

Protecting the Kimberley's Fitzroy River

Science Statement of Support

Statement from the undersigned coordinating authors and supporting scientists

We welcome the Western Australian Government's commitment to create a new protected area in the Fitzroy River Catchment, and to create a management plan to ensure the protection of the National Heritage and other significant cultural and environmental values of the river and provide a basis for sustainable development.

The Fitzroy River is one of the largest principally unregulated rivers remaining in Australia and is recognised as a centre of cultural life and biodiversity in the Kimberley.¹ The river follows a path from the roof of the central Kimberley Plateau, flowing through spectacular and ancient gorges in the King Leopold and Napier Ranges, and coursing between wide floodplains before meeting the ocean at King Sound. The river and catchment support a rich and unique biodiversity of aquatic and terrestrial life with national heritage listed natural and cultural values.²

Cultural values arise from unique archaeological records, major rock art assemblages, and associated and continuing Aboriginal cultural practices, and are exceptionally high in the Fitzroy region. Some of the oldest, continuous and most detailed records of Aboriginal occupation, exploitation of both arid and tropical faunal and botanic suites, and persistence during the Last Glacial Maximum come from the Oscar and Napier Ranges⁴⁹. The sites of Carpenter's Gap 1 and Riwi are in the earliest tranche of sites dated by radiocarbon in the continent and have unheralded preservation records of plants, terrestrial and aquatic fauna, organic and inorganic artefacts including some of oldest known edge-ground axes, bone and bifacial Kimberley Points, and marine shell personal ornaments. The rock art of the region is widespread and highly variable and shares strong cultural traditions with the wider Kimberley, having both Pleistocene (pre-10,000 year old style elements) and later styles including variants of Wanjina from the Holocene (during the last-10,000 years). There are also elements of the painted and engraved art bodies, stone arrangements and mythic tracks affiliated with groups of the sandy deserts to the south. Current cultural art estates are actively maintained by Traditional Owners and Indigenous Protected Area Rangers.

The Fitzroy River Declaration by Traditional Owners further speaks to the ongoing multifaceted value of the river to Aboriginal people and outlines aspirations for the future. It is hoped that this statement will also be of value to Traditional Owners in the process of furthering the aspirations expressed in the Declaration.

The Fitzroy River and its estuary provide critical habitat to arguably the world's most important population of Vulnerable (EPBC Act) Freshwater Sawfish (*Pristis pristis*) and supports other elasmobranch species of conservation significance, such as the Freshwater Whipray (*Urogymnus dalyensis*), the Bull Shark (*Carcharhinus leucas*), the Critically Endangered Northern River Shark (*Glyphis garricki*), the Vulnerable Dwarf Sawfish (*Pristis clavata*) and the Winghead Shark (*Eusphyra blochii*)³. Juveniles of the Freshwater Sawfish occur as far upstream in the Fitzroy River as the Margaret River Gorge. Globally, this species has disappeared in >70% of its former range, and intact nurseries, such as the Fitzroy are rare, and are crucial for its persistence globally. In addition, the estuary of the river is a significant nursery for Dwarf Sawfish^{4,5,6,7,8}. The aquatic habitat supports

thirty-seven species of fish, many of which are endemic to the Kimberley including an endemic glassfish, archerfish, hardyhead, grunter and gudgeon^{9,10,11}.

The lands and waterholes flanking the river are of equally high conservation value. Riparian and floodplain vegetation in the catchment includes 40 species of groundwater-dependent plants, which support riparian bird species such as the nationally Endangered Purple-crowned Fairy Wren and Buff-sided Robin^{12,13}. The wetlands and billabongs at the river mouth and along the floodplain are habitat for internationally protected migratory (and non-migratory) birds¹³. In particular, the large floodplain wetlands at Camballin are important waterbird habitat (67 species recorded) and significant breeding grounds for Magpie Geese and Whistling Duck¹⁴; parts of the floodplain meet criteria for listing as Wetlands of International Importance, under the Ramsar Convention. The river also provides a rich source of food for local Aboriginal and non-Aboriginal people through its abundant fish, freshwater turtle, mussels and freshwater shrimp (cherabin)¹⁵.

Recent genetic analysis of lizards from across the Kimberley has demonstrated that the Fitzroy region and flanking King Leopold Ranges have a rich fauna, reflecting the mixing of arid zone and tropical elements. In particular, the limestone ranges of the Devonian Reef System⁴⁴ flanking the southern margin of the Fitzroy Gorge harbour several endemic species and genetic lineages of lizards, such that this system is a major hotspot of unique evolutionary diversity⁴⁵. Each of these ranges – the Napier, Oscar, Pillara Ranges and scattered outcrops south to Ngumpun Cliffs – are home to unique elements of the biota not found elsewhere^{48,46}.

