Talking fish

Making connections with the rivers of the Murray-Darling Basin

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Queensland content in association with Zafar Sarac and Greg Ringwood.

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Note: The term *Talking Fish* is also being used by the Australian River Restoration Centre as a way of sharing knowledge about people's connection to fish and waterways.

Readers are warned that this publication may contain the names and images of Aboriginal people who have since passed away.

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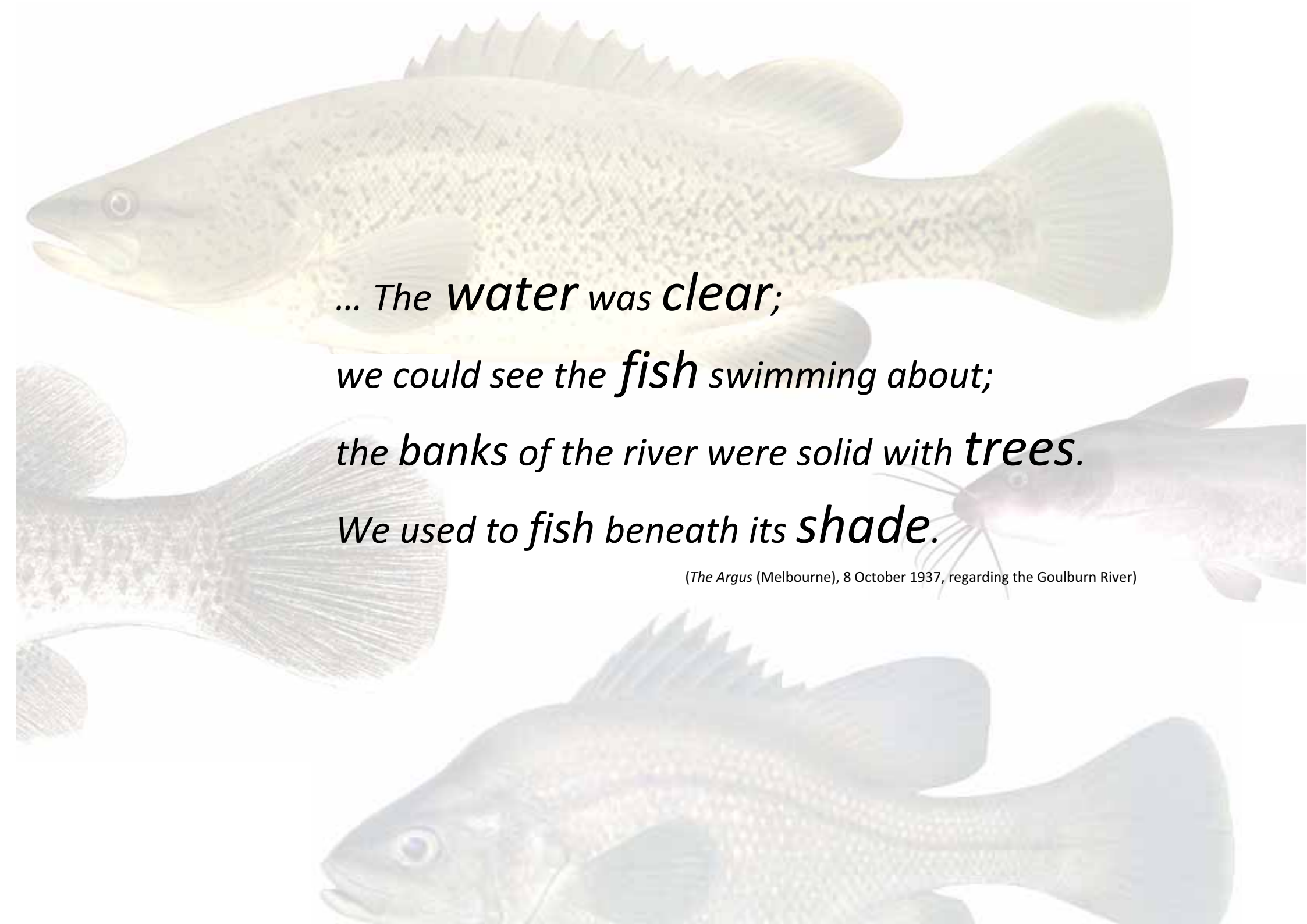
Abbreviations

DPI	Department of Primary Industries
PIRSA	Primary Industries and Resources SA
DENR	Department for Environment and Natural Resources (SA)
SARDI	SA Research and Development Institute
LAP	Local Action Planning Association
MDBA	Murray-Darling Basin Authority
DSE	Department of Sustainability and Environment (VIC)



… The **water** *was* **clear**;

we could see the **fish** *swimming about;*

the **banks** *of the river were solid with* **trees**.

We used to **fish** *beneath its* **shade**.

(*The Argus* (Melbourne), 8 October 1937, regarding the Goulburn River)

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Culgoa - Balonne

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Upper Condamine

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The rivers of the Murray-Darling Basin

The rivers and creeks of the Murray-Darling Basin flow through Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia. The 77 000km of waterways that make up the Basin link 23 catchments over an area of 1 million km^2.

Each river has its own character yet these waters, the fish, the plants and the people that rely on them are all different.

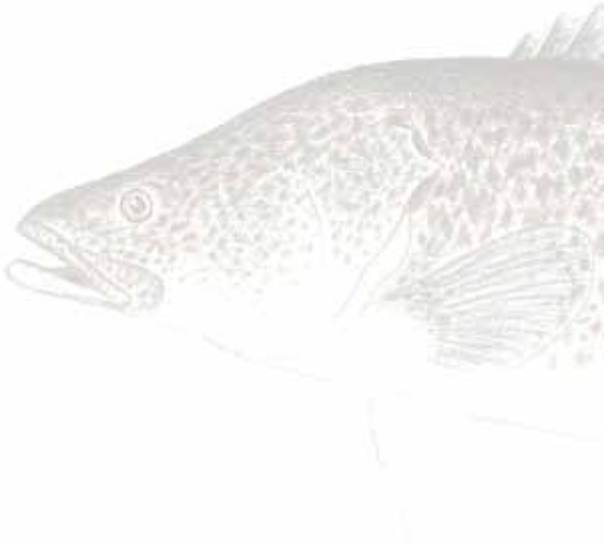
The chapters in this book are about how the rivers, fish and fishing have changed. The main stories are written from oral history interviews conducted with local fishers in 2010-11, and relate individuals' memories of how their local places have changed. They showcase three ways of knowing a river: personal experience, scientific research and historical research.

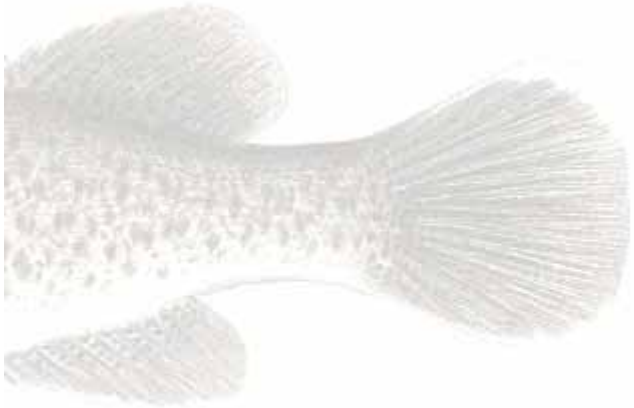
Just as individual fishers do not always agree with one another, so their understanding might not necessarily agree with current scientific information or historical records. Similarly, specific items and events might be remembered differently by different people. These varied perspectives show the range in views about fishing and the rivers, each important in its own way.

