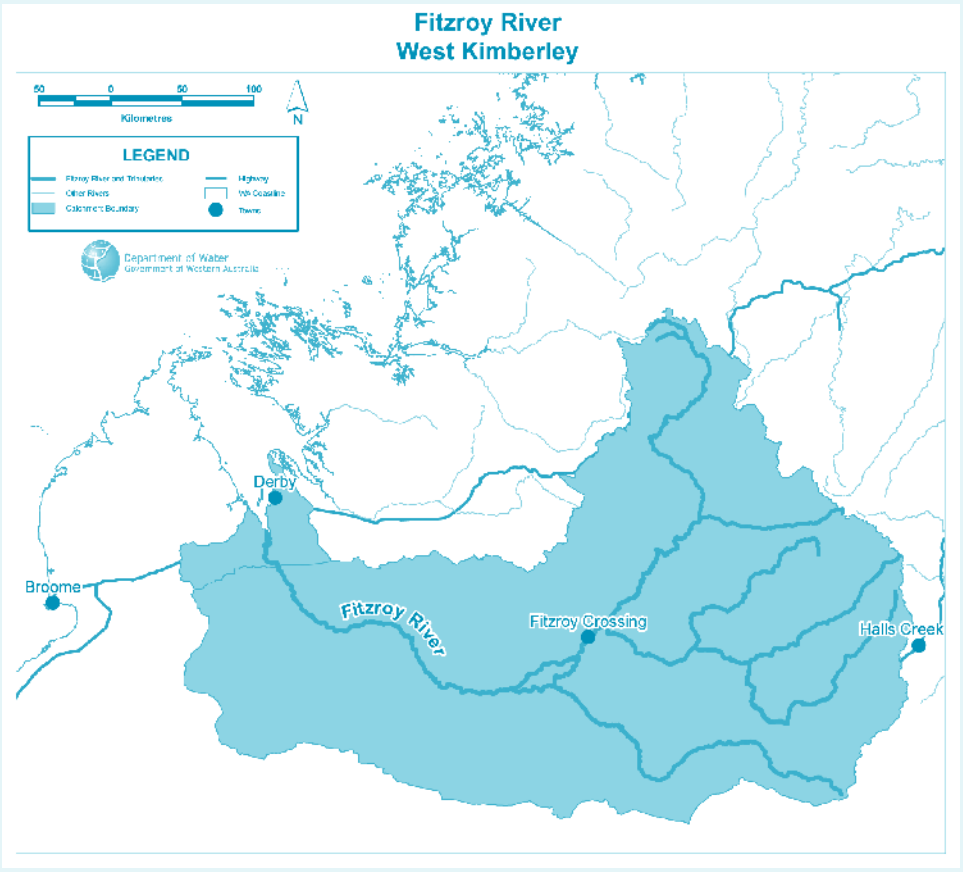
By far the mightiest river in the region is the Fitzroy River in the central and western Kimberley. Although other rivers in Western Australia are longer or have larger drainage areas, the Fitzroy River has, on average, the greatest volume of annual flow and the largest floods. The Fitzroy River is also well known for its high cultural and ecological values, with a number of significant species found there. The Margaret, Leopold, Mary, Hann, Adcock and O'Donnell rivers, and Christmas and Geegully creeks, all flow into the Fitzroy River.

There are other smaller but equally spectacular rivers of the west Kimberley, including the Lennard and Isdell rivers.

Fitzroy River

Facts at a glance

Length [1]	624 km
Catchment area[2]	92 000 km^2
Mouth	Opening Bay in King Sound
Average annual rainfall[3]	500 mm
Annual rainfall range[4]	400 – 900 mm
Notable features	Geikie Gorge, Dimond Gorge, Sir John Gorge, Margaret River pool, Fitzroy Crossing (site of the original crossing), Camballin Irrigation Area and Willare crossing.
Origin of the name	The river was named for Robert Fitzroy, captain of the HMS Beagle during Charles Darwin's famous voyage.



Location of the Fitzroy River

[1] Mainstream / river to the top of the catchment, not necessarily just the named river.
[2] Area up to the mouth.
[3] Rainfall at the centroid of the catchment.
[4] The range within the catchment.

Fitzroy River by Luke Pen

Location

The Fitzroy River is the mightiest in the Kimberley for its catchment area, length and flow. The upper Fitzroy River combines flow from the Hann, Adcock, Manning and Little Fitzroy rivers. Its major tributary, the Margaret River, collects water from the Mary, Glidden, O'Donnell and Leopold rivers. The Fitzroy and Margaret rivers meet just upstream of Fitzroy Crossing. Downstream of the town the major tributaries are Christmas and Geegully creeks. The Fitzroy River discharges into King Sound, about midway between Broome and Derby.

Landscape and form

The headwaters of the Fitzroy River drain mainly rocky country in the north and east of the upper catchment, and drier flatter country in the south-east. Cobble bars and coarse sand are common between occasional waterholes in the channel bed.

The normally wide channels in the catchment above Fitzroy Crossing are occasionally constricted by gorges, including Dimond Gorge and the Margaret River gorge. The well-known Geikie Gorge is located just upstream of the junction of the Fitzroy and Margaret rivers. Below this junction the river is no longer confined by bedrock, and when in flood it spreads out over the 300 kilometre-long floodplain that is anywhere between 2 and 15 kilometres wide. The flooding has resulted in the formation of a series of secondary channels or anabranches, including Cunningham anabranch and Duck Hole Pool.

The main Fitzroy channel is well defined by its fringing vegetation and continuous base flow. Some stretches are narrow (100 metres) but the river can suddenly widen to more than 1 kilometre. Numerous waterholes lie along the main river channel and on the floodplain.

The river's ecology

The flora and fauna of the Fitzroy River – such as pandanus, acacia, bream and crocodiles – have adapted to the high flows as well as to long dry periods. The high flows also deliver large volumes of fresh water and sediment to King Sound, supporting the coastal ecology and marine life. The Fitzroy River is also well known for its high cultural and ecological values, with a number of significant species found there.

The Fitzroy River is one of the last sanctuaries for the endangered freshwater sawfish.

People's connections

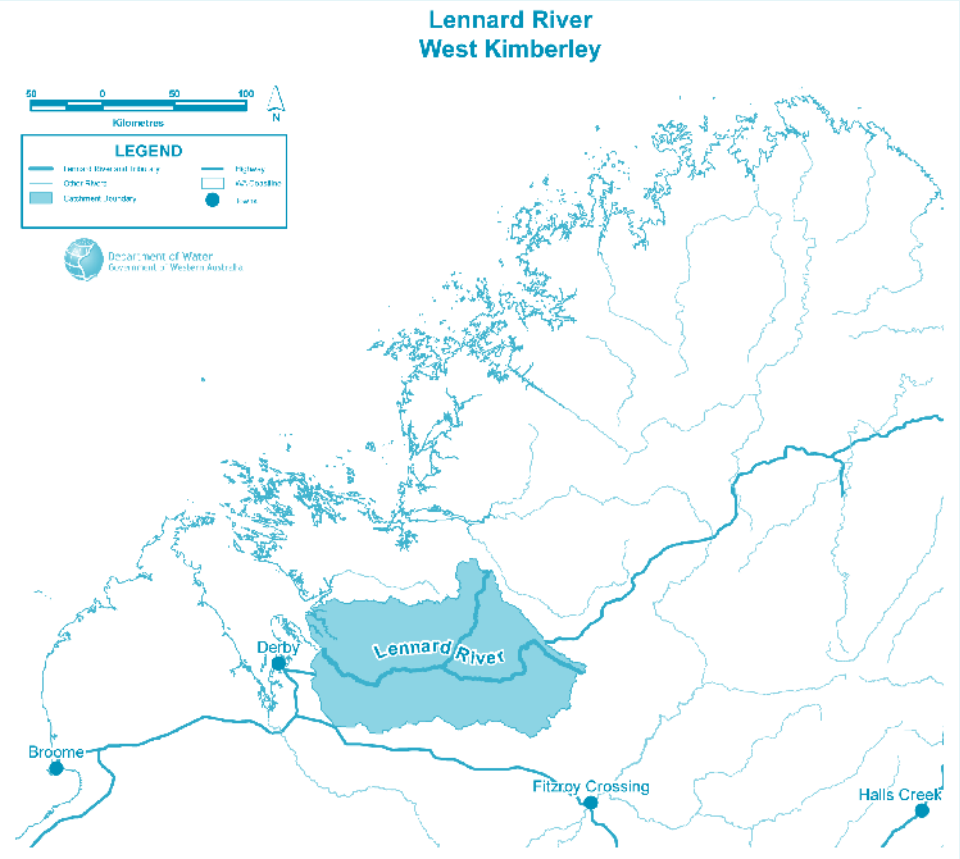
The traditional owners of the Fitzroy River have a close affinity with and understanding of the river and its ecology, which they have always depended on for their livelihood.

Nowadays, the Fitzroy River is a popular fishing and camping spot for all Kimberley residents and visitors. Geikie Gorge National Park, where the channel winds its way through the spectacular limestone walls of an old Devonian reef formation, is perhaps the best-known tourist attraction on the Fitzroy River.