The ecology and hydrology of the river is shaped by highly variable and unpredictable river flows. Waterholes along the course of the river and its tributaries provide vital refugia for wildlife during the dry season months, including fish, turtles, invertebrates, crocodiles and birds. Many waterholes are fed by groundwater during the dry season in a complex interaction between surface and ground water. Surface waters then recharge ground water in the wet season when river flows occur^{13, 14, 17}. The magnitude of these interactions is likely to vary significantly from year to year, as the volume of and duration of river flow is highly variable. These interactions between surface water and groundwater will also be highly variable along the length of the river, requiring detailed mapping and data collection over at least 5-10 years to characterise given inter-annual variability.

High volume freshwater flows from the river into King Sound are critical for both ecological functioning and the long-term sustainability of the pearling, recreational and commercial fishing and tourism industries. These flows act as a pathway for those species that spend part of their life-cycle in both marine and freshwater environments, such as Barramundi, Freshwater Sawfish and Mulletts. Scientific research has consistently identified the importance of wet season flows from northern Australian rivers in determining the productivity of many species of estuarine fish and crustaceans of economic significance^{18, 19, 36}.

Significant flood events in the river catchment replenish the vitality and connectivity of the river, floodplains, wetlands, waterholes and estuarine system. More than one third of all fish species in the freshwater reaches of the river need water flows to access the estuary and near shore zone to reproduce, including the ecologically and economically important Barramundi^{15, 16}. Tracking of Barramundi in other Northern Australian river systems demonstrates that it is critical to maintain the connectivity between floodplains, the river and estuaries in order to support populations of large-bodied fish^{18, 19, 20}.

With such enviable relatively intact freshwater, riparian and adjacent terrestrial ecosystems that support endemic, endangered and scientifically significant species and communities, the creation of protected areas and a management plan in the Fitzroy River catchment is an opportunity to establish an internationally acclaimed and scientifically endorsed conservation regime. However, the

ecological, cultural and natural values of the river and new protected areas are also tied to the overall condition of the river system which is threatened by agricultural practices^{18, 21, 32} and long-running proposals for large-scale irrigation schemes^{33,34,41,42,43}, mining and gas extraction²³.

Large-scale cattle grazing results in soil compaction, degradation and loss of riparian and aquatic vegetation, increased sedimentation, introduction of weeds and potentially significant collective impacts on water quality, hydrology, aquatic ecosystems^{20, 24}, as well as on terrestrial vegetation communities³¹ and threatened species³². The clearing and fragmentation of native vegetation for cropping and associated inputs of pesticides, herbicides, fertilisers and water²³ can lead to severe impacts on freshwater biodiversity.

Native vegetation clearing and water infiltration from irrigation practices can cause groundwater levels to rise and salinisation, as has occurred in the Ord River agricultural area^{25, 26} and in the Murray-Darling Basin. Groundwater salinisation has also been linked to the widespread dieback of *Eucalyptus camaldulensis* (River Red Gum) forests of the Murray River floodplain²⁷.

Lowering of the water table (through reduction of surface water flows or through groundwater abstraction) can cause pools to become 'disconnected' for longer periods and in extreme cases whole refuge pools can dry-up, threatening the diverse wildlife that relies on groundwater-fed pools. Permanent pools are the principal dry season refugia for freshwater fishes, sawfish, turtles and crocodiles in the river²⁸. Vegetation that is groundwater-dependent, such as *Pandanus aquaticus* that provides habitat for the Endangered Purple-crowned Fairy-wren³² is also likely to suffer from moisture stress²⁸.

Stygofauna and troglifauna, which is likely to be diverse in the aquifers of the Fitzroy River catchment, are likewise vulnerable to groundwater extraction^{29, 47}. Similarly, lowering of the water table could impact the unique reptiles of the limestone ranges which have persisted here for millions of years at the interface of the desert and Kimberley supported by these complex groundwater systems¹³.

Disruption to natural surface water flows, including damming of the Fitzroy or its tributaries, off-stream storage dams and direct extraction of surface water, may change the frequency and duration with which riparian and floodplain vegetation are inundated by flood waters³⁰, and the very morphology of the river system. Water harvesting may have substantial impact on habitat suitability, food-webs and ultimately biodiversity. Damming or re-direction of water flows can interrupt migration and cause isolation (physical and genetic) of populations of aquatic species.

The regular wet-season flooding plays important roles in the recharge of groundwater and therefore persistence of dry-season refuges. In addition, waterbird abundance and composition have already been impacted by such developments in many river and wetland habitats in Australia^{28,37}.

Science shows that the most effective way to protect the remarkable natural and cultural values of the river is to: a) create a protected area upstream to eliminate the threat of dams; b) reduce the impacts of landscape-scale threats such as frequent intense fire, weeds and over-grazing that affect water quality; and c) legislate for a management plan that includes a buffer zone along the river that protects important seasonal wetlands; the alluvial aquifers and other groundwater conduits on which dry season refuge pool are reliant, and the floodplains from which the aquifers recharge. The buffer zone must exclude native vegetation clearing, hydraulic fracturing, mining and large water extraction projects^{38,39,40}.

The use of good science and modern planning tools should lead to an outcome that matches or exceeds the protection offered in other world-class protected areas in Australia.

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