There are many other great stories out there about fishing in the Murray-Darling Basin. These are just the beginning.

Figure 1: The catchments of the Murray-Darling Basin.

Contents





Namoi

Source: NSW DPI.

Source: NSW DPI.

Source: Jason Simpson.

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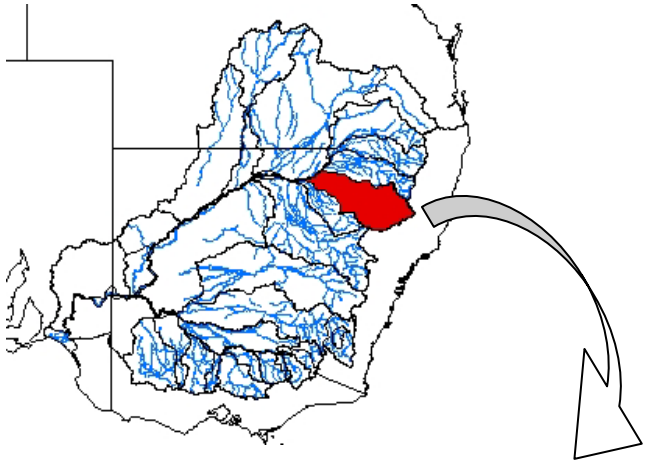
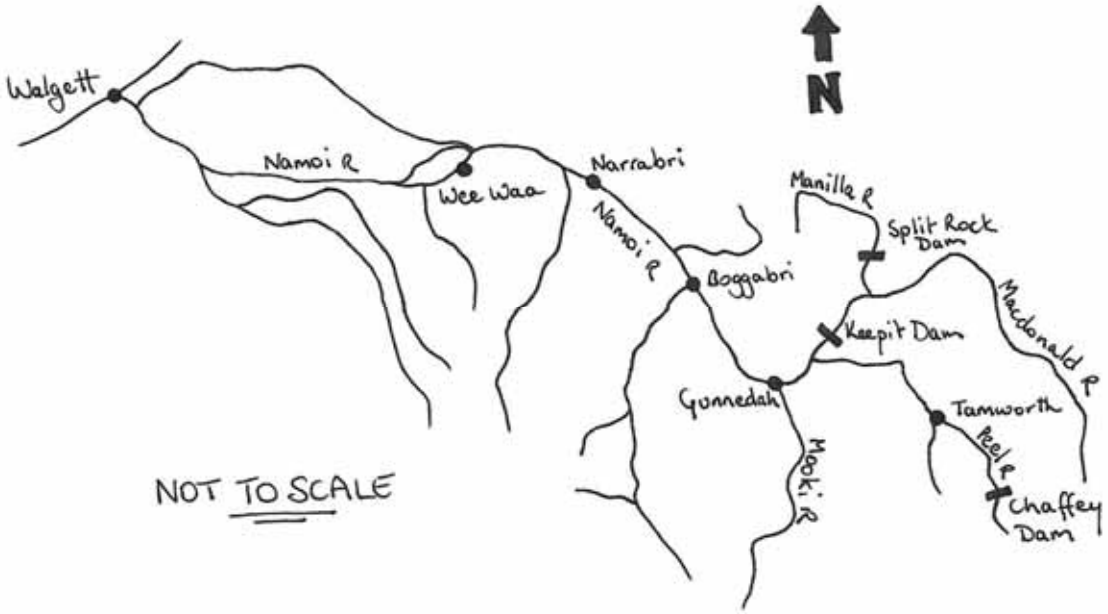
Source: Milly Hobson.





Joe and Pearl Trindall (pictured with their nephew, Phil, centre) were both born in Gamilaraay country. During the fifties and sixties Joe was a drover and Pearl often travelled and camped with him, fishing for food as they went. Fishing has been a way of gathering with family, friends and community throughout their lives. Photo: Jodi Frawley.

Spider Cunningham is an active member of the Narrabri Amateur Fishing Club. He is a passionate fisherman and loves kayaking the Namoi River, especially when freshes and minor floods come down. The river is a vital way for Spider to relax in his busy life.
Photo: Jodi Frawley.

Carol and Eric Hannan came to live in their house on the banks of the Namoi River in the early 1970s. They raised their own and foster children, taking them fishing often. Fishing, they say, helped their children learn about and respect the ever changing river.
Photo: Jodi Frawley.

Jason Simpson learnt to fish as a child on the occasional outings to the river with his family. These childhood experiences grew into an intense love of everything about fishing. Jason chases the big fish around the Namoi River and is a great advocate for catch and release. Fishers, he says, have the opportunity to care for the river and in this way to ensure that there will be fish for many generations to come. Photo: Jodi Frawley.

Fish are in great plenty on the Namoi, and several excellent catches have lately been made; Murray cod, yellow-bellies and bream amply rewarding the disciple of the gentle art.

The Maitland Mercury and Hunter River General Advertiser, 7 October 1873

Introducing the river and its people

The Namoi River winds its way through 42 000 square kilometres of blacksoil plain in the north east of New South Wales. Fed by the rivers of the western slopes of the Great Dividing Range, it contributes about one quarter of the Darling River's flow.

The river, its floodplain, wetlands, swamps and waterholes, are the traditional lands of the Gamilaraay* people. The Namoi is a very different river now to the one the Gamilaraay people once knew and fished.

In the footsteps of the Ancestors

For the Gamilaraay, Ancestor spirits created the rivers and shaped the earth. Some took the form of water serpents, battling each other or rescuing loved ones during their travels. These creative spirits were named *Garriya* in northern Gamilaraay places like Boobera Lagoon, and *Wawey* in the southern areas.

The Wawey in the Namoi River were first recorded by British explorers in 1832, at Borah. A Gamilaraay man told them about the continuing powers of the Wawey; a source of ceremonial stories and of protection for the surrounding communities.[13]

Gamilaraay retold these epic stories of creation through the generations as they fished patiently on the riverbanks. They see more than the Namoi River itself – they see the essence, excitement and power of the ancestors.

The successful fishing by the Gamilaraay was noted by the European squatters. Image: Tamworth Historical Society.

***Gamilaraay* usage note**

The attempts of early European settlers to translate the names of Aboriginal nations and language groups into English led to variations in how these names were spelt. The following names are used in the Namoi: Gamilaraay, Kamilaraay, Gamilaroi, Kamilaroi and Goomeroi. 'Gamilaraay' is used generally in this booklet, but local Aboriginal people often prefer particular spellings. Where an interviewee has a preference, this is used in their profile.

The arrival of the British

Early British settlement followed the rivers. The first grazing properties were set up on the banks of the Namoi in the early 1830s. Major Thomas Mitchell surveyed this country in 1831, noting in his journal:[14]

> *One of our men caught a fish, which weighed eighteen pounds; but according to the natives, this was no uncommon size. These fishes are most erroneously called cod by the colonists, although they certainly very much resemble cod in taste….*

Droughts and flooding rains

The major drought of the 1890s highlighted a river changed by 50 years of development. The lack of water, increased siltation caused by decades of land clearing and the devastation wrought by rabbits meant that the flow of the river changed.