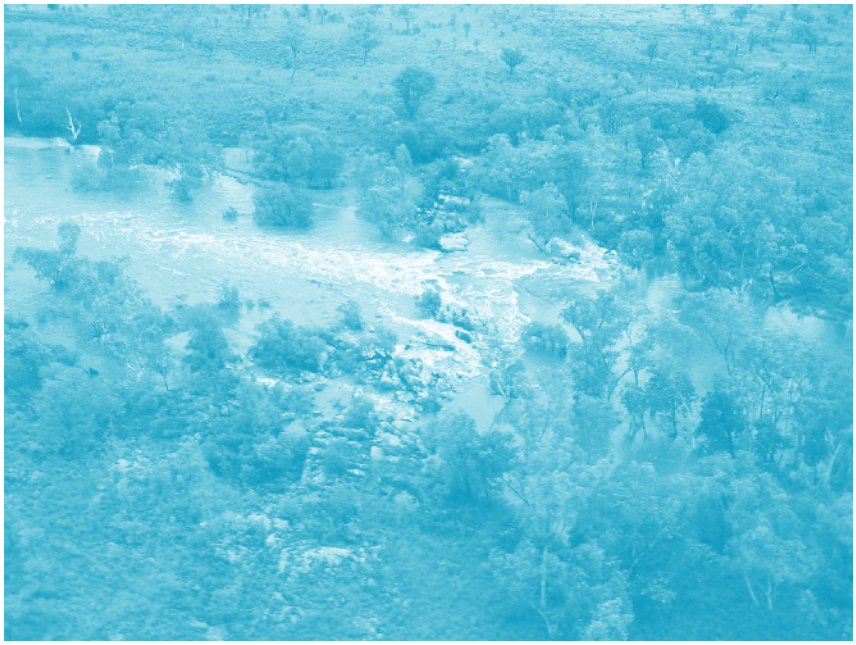
Lennard River

Facts at a glance

Length	240 km
Catchment area	12 300 km^2
Mouth	Stokes Bay
Average annual rainfall	700 mm
Annual rainfall range	600 – 900 mm
Notable features	Windjana Gorge, Tunnel Creek, Lennard River Gorge, Wombrella Gap, Barker Gorge, Richenda Gorge
Origin of the name	John Forrest named the Lennard River in 1879 after his fiancée, Amy Barrett-Lennard.



Location of the Lennard River



Lennard River

Location

The Lennard River basin lies north and east of Derby in the west Kimberley. The river runs through the pastoral leases Napier Downs, Kimberley Downs, Meda, Leopold Downs and Fairfield, as well as Mount Hart station, which is located in the King Leopold nature reserve. Its major tributaries are the Barker and Richenda rivers.

Landscape and form

The upper catchment of the Lennard River drains the rugged terrain of the King Leopold Ranges. Headwater creeks wind between rock outcrops before cutting through the massive ancient limestone reef to form features such as Windjana Gorge. Downstream from where the Barker River joins the Lennard River, the landscape becomes flatter and the river flows across a floodplain that is between 5 and 20 kilometres wide.

About 50 kilometres upstream of its ocean outlet at Stokes Bay, the Lennard River splits into two rivers: the May and Meda. This is unusual for a river, but the wide flat alluvial plain, and the Lennard River's variable flow, which includes large floods, is conducive to anabranching (Water and Rivers Commission, 2002).

Tightly meandering secondary channels run off the two major channels so that from the air the river has an interlaced, 'fishnet' appearance. Some of the smaller channels dry up and disperse onto the plain or expansive tidal flats. A single channel suddenly reappears in the river's tidal section and flows into Stokes Bay. Here, ancient scrolled ridges and swales show how the channel has migrated across the plain.

The river's ecology

Very little is known about the ecology of the Lennard River. It's unusual multiple-channel form along 100 km of floodplain suggests that its ecology will be different from other rivers in the Kimberley.

The main floodplain supports coolibah and bauhinia, and is surrounded by higher pindan country. Windjana Gorge is well known for its populations of fruit bats, freshwater crocodiles and corellas.

People's connections

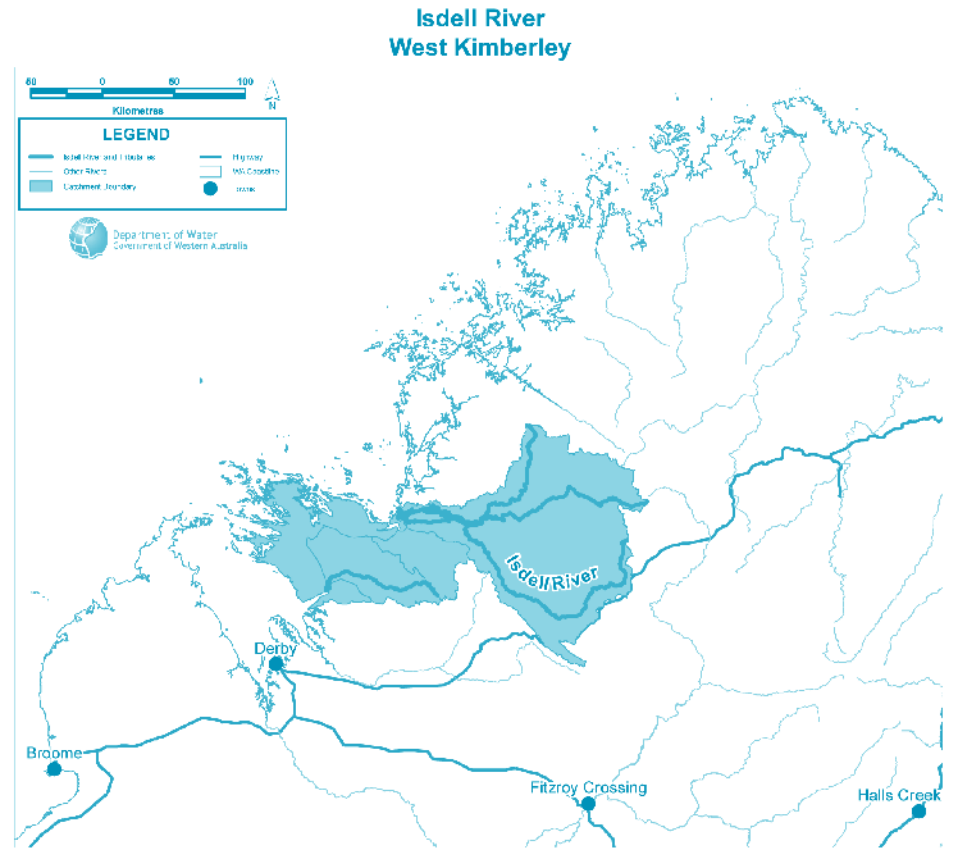
The fierce Bunuba leader and outlaw Jandamarra used his knowledge of the rugged country surrounding tributaries of the Lennard River to avoid police trackers in the late 1800s.

The Gibb River Road passes through approximately 180 kilometres of the Lennard River catchment from Mount Bell to Meda station homestead, and driving along the road gives visitors a good feel for the river landscape. The road crosses the Lennard River in the Fairfield Valley.

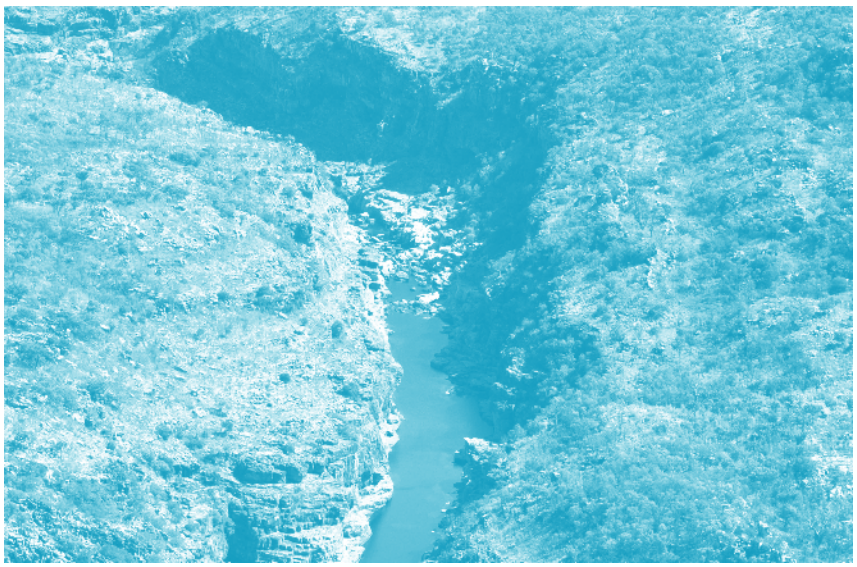
Isdell River

Facts at a glance

Length	206 km
Catchment area	5 540 km^2
Mouth	Walcott Inlet
Average annual rainfall	850 mm
Annual rainfall range	700 – 950 mm
Notable features	Bell Gorge, Galvins Gorge, Silent Grove
Origin of the name	Frank Hann named the Isdell River in 1898 after Mr James Isdell of Nullagine. James Isdell was a pastoralist and prospector.



Location of the Isdell River



Isdell River

Location

The Isdell River flows over relatively high country around Mount House, Mount Elizabeth and Mount Hart stations in the west Kimberley, draining into Walcott Inlet. Its main tributaries are the Greytal and Springy rivers, and Plain and Bell creeks.

