

Case study: A history of cattle, water and wildlife on Nankin Plain

Broadmeadows was one of the first areas in Central Queensland to be used for grazing cattle. It is located on the floodplain of Nankin Creek before it meets the Fitzroy River estuary and has a history of sustaining cattle and wildlife on its well-watered marshes. A viable stud and commercial cattle business has been established that co-exists with thousands of waterbirds, including swans and brolgas that regularly nest in the wetland. The landholders are applying several strategies to successfully reduce soil erosion on vulnerable slopes in the catchment.

From Archer's heifer station, to cattle stud

When the Archer brothers established grazing runs in the Rockhampton district in the 1850s, agriculture began on the part of their holdings known as the Nankin Plain. In this context, the key feature of the Plain was the reliable water supply in Nankin Creek. Spilling on to the Plain during high flows, the Creek also sustained natural pastures for livestock grazing.

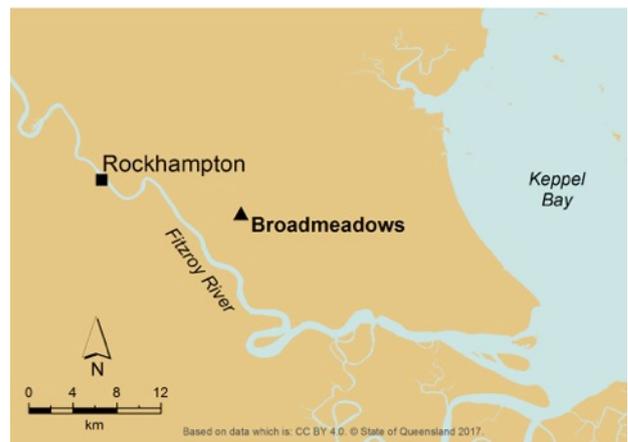


Nankin Creek provides a permanent water supply.

Broadmeadows:

- 13 km ESE of Rockhampton, on the Nankin Creek floodplain
- Marine plain with seasonal grass-sedge swamp and deep permanent creek
- 984 hectares of stud cattle enterprise

In those days, the western part of Nankin Plain was known as 'The Heifer Station'. After it was divided, the England Brothers, Robert and William, took up 5000 acres and named it Broadmeadows; the southern part was later separated and named The Meadows. The firm of Henry Beak & Sons purchased both parts in 1917-18. In 1930, the firm was dissolved and The Meadows was taken over by meatworks operators. The family of present owners Rob and Michele Lang has been associated with Broadmeadows since 1920, nearly 100 years; Michele is granddaughter of Henry Beak.



Location of Broadmeadows, Queensland (Peter Smith, FBA).

Henry Beak & Sons imported Poll Herefords, three bulls and three cows, from the USA in 1920—the first to be imported into Australia: one of these bulls, Polled Gemnation, is entered as No. 1 in Volume 1 of the Poll Hereford Herd Book of Australia. Rob and Michele have continued development of Broadmeadows as a cattle stud although the Herefords have been almost completely superseded by other breeds of cattle. The stud is today based on Charolais cattle, noted for their bulk and meat, cross-bred with Brahman cattle, noted for tick resistance.



Imagery of Broadmeadows showing the location of Nankin Creek and the marsh (Google Earth 2017).



View from Nankin Creek across Broadmeadows, April 2017; at back: Fitzroy River in flood. (Shane Westley, FBA)

Grazing system and strategies

Grazing at Broadmeadows occurs on the floodplain, much of which is occupied by a swamp or 'marsh', as well as on low slopes draining to the floodplain.

Water couch *Paspalum distichum* is a mainstay of the enterprise because the wide shallow marsh where it grows remains wet or damp for most of the year, especially if there has been winter rain. Whereas in Central Queensland marine couch *Sporobolus virginicus* is often grazed to support stock late in the dry season—when water couch is no longer available—normally this is not necessary at Broadmeadows.

Pangola grass *Digitaria eriantha* has been introduced to other parts of the property and is also a key cattle food, along with black spear grass *Heteropogon contortus*. Some Olive Hymenachne *Hymenachne amplexicaulis* occurs but is controlled by heavy grazing by cattle at the right stage of the dry season.