Floods increasingly brought sand into the river. In the 1908 flood, the story made the *Sydney Morning Herald*:

> *The floods of a fortnight ago did great damage to fences and roads throughout the district...the floods brought down and deposited huge beds of sand.*

Floods brought water into the river that was increasingly laced with a cocktail of chemicals being used to poison both native tree regrowth and the increasingly problematic prickly pear.

The river provided food as well as relief from the hard work of everyday life in the 1800s. Source: Narrabri and Districts Historical Society.

Cows and cotton

Grazing was the boom industry of the nineteenth century. There was some cropping but it was hard going in the heavy black soils. It wasn't until the 1960s that cotton boomed, taking advantage of the availability of heavy machinery and water for irrigation supplied by weirs and large dams.

Each industry changed both the landscape and how water flowed into the rivers. Today, flows are held by Split Rock, Keepit and Chaffey Dams and numerous weirs and the Namoi rises and falls as water is diverted to irrigate cotton.

Big animals on the river

Grazing remained the main industry in the Namoi area in the nineteenth century and it boomed up until the major drought and economic depression of the 1890s.

The plains were not heavily wooded when Oxley first saw them in 1818, but the graziers running both sheep and cattle believed they needed to clear the land to grow more stock feed. Stock also trampled vegetation as they accessed the river for water, altering the riverbanks.

Stock damage to riverbanks is still evident today. Photo: Milly Hobson.

This continuous clearing of native vegetation led to increased siltation of the rivers and affected the habitat of fish.

With wool prices hitting their peak in the 1950s, the size of properties continued to be reduced as closer settlement then soldier resettlement brought more small farmers into the area, often using family labour rather than larger workforces.

Working people

Grazing employed many workers - both European and Gamilaraay - particularly before fencing was widespread. After the southern gold rushes in the 1850s, many Chinese workers came into the grazing country as gardeners and 'stick pickers' or clearing gangs. On the big runs Chinese techniques were used to irrigate fresh vegetables to feed workers.

Image source: Wee Waa Historical Society.

The numbers of small townships expanded to meet the rising population and the railway had reached Narrabri by 1885.

The expanding timber mills of the Pilliga Scrub employed seasonal workers as they supplied fencing and housing supplies for development across the region. Grazing runs still needed drovers and shearers.

Local Aboriginal and Anglo-Australian workers were supplemented by newly arriving immigrants in the 1920s. This included the Greek families who often ran pubs and cafes, bringing their own particular interests in fish cooking to the way they wanted to use the river.[2]

Joe and Pearl Trindall - *A wonderful life on the river*

Joe is a Goomeroi man born in Narrabri in 1925. He lived on 'The Island' between Narrabri Creek and the river. Fishing and swimming were a part of everyday life.

Yes, the old Dad always took us fishing. We used to have an old bamboo fishing rod or any straight old stick with a bit of string tied on the end of it, and a hook. We used to catch codfish nearly as long as ourself in them big rivers, you know. You'd say you want a piece of yellow belly, we knew where the yellow belly hole was. If we wanted cod, we knew where the cod hole was. Or the jewfish or whatever piece of fish you wanted, you could go to that area. It was a wonderful life on the river.

Bobby cod

Another fish that was plentiful in the 1930s River were spangled perch, or 'bobby cod'.

Bobby fish, we used to call it, little bobbies. Sometimes you'd get two or three on the one hook. You'd no sooner throw your line in and you'd get one, throw it back, and they'd be on it again so quick.

It was a good healthy life

Pearl moved to Narrabri when she married Joe in 1946. Together they've raised seven children. During the early years of their marriage, Pearl and the children travelled with Joe when he was droving. The rivers were an important part of life on the road. Pearl remembers:

When we were droving, I think people used to feel sorry for me, but I loved it, being out in the open air … it was a good healthy life. But it's the sort of life that's best before the children get to school age.

A clean, clear river

Knowing the right spots to catch fish was as important when they were droving as finding the right spot to water the animals. Fishing was a way to supplement their rations. Joe remembers the rivers in those days as clear and clean:

They had couch banks, you know, and you could see the reflection, you could see yourself in the river, or in the water, the reflection of yourself from the banks.

Sharing the catch

Often the Trindalls caught more fish than they needed. They would share the extra fish with family, friends and neighbours. Some family members would also give fish to the local hospital in whichever country town they happened to be near. Pearl believed that fish had a special role in healing the sick:

When anyone gets sick, we always try to get him a fish, you know. Because it seems to give them strength.

Not everyone shared Joe and Pearl's attitude about their fish. Joe recalls the way that some people wasted fish:

And what used to make me wild, you'd see people that would go down and they might catch 200 fish, and they'd leave them to rot on the banks.

Crops, water and fish

Wheat was one of the first crops grown around the Namoi. Wheat growing had an unexpected benefit for fishers: wheat bags were used extensively for carrying gear and baits, as impromptu nets, as keeper nets and as cushions for sitting on the banks.

Pearl and Joe saw big changes to the river when cotton came to the Namoi catchment in the 1960s. Pearl recalls that dams, irrigation pumps and watering for crops changed the fishing in the area:

> *The problem was that they took so much water out. When the flood'd be on, the rivers'd be full. But then you'd see the irrigation going, and in a matter of a few days, the water'd be low again.*

Joe agrees:

> *It did. At times there'd be a flood here, and the water would not get down as far as Walgett. You'd have it all pumped out before it got to the graziers. We'd get no water. It's still happening.*

And the changes to the Namoi River weren't just related to the amount of water. Pearl laments:

> *At one time you'd stop and have a drink out of the river, wouldn't you? But you wouldn't now, or even fill the billy up, boil the billy for tea. But you don't like to do that now with all the rubbish and the stuff that's in it, you know.*

Some things change

Spider Cunningham remembers the impact of cotton on the Namoi River but has also seen some things change:

> *When cotton was introduced in 1966, they were very naughty and let their water back into the river and it was full of chemicals. It knocked the river around, with the weeds and all that sort of thing around here. But now, whatever water comes onto their property, stays on their property, so they're a bit wiser.*

Mooki River cotton farmer Tim Gavin likes to fish with his three sons and their mates. His worries about using so many chemicals have been lessened with his use of genetically modified (GM) cotton. He says:

> *GM cotton has made a huge difference to the amount of chemicals required for cropping. The environmental benefits of these changes are so big that it is much better for everyone and better for the fish too.*

When cotton was king

In 1962 two Californian families planted cotton at Wee Waa. High numbers of new workers were needed to support cotton production. Some were mechanically trained workers to run the harvesters and cotton gins. Most were unskilled workers called 'chippers', who weeded the crops.

The major floods of the 1970s revealed the damage done by cotton. The roads constructed for all rural industries had altered the flow of flood-water, causing unexpected inundations. The massive flooding ensured that residual chemicals flowed freely into the river system. The Aboriginal chippers went on strike in 1973 in protest about the conditions of the industry.[1]

In an effort to retain water and chemicals within their property boundaries, cotton farmers invested heavily in reticulation and off-river storages. They also stored 'harvested' water from rain-fall. As the massive water storages blossomed, the impacts of water loss became more apparent. Reduced flows from irrigation and continuing high nutrient levels from stock had led to algal blooms in 1994 even before the beginning of a severe drought in 1995 compounded the problems.