Landscape and form

The Isdell River catchment includes both a sandstone plateau, characteristic of the north Kimberley, and a broad belt of folded ranges.

The upper reaches of the Isdell River drain rocky country, such as the Packhorse Range. The middle to upper reaches cross lower, undulating country and are wide and sandy. Further downstream the river alternates between deep, rocky gorges with thick fringing vegetation and numerous pools and falls, and narrow alluvial valleys in flat, stony country.

The channel follows the northern edge of the King Leopold Ranges, with small tributary creeks cutting a series of cliffs. Near its exit to the Walcott Inlet, the Isdell River has cut a long, deep gorge where the King Leopold and Artesian ranges meet.

The river's ecology

Freshwater turtles and thickets of pandanus (*Pandanus aquaticus*) are common along the Isdell River. A new species of freshwater turtle was recently discovered, and there are likely to be other discoveries.

People's connections

The traditional owners of this part of the north Kimberley, the Wanjina Wunggurr Willinggin peoples still have a strong connection to their homelands, despite the disruptions by pastoral

activity. The traditional owners are actively working with their young people and other research partners to gather information and gain further knowledge of the biodiversity and conservation significance of the area with an aim to improve management and livelihoods.

Early settler evidence is visible by a, marked a boab on the Isdell River with the letters 'FH' carved by Frank Hann, one of the early European explorers on 8 June 1898. Hann was excited at the prospect of the region becoming pastoral land.

Crocodiles in the Isdell River by Luke Pen

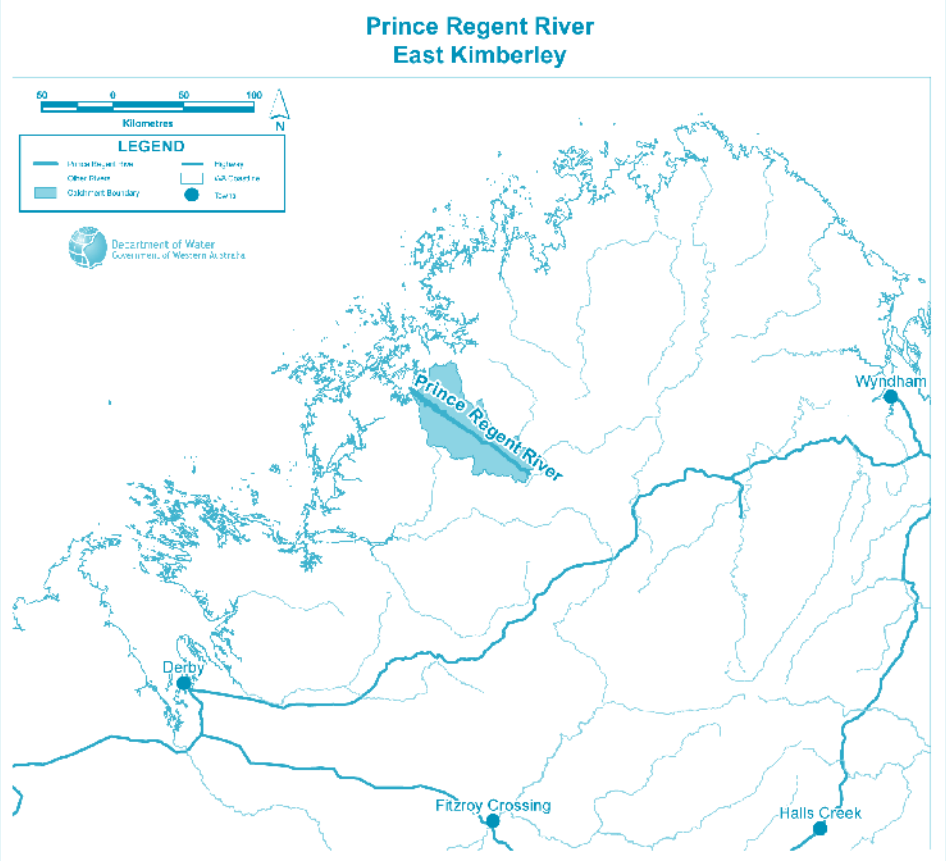
North Kimberley rivers

Major rivers of the north Kimberley include the Prince Regent, Mitchell, King Edward, Drysdale, King George and Berkeley rivers. These rivers are remote, have rugged, rocky catchments and, until recently, were difficult to access. National parks and reserves have been created in some areas in recognition of the ecology and the beauty of these rivers.

Prince Regent River

Facts at a glance

Length	104 km
Catchment area	3 160 km^2
Mouth	St George Basin
Average annual rainfall	1400 mm
Annual rainfall range	1150 – 1420 mm
Notable features	King's Cascades, Mount Trafalgar, Python Cliffs, Pitta Creek, and Gun Springs
Origin of the name	Captain PP King discovered the Prince Regent River in 1820. He named it for the Prince Regent, who later became King George IV.



Location of the Prince Regent River

Prince Regent River by Keith Claymore (DEC)

Location

The Prince Regent River is one of Western Australia's iconic rivers. Its scenery and natural environment were formally recognised in 1964 when the area was declared a C class conservation reserve, and later in 1977 when it was listed as an international biosphere reserve. The Prince Regent River has also been identified as a wild river.

The Prince Regent River drains into St George Basin and then into Brunswick Bay. It has nine major, but short, tributaries originating within 10 to 30 kilometres of the main channel. To the south of the Prince Regent River, the Sale, Gibson and Glenelg rivers drain into Doubtful Bay. To the north, the Roe and Moran rivers drain into Prince Frederick Harbour.

Landscape and form

The Prince Regent River is one of the straightest rivers in the state. It follows a geological fault line, the Prince Regent lineament, in a north-westerly direction for about 80 kilometres. Fractures at right angles to this fault have resulted in numerous steep-sided rocky creeks draining into the main river, and a blocky drainage pattern. The catchment is long and narrow with very rough sandstone country between the Gardner Plateau (to the south side) and the Princess May Ranges (to the north).

The upper reaches of the Prince Regent River are fairly confined between rocky hillsides, with some small permanent pools occur along the channel bed. Its middle reaches are canyon-like, with the river lying at the bottom of a very deep valley. Numerous bedrock bars and waterholes, and patches of dense, fringing vegetation are present. Side creeks reveal waterfalls and gorges.

About 40 kilometres upstream of its exit into St George Basin, near King's Cascades, the river widens and long mud bars are exposed at low tide. St George Basin, like much of this part of coast, is a drowned river valley. Numerous islands and tidal flats occur here and in Brunswick Bay.

The river's ecology

Riverside plants include eucalypts, paperbarks (such as *Melaleuca leucadendra* and *Melaleuca argentea*) and pandanus (such as *Pandanus spiralis*). Mangroves, including species such as *Aegiceras corniculatum, Camptosteman schultzii, Rhizophora stylosa* and *Sonnerata alba,* live in the estuaries. Tropical, dry and open woodland covers most of the rest of the Prince Regent River's catchment, although vegetation such as vine thickets and fern gullies occurs locally.

The only bird endemic to the Kimberley, the black grass wren, lives along and near the Prince Regent River. In the stretches of fresh water 14 species of fish have been recorded, and 21 species have been found in more brackish waters below King's Cascade. The large-scaled

grunter is known only in the Prince Regent and nearby rivers. The estuaries are an important habitat for saltwater crocodiles.

People's connections

The Prince Regent River is inaccessible by road so there are some unoccupied Aboriginal communities located in proximity to this river, however the traditional owners have a long uninterrupted connection with this area. There are many registered sites of significance and there are many more unregistered. St George Basin and the mouth of the Prince Regent host several important early European settlement and exploration sites.

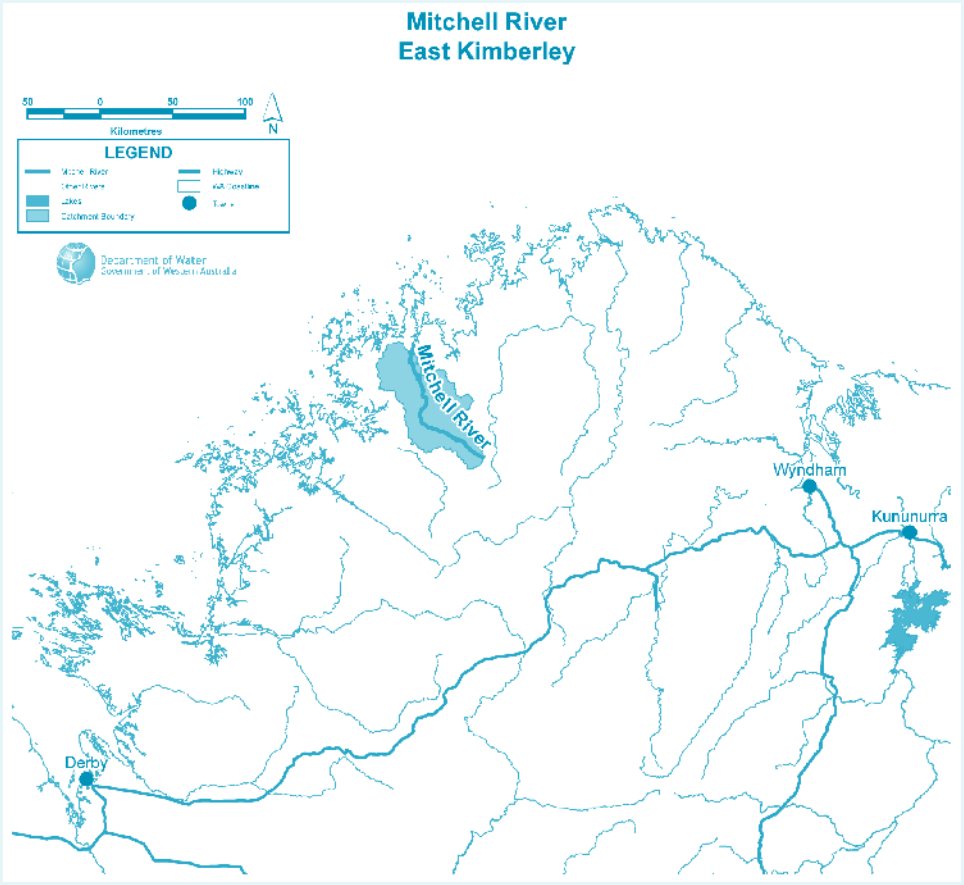
American model Ginger Meadows was taken by a croc while swimming at Kings Cascades in 1987.