Prime weight gain is usually achieved by October each year. Stocking rate is generally around one beast to 1.5 ha, or higher in the marsh pastures for short periods.

Rob Lang's philosophy is that "you can't take out more than what you put in, so adapt the business accordingly". He considers that "even though there may be grass cover, it is good to keep it so and make it even better".



Commercial maiden heifers, Broadmeadows (Adrien Lang).

Accordingly, pasture in the floodplain marsh is grazed carefully—just the tops taken off—so the capacity of this resource is not reduced too early. The good grass cover keeps water on the flat longer into the dry season, by reducing evaporation. Over the decades, the regime for grazing in this wetland has concurrently supported abundant wildlife (see below).

Last century, some wetlands on western Nankin Plain were partly modified by drains and embankments to enhance farm production. Cotton, lucerne and vegetable crops were sometimes grown in suitable sites on these properties during the 1920s.

Wetland ecosystems

Nankin Creek has a catchment of about 13,700 ha in the Berserker and Flat Top Ranges, upstream of where it enters Nankin Plain. It delivers floods to Nankin Plain and connects to the estuary of the Fitzroy River, nearby. The River may backflow fresh water into the Plain when it carries a major flood above height 8.5 m as measured in Rockhampton, such as occurred in 1991, 2011 and 2017.

Local author, James Paterson, wrote in local newspaper, *The Capricornian*, in 1924: "There is no doubt the Nankeen Creek has the most beautiful fresh-water scenery in Queensland." The creek apparently teamed with barramundi and "the black duck and quail shooting was excellent."

The floodplain marsh on Broadmeadows is a shallow open wetland, mapped as 'palustrine' (vegetated, non-channel wetland that has more than 30% emergent vegetation) by the Queensland Herbarium and it may be classified as a 'floodplain grass, sedge and herb swamp'. These wetlands are commonly associated with depressions on marine plains of Capricornia; most have been partly modified by agriculture and some have been drained or replaced by expansion of urban areas. Some overbank flows of Nankin Creek may contribute water to the marsh on Broadmeadows but the main source is a series of several creeks only a few kilometres long, flowing intermittently from hills near its north-western side.



View across the marsh to north-western side of the Plain.

Dominant vegetation in the Broadmeadows marsh includes water couch, swamp rice-grass *Leersia hexandra*, water primrose *Ludwigia peploides*, tall sedge *Cyperus alopecuroides*, knot-weed *Persicaria* spp., common water hyacinth *Eichhornia crassipes*, and aquatic fern *Azolla* sp. Marine couch occurs in the drier margins and run-on areas.



Lush water couch and swamp rice-grass in the grass-sedge-herb swamp on Broadmeadows.

Wildlife values

Nankin Plain is part of the Fitzroy Delta site described in the Directory of Important Wetlands in Australia (site QLD012); Broadmeadows Swamp and Nankin Creek are specifically mentioned. Surrounding areas include national parks and gazetted Fish Habitat Areas. In terms of its wetland systems, Nankin Plain as a whole retains high value because the sustainable grazing regime has ensured the viability of important wetland habitats for threatened, breeding and migratory waterbirds and for fish stocks.

Nankin Creek is up to 10 m deep in some holes and supports large fish including barramundi. Aquatic macrophytes (plants such as water-lilies) have high diversity; together with overhanging bank vegetation and snags, they provide significant refuge habitat for fish. The Creek is of high value to the typical suite of native fishes occurring in creeks entering the Fitzroy Delta. The Broadmeadows marsh can have seasonal connectivity to the Creek and River and is considered valuable as a fish nursery area.

A survey of waterbirds in the Broadmeadows marsh by a team of volunteer observers in July 2003 recorded 27 species and 3140 individuals. Most abundant were Grey Teal *Anas gracilis* (780 birds) and Black-winged Stilt *Himantopus leucocephalus* (555). Unusually large numbers of Australasian Shoveler *Anas rhynchotis* (120) and White-necked Heron *Ardea pacifica* (33) were present. Storks (jabirus) occur and brolgas and swans breed regularly in the Broadmeadows marsh.