It makes you think

Joe and Pearl Trindall are still concerned about the amount of water that irrigated cotton has needed. Joe recalls:

> *There was one place Wanbi Waterhole, they used to call it. It's even dried up. And there was Yarrie Lake, that was always full. Round Swamp, that's between Narrabri and Wee Waa, it's gone. And they were deep, you know what I mean, there'd be four or five foot of water in them. There's nothing there now. They all had fish in them. Yeah, you know, it makes you think.*

Changes to how cotton is grown are reducing the impact on rivers and fish. Photo: Greg Kauter.

Research is continuing into the effective use of screens to minimise the impact of pumping on fish. Photo: NSW DPI.

Pumping water, not fish

Irrigation pumps and drains are a problem for fish. Up to 200 fish can potentially be extracted daily from the river through high volume irrigation pumps. These fish are removed from the natural system with little chance to return to the river, effectively being 'lost' from the main river channel. This situation has a major impact on the health of native fish communities in the Murray-Darling Basin.[4]

Photo: NSW DPI.

Some of the more resilient native fish species, such as spangled perch and bony bream, are able to live in storages, but their ability to return to the rivers and contribute to their natural community is lost.

The issue is not new – back as early as 1928 the Inland Fisheries Officer of NSW recommended:[5]

> *Screens should be installed at all irrigation and other pumping plants having not more than half an inch perforation to minimise the destruction of fish life.*

Camps along the river

Right up till the 1940s large numbers of fettlers - the workers needed to build and then maintain the railway tracks - lived in big camps set up along the lines and needed the river for food as well as for a break from the confined and monotonous camp life.[3]

The cotton farm chippers, who initially had no union cover and no accommodation on the farms, were housed in rudimentary camps on the banks of rivers with no running water and no sewage or garbage services at all. Additionally students from the cities and the workers who were already part of the seasonal agricultural cycles in other areas of the state came to work the cotton. The wastes from these camps added to the river's pollution.

Image source: National Library of Australia.

Camp dwellers were on very low wages and so were dependent on the river for fishing and all other resources.

Darcy Harris remembers a 'Digger Rose' who even as late as the 1960s would camp out by the river as a relief from working life.

> *One old fella … was old army man and he always had a great coat on whether it was Summer or Winter, kept him warm, and he'd sit on this log and lie on the log and fish, with his bottle of rum of course. He had a short line and just bobbed a lot.*

Spider Cunningham - *Tales of catfish and willows*

Spider was born in Narrabri in 1957 and has lived there all his life, just like his Dad. Spider went fishing with his Dad when he was a boy, but feels like he always knew how to fish.

Narrabri - a good little spot! We didn't learn to fish in those days. It was just put a hook with a worm on your line and set 50 lines along the riverbank and then come along and pull the fish in.

They lived close to the river, so they'd set their lines, then leave them for an hour or so before they went back to check them.

Springers

Spider's family used 'springers', a light line that was set in place on the bank, usually made from whatever trees lined the banks of a fishing spot. But it was the introduced willows, with their long flexible branches, that made perfect springers. However these springers sprung to a life of their own.

But see, what happened with the willows years ago was that they'd snap a branch off, stick it in the ground, use it as a springer and then when they leave they take their line off. But they'd never take the springers with 'em. So, that stick will grow and make another tree.

I'll take a catfish every time

When Spider was growing up he caught cod, yellowbelly and occasionally bream, but his favourite fish was catfish.

You know, a lot of people don't like eatin' catfish but you catch a cod and a catfish and you offer me a fish, I'll take the catfish every time - beautiful - beautiful fish.

Sometimes Spider went on camping trips with his mates as he was growing up. If the tent was pitched close to the river then he could hear the fish once the campsite quietened down for the night.

Years ago there was a weed growing on the side of the bank, and if you were camped out on the river you could hear this sucking noise all night. That was the catfish suckin' on the weed. So, you just chuck your line over the weed and you'd usually catch a catfish.

Knowing where the catfish were likely to feed meant that Spider often had catfish to eat when he came home.

Willow FAQs

Willows at Ironbridge Reserve. Photo: Milly Hobson.

When and why were willows introduced?
Willows were planted in south eastern Australia to control bank erosion, particularly in the 1950s – '70s. They are now widespread in permanently wet or seasonally waterlogged sites

How do willows affect fish habitat?
Native fish are used to the continuous leaf fall provided by native plants. Willows drop all of their leaves in autumn. This changes the timing and quality of organic matter entering the waterway

Aren't willows good for riverbanks?
Willows tend to grow into a waterway. They extract a lot of water[8] and change the structure of the riverbed. Their tight root systems form obstructions and can cause water to be diverted around them into banks, causing erosion

Catfish

(Tandanus tandanus – eel-tailed catfish, jewie)

Photo: Gunther Schmida.

- Medium sized fish, usually 50cm or less
- Bottom dwellers that prefer slow moving waters of rivers or creeks
- Eat aquatic insects, yabbies, molluscs and small fish
- Eggs laid in a circular gravel nest which the male guards until the eggs hatch
- Listed as 'Endangered' in Victoria, 'Endangered population' in NSW and protected in SA

A catfish guarding its nest. Photo: NSW DPI.

Joe also remembers catfish

Joe Trindall also remembers them being plentiful in the 1930s when he was growing up in Narrabri:

You'd see the old jewie, the old catfish. They build a nest like of stone and you could see them through the water. You could see them there it was that clear. You could see the young ones, little things.

Jason Simpson is another local lucky enough to see the catfish as a young fisher on the Namoi River in the early 1980s.

When I was a kid and we were doing some stock mustering and I was a bit too young to help, I'd go down to another creek on the other side of the mountains, a rocky creek. You could see the catfish in there and they had nests; round circles in amongst the rocks which they picked clean. It was almost a perfect circle and you could actually see them cleaning the nests. You could throw your line in and they'd pick up the worm on the hook and drop it to the edge. It wasn't until we went away for lunch and we'd come back and all of our lines had fish on them. We worked out they must have seen us and thought it was a bit foreign, so didn't want to take the bait. But once we weren't there, they were quite happy to take it.

But catfish are no longer very common in the Namoi River. They are now on the endangered species list and must not be taken from western rivers in NSW. These days Spider is content to release any catfish that he catches.

Fishing from the kayak

More recently Spider has bought a kayak to take out on the river and he loves to ride the freshes as they come down the river and fish as he goes.

I carry a little fold-up rod, a little telescope rod in the canoe and all of my lures. So if I think there's a good stretch of water when I'm rowing along I'll pull up and have ten minutes.

Spider would like to canoe the Namoi from Boggabri to Narrabri. He thinks it'll probably take two days, but with his sleeping bag, esky and small stove, he's keen to see the river this way. Photo: Milly Hobson.