The Prince Regent is recognised for its conservation significance and accessed by international visitors via coastal tourism ventures. The traditional owners have been engaging in some tourism planning in preparation for the growth in this remote area.

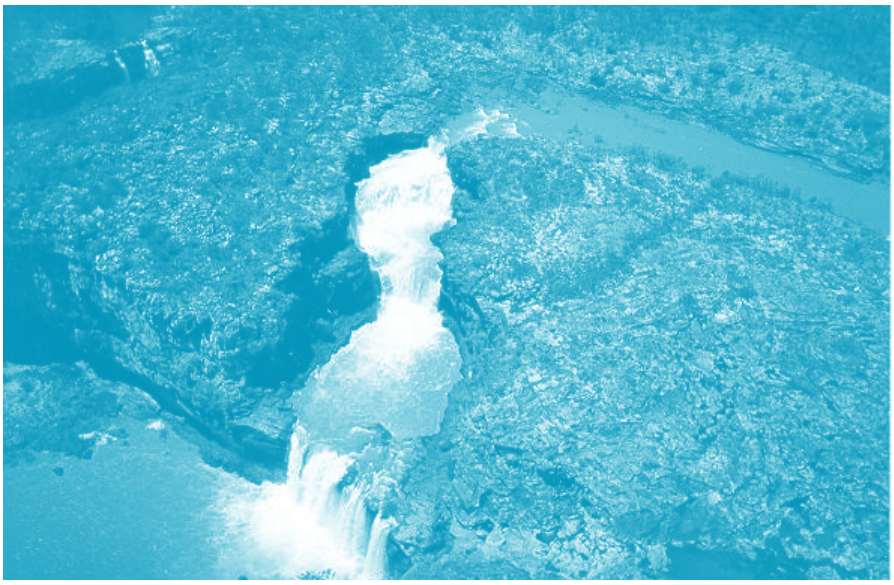
Mitchell River

Facts at a glance

Length	117 km
Catchment area	2 970 km^2
Mouth	Walmsley Bay
Average annual rainfall	1400 mm
Annual rainfall range	1300 – 1450 mm
Notable features	Mitchell Falls, Little Mertens Falls, Big Mertens Falls, Surveyors Pool
Origin of the name	The river was discovered by government surveyor William Easton in 1921 and probably named after Sir James Mitchell, the premier at the time.



Location of the Mitchell River



Mitchell River

Location

The Mitchell River is one of the Kimberley's best-known rivers and is often visited by tourists. The spectacular Mitchell Falls are a rewarding sight after the long drive or helicopter flight needed to reach this remote and awe-inspiring area.

Other major rivers nearby are the Prince Regent, Hunter, Scott and Lawley rivers.

Landscape and form

The Mitchell River flows north from its headwaters on the Mitchell Plateau into Walmsley Bay and Admiralty Gulf. Its main channel roughly follows the western edge of the junction between the sandstone and overlying volcanic rocks that form the Mitchell Plateau.

The upper reaches of the Mitchell River that drain the rounded volcanic hills of the Mitchell Plateau have a finger-like or 'branching' drainage pattern, whereas those draining flattish sandstone country lower down have a more blocky, rectangular pattern due to the weathering of geological fractures.

The middle reaches of the Mitchell River are rocky and little sediment is present in the channel. Long, deep pools are thickly vegetated.

Over time the river has cut into ancient sandstone rock, carving gorges and waterfalls. The largest of these are the Mitchell Falls with their spectacular bare rock walls, The Mitchell Falls are a series of falls 80 metres high with three main sheer steps. Below the falls the Mitchell River is controlled by a geological fracture that runs north–south and forms a narrow estuary over 30 kilometres long.

The river's ecology

The Mitchell River flows through one of the most biologically important areas of the state. Patches of vine-thicket rainforest grow around the margins of the Mitchell Plateau where the climate is moister than in surrounding areas and fires are relatively infrequent. The region has an average rainfall similar to that of Walpole in the far south of Western Australia. The Mitchell River becomes tidal below the Lower Mitchell Falls and is habitat for estuarine crocodiles.

Open woodlands of grey box, white gum and other trees and shrubs grow around the valleys and creeks. This is one of the few places in Western Australia where the fan palm (*Livingstonia eastonii*) is conspicuous. Pandanus and paperbarks fringe the Mitchell River and its tributaries, and a new species of acacia has recently been found at the river's mouth. The aquatic plant *Ondinea purpurea* is endemic to the region. The black grass wren and the white-lined honeyeater are rare birds found in the area.

People's connections

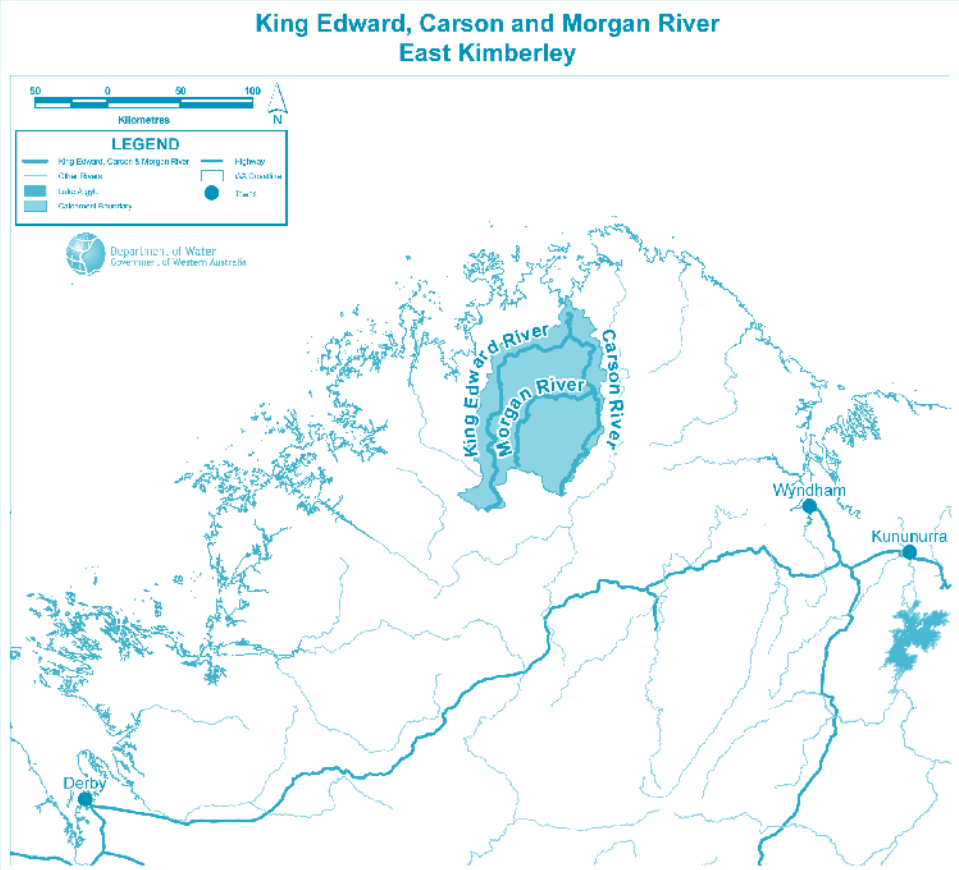
Traditional Aboriginal owners have very strong ties with the Mitchell River region. The Wunggurr (creator 'snakes') live in the deep pools below the Mitchell Falls, which are also known as Punamii-unpuu. To respect the culture, swimming is no longer allowed in these pools although it is permitted further downstream or above the falls. The Mitchell Falls area is well known for its high concentration of outstanding rock art that has been well studied but its provenance still not well understood.

There is a national park campground not far from the top of the Mitchell Falls that hosts a growing number of tourists each year. There is a multitude of luxury cruise boats touring the Kimberley coastline and Mitchell Falls is a popular side trip for these tourists, via the boats private helicopters. There are helicopters stationed at the campground for scenic flights also, making the airspace busy and congested in peak tourist season.