Densely vegetated wetland on Broadmeadows provides cover for many Comb-crested Jacanas.

In December 2016, Comb-crested Jacanas *Irediparra gallinacea* were plentiful in the wet marsh and the relatively uncommon Cotton Pygmy-goose *Nettapus coromandelianus* also was present. Australasian Darters *Anhinga novaehollandiae* were nesting in *Melaleuca* trees overhanging Nankin Creek. In February 2017, 22 waterbird species were recorded in drying wetland. At times, Magpie Geese *Anseranas semiplamata* have been present in large numbers on Broadmeadows.

The wetlands of Nankin Plain had a reputation for reptiles. Writing in *The Capricornian* in March 1924 in regard to the meatworks property, James Paterson stated that "the flats had an unenviable name for dangerous snakes. It was thought the numerous frogs attracted them. However, during one big flood 1200 were killed, and that slaughter thinned them out for some time."

Challenges for upholding water quality: erodible catchment

Rob Lang's primary concerns in managing the property are "to improve ground cover, control salt and reduce erosion, to create better grazing practice".

Upland areas of Broadmeadows with gentle or greater slope are subject to gully erosion and increased salinity, and so are a focus of management planning.



Minor erosion gully with salt scalds.

Sediment from highly erodible catchments ends up in the Broadmeadows wetlands or beyond. Heavy rains in the late dry season do the most damage; grass cover on its own cannot prevent erosion from those rain events at that time of year. After 375 mm of rain in July 2016, erosion gullies formed across old embankments where they had been partly washed away.



Severe erosion caused by a downpour in 2016.

The principal landholder intervention so far has been to create low bunds across some of the gullies, using C-Class fill (with rock to 20 cm) sourced on the property. These bunds slow and spread water flow across the slopes and thus reduce erosion. Native wetland plants including beetle grass *Diplachne fusca*, sedges *Eleocharis* spp. and aquatics such as nardoo *Marsilea* sp., swamp lily *Ottelia ovalifolia* and water lilies *Nymphaea* sp., have established above the bunds.

Stopping gully erosion:

- Source C-Class fill for bunds
- Length of bunds up to 50 m
- Machinery to deliver and construct.

Maintaining good ground cover and remediation of erosion in these shallow gullies have economic benefits for farm production, ensuring localised feed and drinking water for stock during the dry season when surrounding dryland pasture has declined from its peak quality. The small ponds above the low bunds also have the additional benefit of providing multiple small patches of habitat for wetland animals.

Rob Lang considers the bunding a successful strategy because of these benefits to land condition and farm production. "After many years of attempting to stabilise erosion in the salted areas on Broadmeadows with the onsite parent material, which proved unsuccessful, we began using a 'C' Class product sourced on the property. The results have been extremely successful and have, to date, not resulted in the failure of any bunds we have constructed."

The upland paddocks are relatively small (30-50 ha) and stock can be moved out of them to enhance outcomes while restoration work is occurring. Temporary electric fences also may be used.



Low bunds to slow runoff on slopes have reduced gully erosion and provided wildlife habitat and seasonal feed.



Satellite image (total width 180 m) of the low bund in the photograph above.

Sedimentation from erosion in the external catchment is a significant issue in Nankin Creek. A popular swimming area over 50 years ago, Nankin Creek has been silting up: sawn logs have been dug up under sediment in the creek bed.

Work in progress or planned

Capricorn Catchments, a community organisation promoting natural resource management, is working with the Langs to support development of additional low bunds that slow and spread water flow on slopes at Broadmeadows (reducing erosion and increasing ground cover). The short low bunds are proposed for shallow gullies without well-defined channels and, during heavy rain and floods, fish could bypass them. Thus the interventions are not waterway barrier works or ponded pastures, which are the subject of specific government regulations.

Some washed-out old bunds on Broadmeadows may be repaired with rock and gravel that will allow most runoff to continue downhill to the big marsh. Some bare or eroded bunds may be stabilised by planting native wetland plants; candidates include the tall bulky sedge *Cyperus alopecuroides*, which occurs locally and grows on the edges of some existing bunds.