Club fishing trips

Spider joined the Narrabri Fishing Club about ten years ago and enjoys the companionship of the club's fishing trips down the river, the swapping of stories while they fish or in the pub afterwards. The club is increasingly involved in caring for the Namoi River. They've had a working bee to repair a local fishway, they hold an annual carp muster to remove carp from the river and they release cod and yellowbelly fingerlings to assist in keeping fish in the river.

If we don't start doin' somethin' what's gonna happen?

Explaining why he enjoys this part of the club as well, Spider says:

> *When we were teenagers we threw rubbish out the window driving along and threw stubbies at guide posts. Now the older you get, you know, the wiser you get and you think, what are we doing this for? And it's like fishing, like we used to catch a hundred fish and you'd bring 'em home. But now, we catch and release because it's getting to the point where we're old enough to know if we don't start doin' somethin' like that, what's gonna happen?'*

Members of the Narrabri Amateur Fishing Club mucking in and battling with the degraded banks of the Namoi to plant river red gums and she-oaks. On this occasion 120 trees were planted from the rail bridge in Maitland Street to a position level with Regent Street. The project was part of the Namoi Aquatic Habitat Initiative. Photo: Milly Hobson.

The Narrabri Amateur Fishing Club is also involved in regular water quality testing. It might not be fishing, but these club members found they enjoyed giving something back to their river and sport.
Photo: Milly Hobson.

Revegetation

These before and after shots, taken 3 and a half years apart, show the progress being made on Doug Jamieson's property.

- Riparian vegetation helps stabilise banks, regulates water temperature and provides both food and woody debris ('snags') for fish
- Clearing riparian vegetation, as well as weed invasion, uncontrolled stock access and cropping, has led to the decline in the health of native fish populations

Photo source: Doug Jamieson.

Eric and Carol Hannan - *Learning the floodplain life*

Eric and Carol were in their twenties when they came to live at *Rampadelles* in 1973 with their two-year old twins. The house, nestled in the bend of the Namoi River, came with Eric's job at *Kurrumbede, a* grazing property. At first the Hannans were daunted by floodplain living, but slowly this changed as they learnt what to expect.

The dinghy was our transport

The house itself almost always stayed high and dry. But with the river on one side and Gulligal lagoon on the other, they were regularly cut off.

> *When the river runs into the lagoon, particularly if the lagoon's empty, it just roars round that corner. Once the lagoon fills up then it's got to drain back down to river height. Which can take weeks, sometimes as long as three months.*

Even the smaller floods of the 1970s meant the dinghy became the main transport for the family so they could get to nearby Boggabri for school and provisions.

Fishing from the veranda

Fishing was something the Hannans could do with their kids as they were growing up. It also was a way to get to know their part of the river. They learnt how the Namoi River moved, where the deep spots were and what happened when the water did break the banks. When flooded in, the kids would sometimes fish off the front veranda.

Photo source: Eric & Carol Hannan.

> *They never caught fish, but they used to just fish out there, in the current, when the water was flowing past. And we used to tie the boat to the veranda post out there and taught the kids to row off the edge of the veranda because they couldn't get away, they just keep rowing against the current.*

A time of plenty

As the children learnt to swim and became confident in the river environment, Carol let them explore with their fishing rods and bait. And as the children grew their explorations took them further away out along the banks, into the lagoons and marshy areas that the floods filled in every couple of years. They would search for the deep holes and big snags that were the best for catching the local fish. Carol remembers this as a time of plenty:

> *They'd go down fishing with worms, or they'd throw the shrimp trap in down there. Sometimes they would even use mussels. We used to catch a lot of fish. You know, catfish, the yellowbelly and the cod. You'd always get a feed of fish from the river, no trouble.*

The river near the Hannan's house. Photo: Jodi Frawley.

Enough to share

The family never took more from the river than they needed, and on a good day's fishing they would only bring home enough to feed the family. They would share what they didn't throw back into the river.

If we caught twenty fish on the river we'd never keep twenty fish, you'd only keep five or six or whatever and bring them home. And then next week you might catch the same again if you wanted them. But if someone came here and wanted to take a fish home, we'd give them a fish, because we had extra fish.

The kids had a ball

From their veranda, the land drops away to a flat grassy area before dropping again to the bank of the river. Shaded by big river red gums it's the ideal spot for fishing. When the river was low, the hole at this spot was still fourteen foot deep.

When the kids were little there was a big bend in the river and we had a big, platform in there. And in summer time you know, they'd come home from school, we'd head down to the river. And Eric would head home that way, and he'd just strip down and go in swimming with them. The kids just had a ball down there.

Desnagging

As late as 1995, removing snags was seen as a good thing.

Image source: Doug Jamieson.

Snags were removed on a large scale from the rivers of Murray-Darling Basin to improve navigation for paddle steamers.

Snags were also removed from the rivers as it was thought they caused erosion of river banks and increased the incidence of flooding by reducing the capacity of water that the river channel could hold.

While in certain instances small-scale and short-term erosion may occur, in many cases the presence of natural loads of snags may reduce erosion by protecting the river banks. Similarly, the notion that snags increased the incidence of flooding is now known to be largely incorrect.

The removal of large woody debris (snags) is a key threatening process under the *Fisheries Management Act 1994* and is implicated in the decline of the vulnerable Murray cod and endangered trout cod.[12]

Resnagging

Now snags are being returned to the river, providing vital habitat for fish and helping to maintain the holes and gravel beds so loved by Murray cod and catfish.

Increased scientific understanding of the importance of snags to native fish and river health has led to significant efforts to reverse the loss of this vital habitat.

The most obvious way to achieve this is to put the snags back in.

A great deal of scientific and engineering analysis goes into determining the right position, size and type of snag put back into the river so that maximum environmental benefits and minimal environmental damage occurs.

The construction of a log groyne involves a lot of analysis, planning and getting appropriate permits – all before a log enters the water. It's so much easier if it happens naturally! Photo: Milly Hobson.

Jason Simpson *Take a photo and let 'em go*

Dad's 'secret spot'

Jason was born in 1976. In 1980 his family came from Tamworth to live in Narrabri. As a youngster he fished with his dad and his brother. Fishing was an occasional, rather than regular, activity. It was an outing when the weather was perfect or the busy family schedule. His father had a 'secret spot' that he liked to take his boys to fish.

I had a brother so, you know, it was us three men, I suppose, going out and thinking we were big game hunters and bringing home five or six fish. That was a good afternoon. Dad's secret spot was close to town and so when us kids got bored or whatever, it was a quick pack up and you're home in time for tea.

Jason with a nice Namoi cod. Photo source: Jason Simpson.

While as kids Jason and his brother saw this as a bit of a lark, for his dad there had to be a reason to going fishing. Jason remembers:

To go fishing there was a purpose, it was always to catch them, but it was probably more about catching a feed of fish than just about having fun.

Sharing with rellies

Jason's father also fished the Namoi River growing up. He told Jason how it was common practice for many fish to be kept by fishers' families. Everyone took lots of fish in those days. The fish were so plentiful that sometimes they were shared or bartered with other people in the community.

I remember my father telling me stories about how … they'd be cleaning fish for three or four hours when they got home. Well, they had fairly big families back then and money was probably a bit tight too. It was probably a bit of a change from eatin' lamb and beef, but no doubt it was probably given away to all the rellies, and the next door neighbours for maybe for a carton of eggs or something like that but I'm pretty sure it wouldn't have went to waste.