King Edward River

Facts at a glance

Length	221 km
Catchment area	8 400 km^2
Mouth	South Napier Broome Bay, Kalumburu
Average annual rainfall	1120 mm
Annual rainfall range	1000 – 1300 mm
Notable features	Carson and Morgan Rivers, Carson Escarpment, Morgan Falls, Worriga Gorge, Moongiyarrie Falls
Origin of the name	The King Edward River was named after King Edward VII, a British monarch known for supporting geographical research.



Location of the King Edward, Carson and Morgan rivers

King Edward River

Location

The King Edward River lies in the far north Kimberley and is recognised as a wild river. It flows northward for approximately 120 kilometres from its source before turning east. It then turns north again for 100 kilometres to flow into Napier Broome Bay, just downstream of Kalumburu.

The Carson River is a major tributary of the King Edward River. It joins the King Edward River just 25 kilometres upstream of Napier Broome Bay and has a catchment of approximately 4000 square kilometres: similar in size to the King Edward River's catchment. In turn, the Morgan River is a major tributary of the Carson River. Although it is more than 100 kilometres long, the Morgan was not formally named until 1958.

Other waterways near the King Edward River include Wade Creek and the Lawley River, which are also nationally recognised wild rivers.

Landscape and form

The upper reaches of the Morgan River drain a gently sloping rocky plateau of sandstone and volcanic material; channels are narrow. In the middle reaches there are deeper soils and the channel broadens to approximately 100 metres, becoming braided with vegetated bars and islands. Within the wider reaches the landscape alternates between minor rocky gorges and occasional series of small waterfalls. In one section the Morgan River is more deeply cut, forming a long, slot-like gorge.

The upper Carson River drains volcanic-rock hills and flat-topped laterite mesas. Its course is then mostly straight, bound to the east by resistant sandstone that sits on top of the volcanic stone to form a long (more than 100 kilometre) and spectacular escarpment. This geology contrasts with that of the Mitchell River, where the volcanic rocks are above older sandstone. Downstream of its junction with the Morgan River, the Carson turns west, towards hillier country, before joining the King Edward River at the western margin.

The upper and middle reaches of the King Edward River drain the undulating sandstone tableland of the Gardner Plateau. Slopes are gentle, floodplains are scarce and long narrow pools characterise the channel, which is not deeply cut. A few small waterfalls are present; the largest is the King Edward Falls. Much of the river is very straight, its course controlled by geological fractures. Just before it meets the Carson River, the channel becomes wider and large bars are common.

Below the King Edward River's junction with the Carson River, its lower reaches alternate between long, wide pools and drier sections of flat bedrock. Kalumburu is at the lower end of a particularly large pool. The estuarine reaches of the river are confined by a gorge that fills with water at high tide.

The river's ecology

Little is known of the river's ecology. Fragile patches of dense vegetation, including rainforest species, occur along the lower reaches of the Carson River. Fish and turtle species are now being studied.

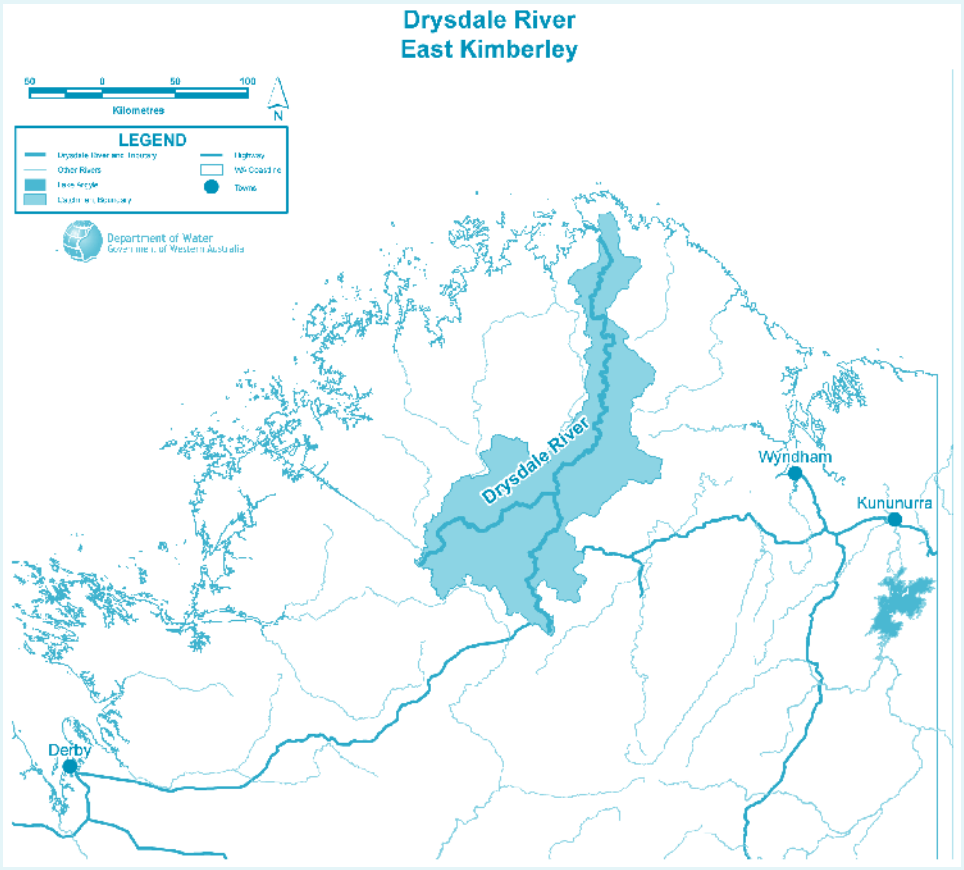
People's connections

The Kalumburu Mission was established near the mouth of the King Edward River between 1932 and 1937. Now an independent community, Kalumburu has a population of approximately 500 and is a popular destination for tourists exploring the Mitchell Plateau and northern coastal region. The road to Kalumburu passes through the centre of the catchment and becomes impassable in the wet season, restricting access to the Mitchell Plateau and northern Kimberley communities for a large part of the year. This poses a significant issue for permanent residents of these northern communities for access to supplies and services. Important Aboriginal heritage sites are present along the King Edward River and there are also some temporary tourist camps on the river.

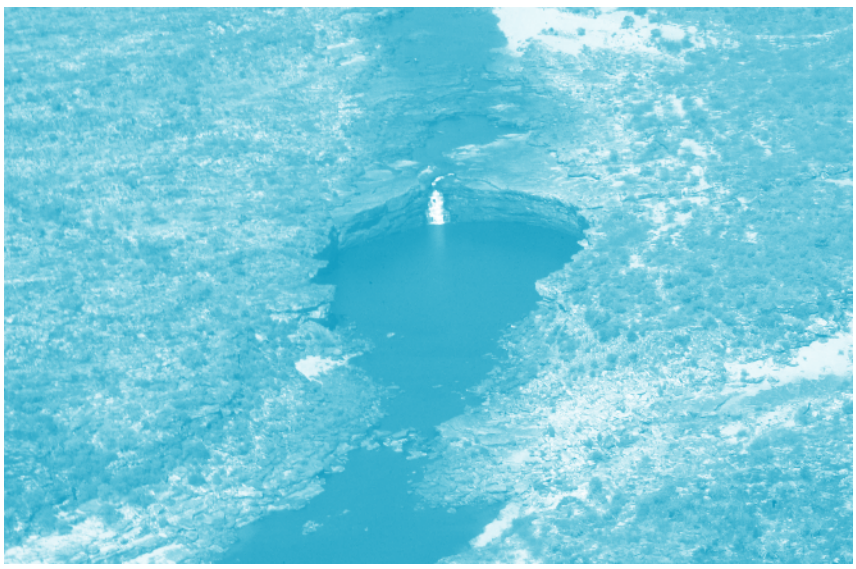
Drysdale River

Facts at a glance

Length	432 km
Catchment area	15 690 km^2
Mouth	Napier Broome Bay
Average annual rainfall	1000 mm
Annual rainfall range	900 – 1300 mm
Notable features	Solea Falls, Miners Pool, Carson Escarpment, Theda homestead, Drysdale River National Park
Origin of the name	The river was named by Chas Burrowes in 1886, after TA Drysdale, a director of the Victoria Squatting Company.



Location of the Drysdale River



Drysdale River

Location

The Drysdale River drains the heart of the north Kimberley. It is the third longest river in the Kimberley and its catchment includes many types of landscape. The main tributaries of the Drysdale River are the Gibb and Woodhouse rivers and Crossland and Banjo creeks. Major rivers nearby are the King George and Berkeley rivers.

Landscape and form

The upper reaches of the Drysdale River drain fairly flat plateaus that are broken by rocky, sandstone hills. Channels are not deep and carry large amounts of sand.

The middle reaches lie in the Drysdale River National Park. The country is hilly in the park's southernmost section, but further north it flattens out to broad valleys and shallow gorges. The channel here is approximately 150 metres wide and meanders across the landscape. Large sandbars and long broad pools are evidence of the power of the river in flood. Floodways extend up to 500 metres from the river channel.