Cyperus alopecuroides tall sedge in Broadmeadows marsh.

There is no major barrier to fish movement between lower Nankin Creek and the Fitzroy River for fish that need to enter saltwater for part of their life cycle. However, fish migration upstream of Thompson Point Road, which is near the north side of Broadmeadows, is impeded at the road culvert. Fitzroy Basin Association is working to facilitate fish movement by modifying the creek bed at the culvert. A rock ramp fishway will be constructed, with average maximum drops of only 50 mm, to allow smaller native fish species to access the creek and other wetlands above the culvert.



The existing culvert on Nankin Creek at Thompson Point Road (Fitzroy Basin Association).



Example of the type of solution to be installed: a rock ramp fishway (Fitzroy Basin Association).

Other management challenges

Researchers using DNA analysis have detected evidence of the introduced, harmful Tilapia (<https://www.daf.qld.gov.au/fisheries/pest-fish/noxious-fish/tilapia>) in Nankin Creek. Spread of Tilapia in the Fitzroy Basin, and in Queensland generally, is a major concern because Tilapia out-compete and may replace native fishes. Fitzroy Basin Association is among the organisations supporting efforts by the Department of Agriculture and Fisheries in raising awareness of Tilapia (http://www.fba.org.au/wordpress/wp-content/uploads/2014/06/3295_FBA_Tilapia-A4-factsheet_lo.pdf) and the threat it presents.



Tilapia is a threat to native fish populations (Fitzroy Basin Association).



Deep-water fish habitat, Nankin Creek.

Biological control of *Salvinia molesta* infestations in Nankin Creek has been successful and the waterholes have provided the control insect for use at other localities in the region.

As sea levels continue to rise, many freshwater coastal wetlands will be threatened as saltwater encroachment forces an inland shift of saline wetlands and increases intrusion of saltwater to surface and ground water.

Many smaller properties lie adjacent to Broadmeadows and neighbourhood cooperation to prevent spread of weeds such as Giant Rat's Tail grass (*Sporobolus pyramidalis* and/or *S. natalensis*), a pasture invasive, is essential. Scotch thistle *Onopordum acanthium* can be temporarily extensive on-site if winter rains are good.

Conclusion

Robert and Michele Lang sum up their approach to sustaining a viable grazing enterprise at Broadmeadows: "High performing, quiet cattle are essential in any beef cattle operation but particularly in a beef cattle operation as small as we have at Broadmeadows. We have found Charolais and Charbray cattle to be the most suitable breeds to enable us to achieve the aims and objectives of our enterprise." And regarding ground cover—which has implications for condition of downslope wetlands: "Low pressure grazing and strategic fencing have minimised labour costs and the impact of dry-weather. Ongoing restoration of areas currently unusable, such as eroded gullies and salted areas, is essential for the future sustainability of our beef cattle operation at Broadmeadows."



Beef cattle, Broadmeadows (Adrien Lang).

Acknowledgements

This case study was funded by Fitzroy Basin Association Inc. and the Department of Agriculture and Fisheries, as part of the Queensland Wetlands Program.



The marsh at Broadmeadows after heavy rain, April 2017 (Shane Westley, FBA).

The willing cooperation and generous assistance of landholders Robert and Michele Lang of Broadmeadows is gratefully acknowledged.

Staff of Fitzroy Basin Association and Capricorn Catchments provided timely administrative and logistical assistance and together with staff of the Queensland Wetlands Program (Department of Environment & Heritage Protection; Department of Agriculture & Fisheries) contributed much appreciated review comments on drafts of the case study.

Photos are by the author, Roger Jaensch, unless indicated otherwise.

The Queensland Wetlands Program supports projects and activities that result in long-term benefits to the sustainable management, wise use and protection of wetlands in Queensland. Tools developed by the Program help wetlands landholders, managers and decision makers in government and industry. The Queensland Wetlands Program is currently funded by the Queensland Government.

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QWP/2017/07