Jason with one of his trusty lures. Photo source: Jason Simpson.

Fishing with mates

As a young man in the 1990s Jason's love of fishing grew and after buying his own boat, he began to hone his fishing skills.

When we were younger we all had our names on our lines, so it was back when we had licences. They changed the rules and we didn't need licences, and then, dare I say it, I used to fish illegally - I used to have too many set lines.

Snags and gravel beds are revealed by low water levels in the Namoi River. The hollow logs are especially loved by Murray cod as ambush sites. Having snags at various levels up the bank means there is a greater variety of fish habitat at different depths – once the water level rises. Photo: Milly Hobson.

High flows conceal the wealth of snags providing vital fish habitat. Photo: Milly Hobson.

Family fishing changed into fishing with his mates. This time on the river with a boat allowed Jason and his mates to explore the river in a way that they couldn't when they were kids.

Chasing cod

Jason and his mates came to understand the patterns of shallows and holes and which bits would yield the cod they all loved to catch.

> *When we were young, just to go fishing was a bit of a privilege but once we got access to a boat, that sort of opened up the other side of the bank. We could go to spots we hadn't fished before, or a better spot. And that's probably improved our fishing. But with the help of electric motors it sort of makes things a lot easier. At the same time, I suppose we got better at it so it also makes fishing easier. When you get better at it, you get more enjoyment out of it when you come home with fish.*

Where are all the fish?

For Jason one of the important things is a better understanding that native fish are in decline. He realised that over one generation, the numbers of fish available in the river had drastically changed. We know from the memories of the Trindalls, Spider Cunningham and others that the river of the 1950s still had plenty of fish to catch and share amongst family and friends.

We could pull the carp out

Jason also recognises the threat carp posed to native fish:

> *We've been down towards Wee Waa there and we've walked probably for a kilometre and we came across a big puddle three metres across, and there would have been 50-60 carp in there and there wasn't enough water to cover their backs and you could just pull 'em out one by one.*

Can't catch them twice!

Jason's fishing practice changed to 'catch and release'. He now says native species need to be protected by voluntary and regulatory reduction in the number of fish that can be taken out of the river:

> *Times have changed and so have people's opinions of fish. What you can do and what you should do are two different things. I eventually saw keeping fish as not the best thing for them, 'cause, you know, once I caught the fish I couldn't catch them again. So, then I started using lures and I very rarely go bait fishing now. We still do dig worms*

and we still catch wood grubs and yabbies and still fish like that every now and again. But we very rarely catch a feed of fish out of the river. Normally we just go to the dams, which are stocked, and take the fish out of there. In my opinion, it's a better idea than taking them out of the river. Better to take a few photos and let them go again.

Eric Hannan agrees that limiting catch is important:

You know, as for fishing, I think it's a good thing to stop people from taking piles of fish out of the river.

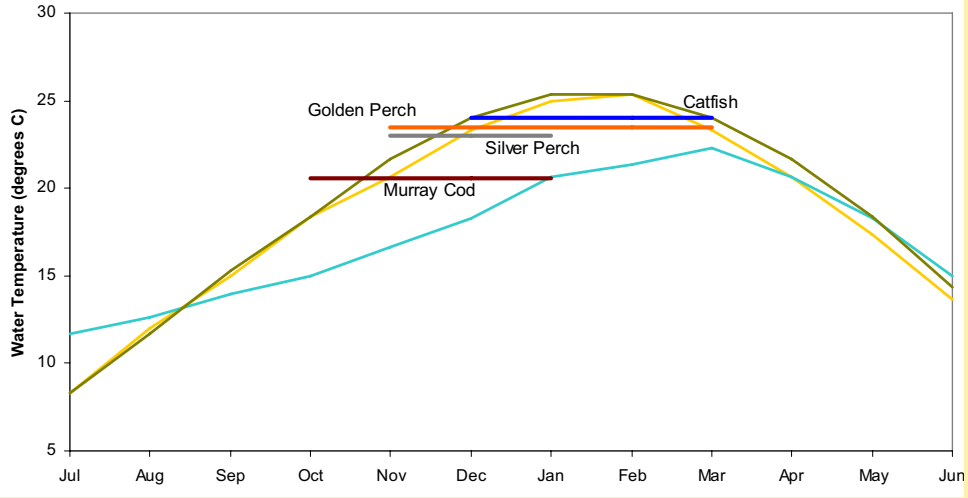
Jason Simpson releasing a nice sized cod.
Photo source: Jason Simpson.

The age of engineering

Keepit Dam, first conceived in the late 1800s, started in the 1940s and completed in 1961, was the realisation of a dream to supply water for irrigation and mitigate the effects of floods. Unfortunately, its impacts on native fish were not good.[9,10]

Dam impacts on fish

- Dams modify the pattern and seasonality of water flow. Native fish have evolved to breed when there are 'freshes'. Dams even out the flow, so fish don't get this signal to breed
- Dams and weirs also interrupt fish migration. Fish, such as Murray cod and golden perch, migrate to breed. If they are able to these fish can travel hundreds of kilometres, but a dam wall is an impassable barrier
- Fish need a temperature signal to spawn. Water released from large dams can lower the temperature of the river for hundreds of kilometres downstream. Known as 'cold water pollution' this also disrupts native fish breeding



At Keepit Dam, it takes the distance to Boggabri – approximately 115km - for the river temperature to have returned to what it when it entered the dam. For fish, this means that the river below the dam for a distance of over 100kms is never warm enough to trigger spawning.

This graph shows the minimum water temperature needed for spawning in relation to water temperature in three areas in the Namoi. The green line shows the water temperature upstream of the dam. The blue line shows it downstream of the dam. The yellow line shows the temperature downstream at Boggabri.[6]

Making connections

Good times

Many people learnt to fish from their parents or grandparents or aunts and uncles. This tradition of teaching kids to fish also is about learning about the river and the plants and animals that live in and around it, and how it all changes from season to season.

It's also about getting together. For the Gamilaraay, this meant getting the mob together for storytelling on the river's edge. Pearl Trindall remembers:

> *We had some good fishing times. But in them early days, where that junction was it was this nice big place, and we'd go out there, you know, and camp on the ground. We used to make a big fire, all of us, all the families would go out there and meet. It used to be lovely.*

And getting away

It wasn't always the attraction of group gatherings that was important to fishers. For Darcy Harris, who grew up on a property on the Namoi River, fishing was a chance to get away:

> *There was a lot of good fish caught and a lot of time spent getting bait and sometimes you'd get nothing. It's a strange game and it's very rewarding, and you can sit there and romanticise about how much money or how good your crops gonna be. Just sit and relax. Think about the good things…not the bad things.*

Getting away and just being on or near the river is part of the attraction. Photo: Milly Hobson.

But we need to have a little bit of a look at things

Eric is concerned about bank erosion and the amount of silt and debris that end up in the river because of it.

> *We've got probably six kilometres of river frontage and we wouldn't have half of the holes that we used to have. The banks have caved in and the holes have filled in. Personally I'd like to see, probably grass put there, more than I would trees at present, because you can't grow trees on straight drop banks - grass yes. I think, before we go doing that, we want to have a little bit of a look at things and ask a few people that's been around for a long time. That's my motto, anyway.*

Controlling erosion is an important part of rehabilitating riparian areas, like this bank of the Namoi River. Photo: Milly Hobson.