Near the northern border of the national park, the Drysdale River descends from the sandstone plateau through a gorge in the Carson Escarpment via small falls and rapids. The Solea Falls or Horseshoe Falls are the best-known waterfalls in the area.

Below the plateau the country begins to open out and the river flows over a low plain. The channel is broad and sandy, braided in places, with numerous long pools. Just upstream of its mouth, the river is confined by the Barton River fault to a very straight and narrow course for over 20 kilometres, before finally emptying into Napier Broome Bay over a series of stepped rapids.

The river's ecology

Riverside vegetation is dominated by paperbarks and pandanus, with some cadjeputs, figs and Sesbania. In the national park 30 aquatic plants have been recorded, including unusual species such as *Nymphoides minima* and *Blyxa echinosperma*. Catchment vegetation is predominantly open savanna woodland, but small pockets of vine thicket are scattered throughout the park. Biological surveys have recorded 594 plant species, including 30 aquatic and swamp plants that live in permanent pools, and 25 species of fern.

Half of the 26 known species of native mammals are bats. In the national park 129 bird species have been found, including the purple-crowned fairy-wren, Gouldian finch and grey falcon. Other recorded vertebrates include 47 species of reptiles, 13 frog species and 26 species of freshwater fish.

People's connections

The Drysdale River runs through quite a remote part of the north Kimberley with limited road access, other than by parts of the Kalumburu road. This means there is not a lot of permanent residents along the Drysdale or heavy tourist visitation. This river crosses over traditional owner groups country so some parts of it would be shared area for traditional usage. There are many registered sites of Aboriginal significance along the Drysdale. Aboriginal people would have traversed this river as it would have had permanent water in many parts of it, as would some of the early explorers.

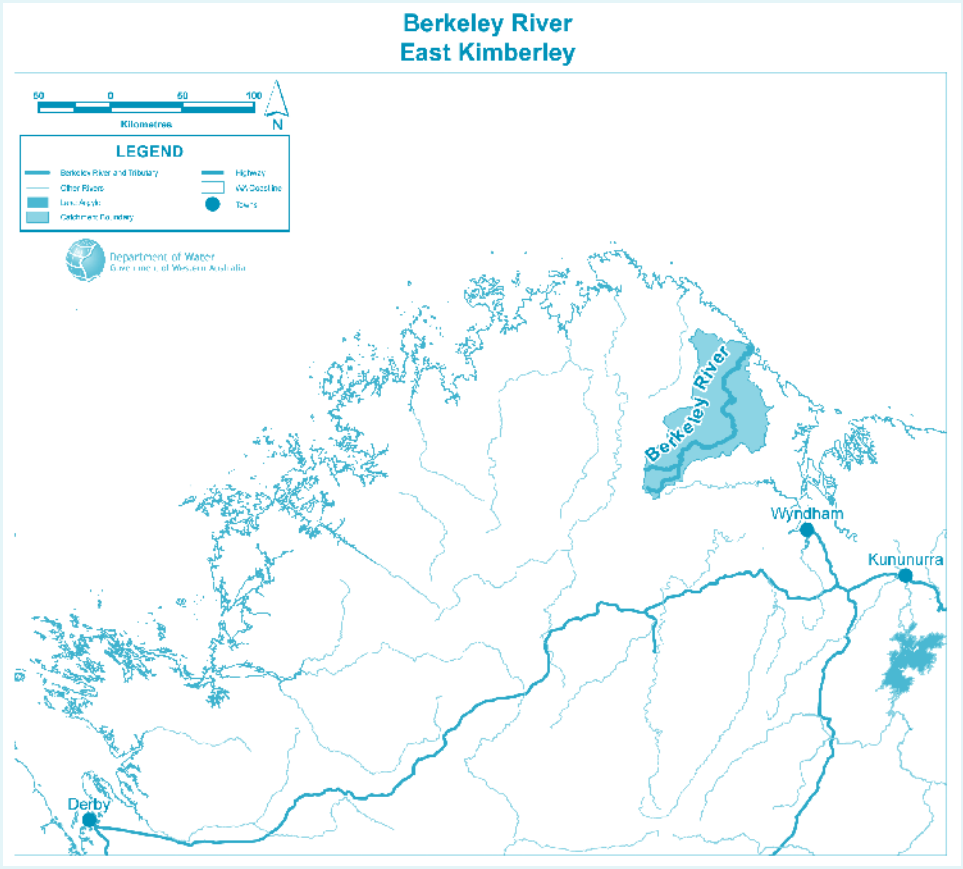
Government surveyor Fred Brockman first traced the river from its mouth to its upper boundary in 1901.

The Drysdale River National Park is the largest in the Kimberley, but it is not a major tourist destination because of its remoteness, inaccessibility and relatively flat landscape. There are camping sites on the river that are managed by Drysdale River Station and a fuel and rest stop that services visitors to the Mitchell Plateau.

Berkeley River

Facts at a glance

Length	180 km
Catchment area	4 740 km^2
Mouth	Joseph Bonaparte Gulf
Average annual rainfall	850 mm
Annual rainfall range	800 – 900 mm
Notable features	The sand bar at the river's mouth, Casuarina Creek falls, Mount Casuarina
Origin of the name	The river was named in 1911 after Berkeley or 'Berksley' Conigrave, the only brother of Price Conigrave, a senior geological assistant with the Western Australian Museum.



Location of the Berkeley River

Berkeley River by Luke Pen

Location

The Berkeley River flows across the north-east Kimberley into the broad Joseph Bonaparte Gulf. Its catchment is one of the largest under Indigenous management: run by the Oombulgarri community of the Forrest River Reserve. Tour boats and fishing enthusiasts visit its estuaries. It has one major tributary, the De Lancourt River, which is 57 kilometres long.

Landscape and form

The whole of the Berkeley River drains an ancient rugged sandstone plateau, the Karunjie Plateau. Its upper reaches are fairly straight, with small pools scattered along a predominantly sandy channel. Further downstream, in its middle reaches, the river's course is irregular; in some sections it is bound by isolated high plateaux and in others it runs through more open country where the channel is wider – in places up to 500 metres across.

In its lower reaches, the Berkeley River is confined by cliffs up to 80 metres high with small mudflats and mangroves at their base. The gorge was even deeper before its former outlet was 'drowned' by today's sea level. A large sand dune lies at the mouth of the Berkeley River; the dune is probably river sand shaped by wind and waves.

The river's ecology

Little is known. One species of acacia found recently is endemic to the Berkeley River. There is anecdotal evidence of dugongs in the seagrass beds behind the sand dune at the river's mouth.

People's connections

Reveley Island, near the mouth of the Berkeley River, is associated with Aboriginal rain-making stories. The Berkeley River is a very popular local recreational fishing area with people accessing it via the Cambridge Gulf from Wyndham. Although it is quite remote, accessed only by boat, the impacts of unmanaged visitation are beginning to show.

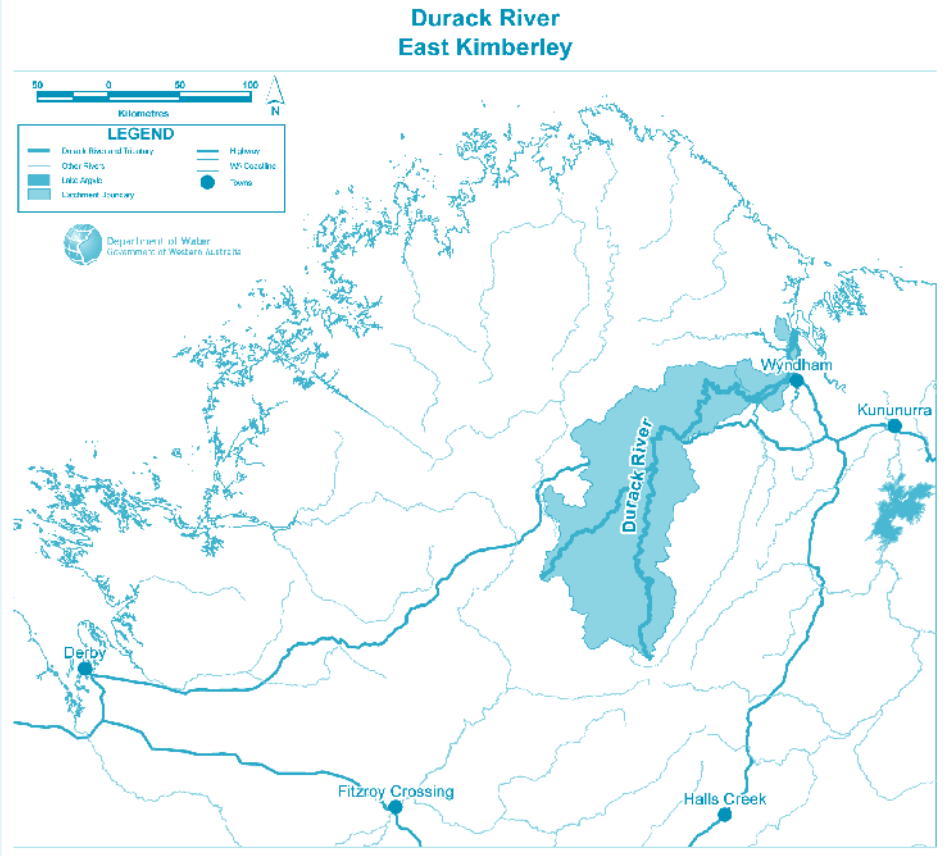
East Kimberley rivers

Rivers of the east Kimberley include the Durack, Salmond, Chamberlain, Pentecost, Forrest, King and Ord. The Ord River, with its tributaries, the Dunham, Panton, Nicholson, Bow and Negri rivers, produces the second largest flow volume in Western Australia. Regulation by two dams has changed the river and surrounds significantly by allowing the water collected during the wet season to be released throughout the year.

Durack River

Facts at a glance

Length	306 km
Catchment area	14 200 km^2
Mouth	West estuary of the Cambridge Gulf, Wyndham
Average annual rainfall	800 mm
Annual rainfall range	630 – 900 mm
Notable features	Durack Falls, Jacks Waterhole, Scotty Salmond Gorge, Durack, Ellenbrae and Karunjie.
Origin of the name	The river was named after Michael 'Stumpy' Durack, the first white man to cross the river in 1882.



Location of the Durack River

Durack River by Duncan Palmer

Location

The Durack River is the fifth longest river in the Kimberley. Despite its length and the familiar name, little is known about it. It discharges into the west arm of the Cambridge Gulf, fed by tributaries such as the Chapman River and Wood, Blackfellow, Campbell and Ellenbrae creeks, which begin in the same ranges as the headwaters of the Fitzroy and Drysdale rivers. The Gibb River Road crosses many of the Durack River's tributaries.

Landscape and form

The Durack River catchment is characterised by a gently sloping sandstone tableland. The middle reaches are fairly wide and sandy, with well-developed point bars and long pools. The lower reaches of the Durack River have cut through the tableland to form a more-or-less continuous sandstone gorge, with high cliffs on the outer side of its wide, sweeping bends.

The river's ecology

Little about the Durack River's ecology is documented. Paperbarks (*Melaleuca leucodendra*), pandanus and eucalypts are common along banks. . The Durack River is known to host significant but isolated populations of the vulnerable Purple crowned fairy wren (*Malurus coronatus*).

People's connections

The Durack River is accessible via the Gibb River road and there are a number of Aboriginal communities located near this river, some active living areas. Traditional owners are connecting with various land management projects in the region to work with their young people on country. Traditional owners have been carrying out fire management planning with partner organisations and pastoralists to protect certain habitats such as the riparian zones that support Purple crowned fairy wrens.

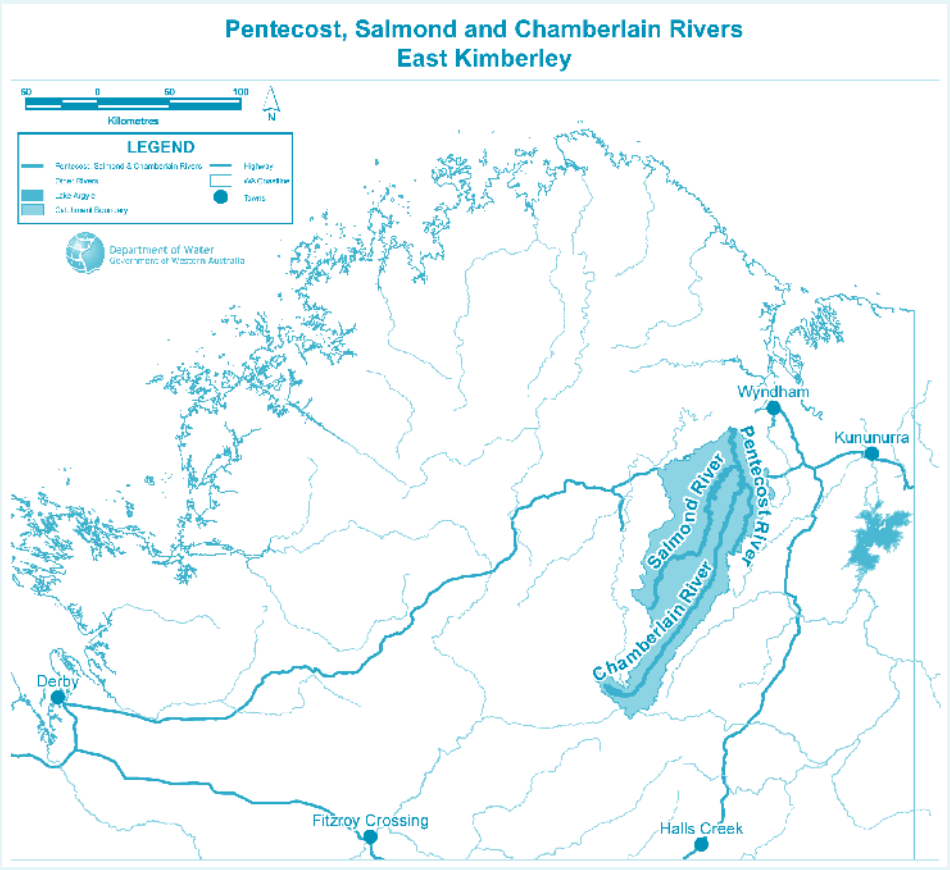
The Durack flows through several operating pastoral stations including Home Valley, Ellenbrae, Durack River, El Questro and Pentecost Downs. Michael 'Stumpy' Durack moved

to Lissadell Station with his wife and 10 children in 1886. This property, along with others run by the Durack family, was stocked with cattle from Queensland. The Durack's journey from Queensland is one of the longest overland droving trips in Australian history and the Durack family play a pivotal role in the pastoral history of the Kimberley.

Pentecost River

Facts at a glance

Length	275 km (Pentecost – Chamberlain mainstream)
Catchment area	8 940 km^2
Mouth	West estuary of the Cambridge Gulf, Wyndham
Average annual rainfall	700 mm
Annual rainfall range	600 – 750 mm
Notable features	Salmond and Chamberlain Rivers, Pentecost River crossing, Chamberlain Gorge, Emma Gorge, El Questro Wilderness Park
Origin of the name	The Pentecost River was named after John Pentecost, a surveyor and geologist, by Michael 'Stumpy' Durack in 1882.



Location of the Pentecost, Salmond and Chamberlain rivers

Pentecost River by Luke Pen

Location

The Pentecost River flows into the west arm of the Cambridge Gulf. Although the Chamberlain and Salmond rivers are tributaries of the Pentecost River, both are longer than the Pentecost. Other major rivers adjacent to the Pentecost are the Durack, King and Ord. The Durack and King rivers join the Pentecost in the west arm of the Cambridge Gulf and when the sea level was lower they would have been part of the same river system. Visitors can easily reach sections of the Pentecost and Chamberlain rivers from El Questro Wilderness Park.

Landscape and form

In its upper reaches the Pentecost River drains the ridges and hills of the Durack Range. The undulating terrain and confined valley give way to an open, broad valley in the middle reaches of the river, before ranges again confine it. The Pentecost River flows through a narrow gorge for approximately 10 kilometres just upstream of its junction with the Chamberlain River. In its lower reaches, below the junction with the Chamberlain River, the Pentecost River has steep cliffs and permanent pools. Its tidal reaches are in more open alluvial country, but it is somewhat confined by the Cockburn Range to the north and hills to the south.

The Chamberlain River is one of the most geologically impressive rivers in the Kimberley, running along a deep, steep-sided valley between the Durack Range and Elgee Cliffs for almost its entire 220 kilometres. Where the valley floor is wide enough, the channel meanders from valley wall to valley wall, but usually it is fairly straight as it has no room to move. The valley is asymmetrical due to its geology: its western side is almost vertical but its eastern side slopes at 45 degrees and is drained by scores of parallel tributaries – each only about 2 kilometres long. Numerous pools punctuate a fairly rocky channel bed. This catchment is extremely narrow.

The neighbouring Salmond River, which displays tightly curved meanders that are often deeply cut into the flat sandstone country, contrasts markedly with the straight Chamberlain River.

The river's ecology

Little is known, but studies of the Pentecost River have been started to gather data. The data will help to measure the effects of the Ord River dams on the aquatic ecosystem.