Doing our little bit

Jason Simpson and his boss Doug Jamieson have been rehabilitating the banks of the river, planting trees, grasses and shrubs where Doug's farms have frontage.

Like many people along the river, although they know that willows are introduced, they are not convinced that it is a good idea to pull them out without first establishing other plants that will hold the bank in times of high waters.

Jason says of their efforts to re-vegetate the banks:

> *We've been doin' it for 13-14 years that I know of and the boss Doug, is very much into his land care. We went along and did as much as we could with land care and CMA and all those sorts of affiliated companies. Mainly just planting trees and fencing off the rivers, and just limiting the areas that the cattle can come down and drink, so that stock don't degrade the banks. It lets the grass grow up and when the flow does come down, we're doing our little bit to keep it as good as what we can. We can always do better but it's an ongoing process.*

An area of riverbank that Doug Jamieson has been steadily replanting. Photo: Doug Jamieson.

Replanting and fencing to manage stock access in an area of the Namoi Demonstration Reach.
Photo: Milly Hobson.

State of river: 'moderate'

The Sustainable Rivers Audit (SRA) is a systematic assessment of river health for 23 major river valleys in the Murray-Darling Basin. Environmental indicators include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.[7]

The Namoi Valley was surveyed in 2006. The 'Slopes Zone' and Ecosystem Health were considered to be in Moderate Condition. 62% of predicted native species were caught. While these species were approximately half of the total number caught, native fish were only one fifth (20%) of the biomass.

Native fish catch in the 'Slopes Zone' was dominated by bony herring and carp gudgeons. Murray–Darling rainbowfish, Australian smelt, spangled perch and Murray cod were also common. Carp dominated the alien species. Eastern gambusia were common and goldfish were also caught.

A bank with snags, adjoining the Jamieson property: perfect habitat for cod. Photo: Scott Nichols.

Visions for the Namoi

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

Give fish somewhere to live

Eric Hannan suggested that when the river is dry that this might be a time when river care could come into its own:

> *When the river's really low, I would like to see the holes cleaned out, and I don't mean take the big old logs out of it - there's some big logs there that have been there before I was born, they're fine. But dig the holes out so the fish have got somewhere to live when the river does come back. I don't mean dig new holes - I mean clean the old ones out that are there. The ones that have been there for generations. That's what I'd like to see.*

Reinstating holes that used to exist in the river bed needs a careful understanding of how the river flows - and several permits! Knowing where the old holes were is an important piece of the puzzle.

Fencing for more fish

Darcy Harris has seen the damage that stock could do to the river bank:

> *Well, I know the stock were doing damage on river banks and that but… like on our place, there weren't many spots where they could go down to water because they were steep banks. So they could only go down to water where the good fishing holes were basically, and that's where there's a nice little beach you could go and sit on. And I guess they were grazing the vegetation right up to those banks, so that was denuding it to a certain extent.*

Darcy Harris hopes that fencing off the river, like this area of Namoi riverbank, will continue to be a part of helping the rivers to recover, so that there will be fish for his children, grandchildren and future generations. Photo: Milly Hobson.

Fishing is a great pastime for kids. Photo: Anthony Townsend.

I just love the river

Fishing in the Namoi River creates a special connection between fishers and places that they frequently visit. Robert Horne sums up the way that most fishers feel:

> *I just love the river. You know, it's so tranquil and it's great, all the bird life there, the little kingfishers and things. So I have spent a lot of time on it as a youngster, and I still do now.*

These fishers can all sense what the Namoi River could be like with some care and attention. A river with snags, sand bars and deep holes, overhanging native vegetation, reeds and weed, flushed with freshes and flood rains and linked up to floodplain wetlands – just imagine the fish that would thrive in such a place!

Carp FAQs

Carp arrived in large numbers with the floods of the 1970s. These fish are now a major pest in the Namoi.

Photo: Milly Hobson.

How many eggs to carp lay?
Carp are very fecund and can lay millions of eggs per year.

Can eggs be carried by birds' feet and survive in mud and in the water to be fertilised at any time?
No, carp eggs only survive out of water for a short time and are usually attached to plants. Unfertilised eggs soon die.

Can carp stay alive in mud?
No, carp cannot live in mud.

Do carp undermine river banks?
Carp feed by sifting through mud but there is no evidence that they undermine river banks.

Do carp spread diseases to native fish?
A large number of parasites, diseases and viruses have been associated with carp but there have been no specific reports of deaths of native fish caused by carp-borne diseases in Australia.[11]

Carp are widely thought to have arrived in the Namoi with the floods of the 1970s. But newspaper fishing reports suggest carp may have been around two decades earlier!

> *They have been having a record fishing season on the Barwon and Namoi Rivers, catching perch and cod by the score. One of the locals writes: "they must have come down with last year's flood. But with them is a strange fish we have never seen before. We have named it the New Australian."*
>
> (The Sydney Morning Herald 27 February 1952)

Making a difference for native fish by replanting a section of Namoi river bank. Activities like replacing lost vegetation helps native fish hold their own' against introduced species like carp. Photo: Milly Hobson.

Some would say 'a good carp'. Photo: Milly Hobson.