People's connections

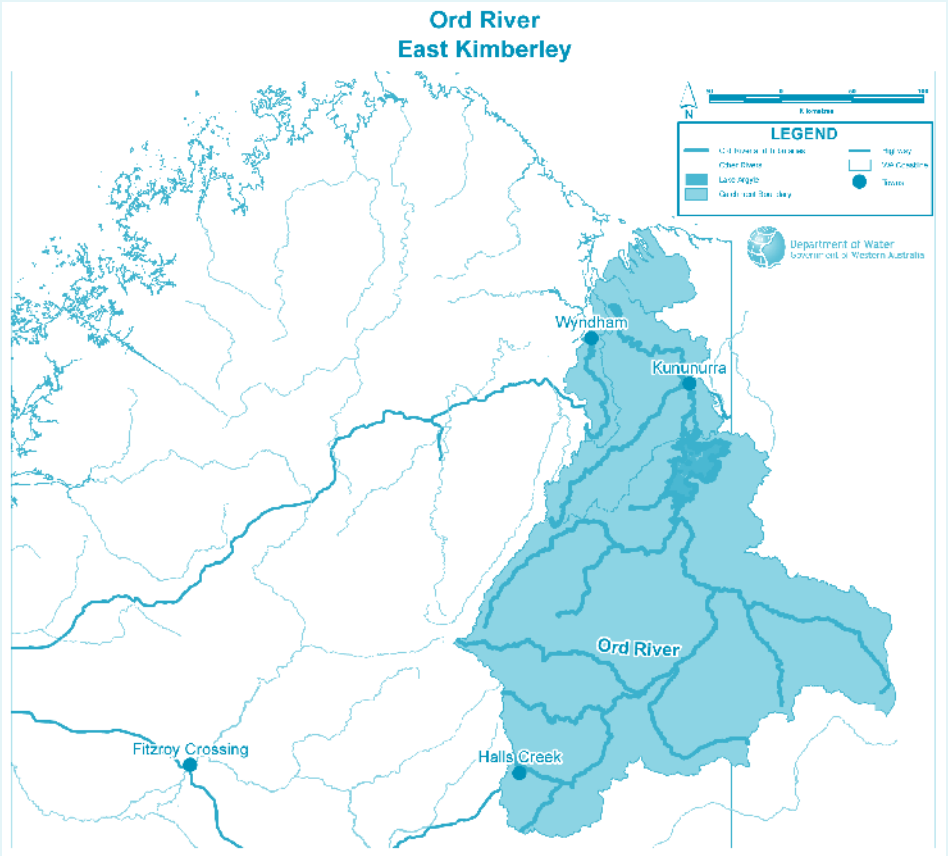
The tidal reaches of the Pentecost River are a popular fishing place for Kimberley locals and tourists.

The Chamberlain Gorge is located within a commercially run tourism property so there are very high tourist numbers visiting each year. There is some significant Aboriginal rock art located there and tourists travel up the gorge in small boats to view it.

Ord River

Facts at a glance

Length	588 km (130 km downstream of main dam)
Catchment area	53 900 km^2 (main dam 45 200 km^2)
Mouth	Cambridge Gulf
Average annual rainfall	560 mm
Annual rainfall range	450 – 820 mm
Notable features	Lake Argyle and the Ord River dam, Lake Kununurra, Carlton Gorge, Tarrara Bar, Ivanhoe Crossing
Origin of the name	The river was named after Sir Harry St George Ord, former governor of Western Australia.



Location of the Ord River

Lake Argyle

Location

The Ord River is the most regulated river in the Kimberley: the Kununurra Diversion Dam traps water to form Lake Kununurra and the Ord River dam traps water to form Lake Argyle. Water from the Ord River is used for agriculture and hydroelectricity.
The major tributaries of the Ord River upstream of Lake Argyle are the Elvire, Panton, Nicholson, Negri, Wilson/Bow and Behn rivers. The Dunham River is the largest tributary downstream of Lake Kununurra. There are no major tributaries between Lake Argyle and Lake Kununurra. The Ord River drains into the west arm of the Cambridge Gulf. Nearby rivers include the Keep and King.

Landscape and form

The upper catchment of the Ord River straddles the Halls Creek fault and is composed of basalt, sandstone, mudstone and limestone. The main channel meanders through broad, open valleys and is somewhat confined by bedrock outcrops. It varies from a channel with wide sand and gravel bars that are very lightly vegetated to a channel filled by narrow, well-vegetated bars.

The Ord River dam is in a natural gorge in the Carr Boyd Ranges. Below the dam, steep-sided tablelands and rocky hills border wide plains of deep, cracking clay soils. Downstream of Kununurra the channel is characterised by lateral bar forms, occasional rock outcrops (such as Tarrara Bar) and heavy growths of algae and larger aquatic plants. The latter is a result of the changed flow regime and nutrient levels since the dams were built.

In its estuarine reaches the Ord River large quantities of sediment have accumulated at regular intervals between bends. Gully erosion is common along the flat flanks of the river.

The river's ecology

Since the Ord River was dammed, new ecosystems have evolved due to the changes in channel form, water balance and resultant vegetation. The lower Ord River's floodplain and lakes Argyle and Kununurra have been declared internationally important wetlands under the Ramsar Convention as a result of the post-dam ecology.

The Ord River has been recognised as a nationally important wetland due to its significance as a habitat for more than 75 bird species, including significant breeding and migrant populations.

People's connections

The Ord River is the traditional homelands of the Miriuwung Gajerrong people and also plays an important part in the life of many east Kimberley residents and visitors. Recreational activities centred on the river include fishing, sightseeing, waterskiing and camping. The damming of the Ord has had a major impact on indigenous cultural values including the inundation of significant sites, hunting grounds, travel routes and access to the river from a resultant thickening of riparian vegetation. Water from the Ord River is used to irrigate 15 000 hectares of horticulture, timber and other crops. This industry, along with tourism, mining and pastoralism, supports the town of Kununurra.

Early Explorers of the Kimberley rivers

Kimberley rivers have only very recently been mapped and given English names – the 106 kilometre long Morgan River, for example, was not officially recognised until 1958.

Early European explorers visiting the Kimberley in the 1600s kept close to the coast and it was not until the 1800s that explorers ventured further inland. Kimberley rivers were important to explorers for fresh water and navigation. They were also of interest for their potential to support a future pastoral industry.

Five major phases of European exploration of Kimberley rivers have been identified:

Phase 1	In the 1820s and 1830s water- and land-based exploration of the coast took place. In 1837 George Grey travelled by boat to the mouth of the Prince Regent River to explore the surrounding land, naming the Glenelg and Sale rivers.
Phase 2	Further water- and land-based exploration occurred around Camden Harbour near Kuri Bay.
Phase 3	A major expedition led by Alexander Forrest in the late 1870s set out from the Pilbara to find land suitable for stock in the Kimberley. Forrest explored Lennard River Gorge, Bell Gorge and Geikie Gorge, then headed north-east to the Ord River.
Phase 4	Frank Hann led expeditions in the late 1890s, and was followed by Fred Brockman. Hann crossed the King Leopold Ranges, naming the Adcock River and Bell Creek. He also visited the Charnley River and tributaries of the Ord River north of Halls Creek.
Phase 5	Government-driven surveys took place in the 1900s.

The early explorers gave little thought to existing Indigenous place names. Of the 109 formal rivers names in the Kimberley, only 12 are derived from Aboriginal languages. Because rivers pass through the country of a number of different language groups, Indigenous names for rivers typically apply to sections of a river rather than the whole river, and different languages sometimes have a different name for the same section. The Fitzroy River has at least 14 different Indigenous names.

Five of the 11 surveyors general of Western Australia had rivers in the Kimberley named after them: Fraser, Forrest, Johnston, Brockman and Morgan. Only three of 27 state governors – Robinson, Ord and Lawley – were accorded this honour; however, two rivers in the Kimberley – Barker and Townshend – were named after state governors' wives.

Adapted from Epton, 2000.

Glossary

alluvial	(of soil, sediment, etc.) transported or deposited by flowing water
anabranch	a branch of a river or stream that leaves the main stream of a river and then re-enters it further downstream
bar	a deposit of sand or silt, usually formed across a river or river mouth
blocky drainage	drainage lines that run along right-angled faults or fractures to form a square or block-like pattern
braided	dividing and reuniting to form a network of channels
catchment	an area of land that catches rainfall and drains the collected water into streams, rivers, wetlands or underground
discharge	an outflow of water, often measured in cubic metres or litres per second
flood	an overflow of a river from the main channel onto the floodplain
laterite	a red-coloured soil found in tropical regions
meander	to follow a winding and turning course
mesa	broad, flat-topped hill with one or more cliff like sides
Ramsar Convention	The Convention on Wetlands, an international treaty signed in Ramsar, Iran in 1971, under which internationally important wetlands are identified for protection
reach	a stretch of water visible between bends in a river or channel
sediment	sand, clay, silt, pebbles and organic material carried and deposited by wind and water
river	a large natural stream of water emptying into an ocean, lake or other body of water and usually fed along its course by tributaries
swale	a shallow, troughlike depression that carries water, mainly during rainstorms
tributary	a stream, creek or small river that flows into a larger stream, river or lake
water resources	water in the landscape (above or below ground) with current or potential value to the community and the environment

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Notes

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The following information applies to all maps included in this document.

Sources

The Department of Water acknowledges the following datasets and their custodians in the production of the included maps:

Dataset Name	Custodian	Metadata date
Western Australian Towns	LANDGATE	Aug 2004
Lakes	AUSLIG	Dec 1998
Hydrography, linear (hierarchy)	Department of Water	Nov 2007
Road network	GA	Nov 1998
WA coastline	Department of Water	Jul 2006
Hydrographic catchments	Department of Water	Jun 2007

Datum and projection information

Vertical Datum: Australian Height Datum
Horizontal Datum: Geodetic Datum of Australia 1994

Disclaimer

The included maps are a product of the Department of Water, Water Resource Management Branch and were published on August 2008.

All maps, except for the Kimberley rivers locality map, were produced with the intent that they be used at the scale of 1:4 000 000 when printed at A4. The Kimberley rivers locality map was produced with the intent that it be used at the scale of 1:12 000 000 when printed at A4.

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