Upper Darling

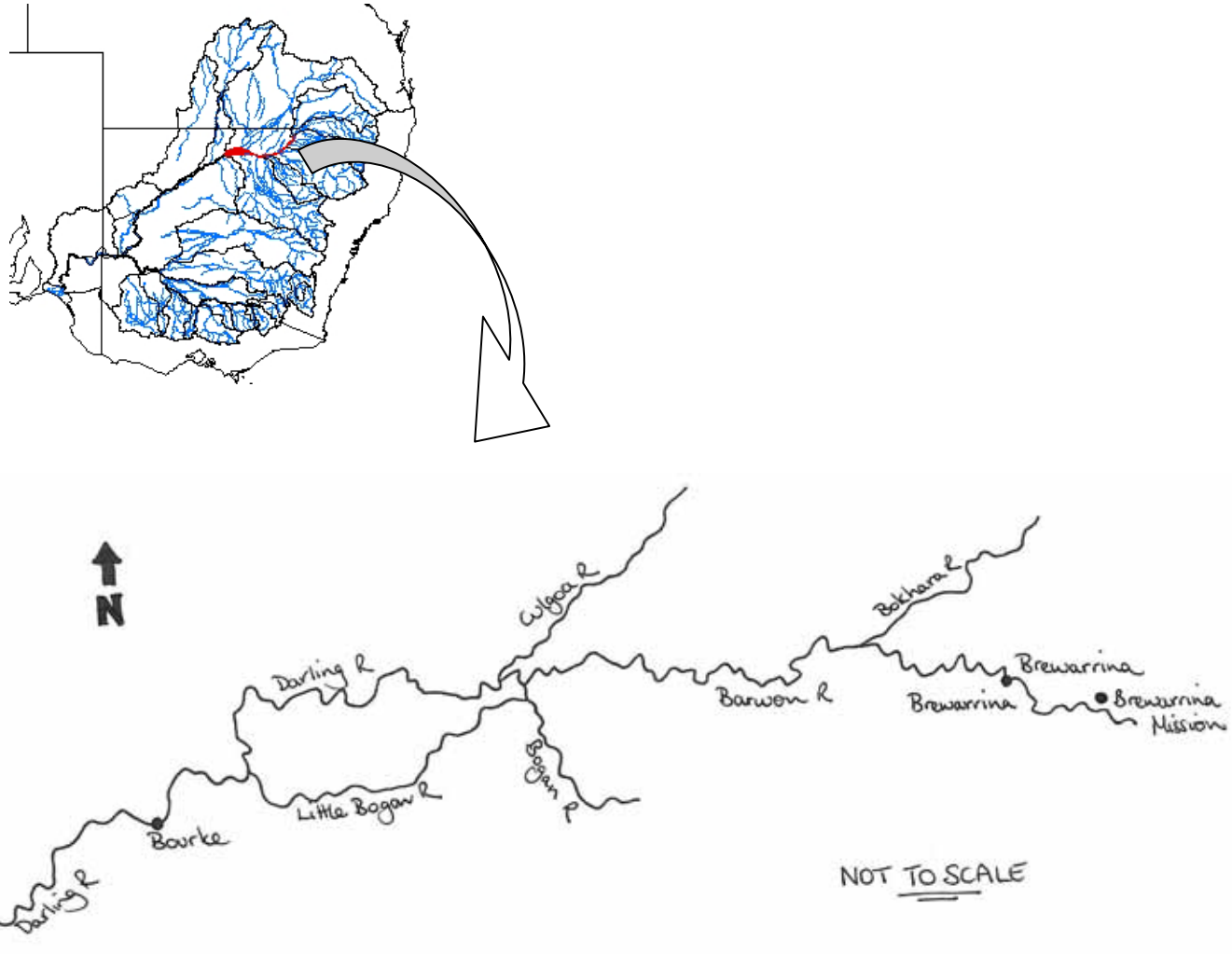
Brewarrina to Bourke

Source: Phil Sullivan - Wellbeing Project DECCW (Byrock waterhole).

Source: Phillip Parnaby
('Bull' Milgate, Robert Parnaby, Dean Bowden, Jason Sommerville, Phillip Parnaby and Dick Oxley).

Source: Scott Nichols

Source: Scott Nichols.



Originally from Gundagai, **Gordon Brown** learnt to fish with his brothers and sisters on the family's annual holiday to Moruya Heads on the NSW coast. A chance job in Brewarrina as a young man has led to a life spent on the Darling. Photo: Cathy Simpson.

Phil Sullivan is a Murawari and Ngemba man. Fishing has always been a family and community affair and he's lived his life close to Ngunnhu, the Brewarrina fish traps. Photo: Jodi Frawley.

Phillip Parnaby was born and bred in Bourke. All of the family fished, either as part of large gatherings or on their own, like his Pop, who taught Phillip to fish. Photo: Jodi Frawley.

For as long as he can remember **Dwayne Willoughby** and his family have headed out to the river on weekends and school holidays with the tinnie, camp oven and as many kids and dogs as they can get into the cars. Photo: Jodi Frawley.

The water being beautifully transparent, the bottom was visible at great depths, showing large fishes in shoals, floating like birds in mid-air.

From the journal of Thomas Mitchell, while camped on the Darling River, 1st June 1835

Introducing the river and its people

To say ‘Back o’ Bourke’ means ‘miles from anywhere’ to most Australians, however the Barwon and Darling Rivers that pass by the townships of Brewarrina and Bourke, respectively, are at the heart of the Murray-Darling Basin.

These are the traditional lands of the Ngiyampaa, Murawari and Yuwalaraay peoples*. They fished the river and surrounding waterways and hunted the wetlands.

In the footsteps of Baiame

Baiame, the Creator, strode across the landscape from near Cobar to the mountain at Gundabooka then on to Byrock, where the mark of his footprint was preserved in the still-soft rock. Baiame continued on to Brewarrina, and stopped at the deep waterhole called Gurrungga where a great black fish was imprisoned behind Gurrungga's rock wall. Baiame, being hungry, raised his short wooden spear, wounding the fish which broke through the rock wall, burrowing desperately into the hard ground to escape. Baiame dug after it, cutting a channel that filled behind him with the escaping water from Gurrungga.

The fish grunted with pain, then dodged and twisted away from the spear thrusts to form the tortuous bends of a now mighty river. Where the fish doubled back are the still billabongs. The hard rock barriers that cross the river are where Baiame rested in his pursuit. The chase continued until the black fish broke into a broad river in the south and made its escape. So the Callewatta was formed and can still be traced from Brewarrina to the sea.

Later during a great drought, the waters below Gurrungga dried up, the fish disappeared and the people were starving. So Baiame returned to help, bringing his two sons to help build a stone web in the shape of a huge fishing net stretched across the dry river bed. Baiame showed the old men how to dance and call the rain.

After many hours of dancing, the rains came, filling Gurrungga until its waters rose and rushed over the rock wall, covering Baiame's stone net, or Ngunnhu, and on down the dry Callewatta. Slowly the flood fell, exposing Ngunnhu, and thousands of trapped fish.

This is how the Rock Fisheries came to Brewarrina.

The fish traps today looking from downstream.
Photo source: Phil Sullivan.

The arrival of the Europeans

In 1828 Charles Sturt came to the Darling in a dry year and proclaimed it uninhabitable. Thomas Mitchell arrived during a better season and established Fort Bourke in 1835. The river was essential for the grazing runs until artesian drilling found water in 1879.

After early conflict, Aboriginal people worked seasonally in the pastoral industry, camping on their own land within the big runs, moving between station work and caring for Country.

By the 1870s Bourke was a transport hub. It had the port and Cobb & Co services. It was the end of the line for most of the paddlesteamers that made their way up the muddy Darling from as far away as Goolwa. The steamers sometimes had to wait for months before the waters became navigable. Rains that fell anywhere from the Condamine in Queensland to the western edge of the Blue Mountains, fed increasingly muddy waters into the Barwon and Darling. When the rains didn't come, the channel dried to a series of pools.

In 1885, the railway arrived. Many workers lived in temporary camps along the river, where they fished for cod, yellowbelly and catfish. By the time the weirs were built in the 1930s, rail and later road transport had replaced river trade.

A temporary camp on the Darling. Image source: Wentworth Historical Society.

River trade on a low Darling. Photo source: Wentworth Historical Society.

Despite a massive flood in 1890, a long drought saw the river dry by 1901. The overstocked land was damaged, blowing across the region as dust. Slowly the cattle market recovered and, in 1938, the Tancred Brothers meatworks opened, processing 2 000 cattle a week.

The long decline in the wool industry was reflected in the area's economy while increasing mechanisation drastically cut the number of working people in the region. The cotton industry expanded in the late 1970s and boomed in the early 1980s, reviving the local economy. The 1980s also saw a rise in outback tourism.

Floods in the mid 1970s introduced carp from the south. Both cotton and carp brought their own challenges for native fish and the Darling River.

*Aboriginal language groups

The Darling River and its tributaries have always been important to the local Aboriginal people with a number of Aboriginal language groups found in the region.

The attempts of early European settlers to translate the names of Aboriginal nations and language groups into English led to variations in how these names were spelt.

Despite the different spellings, all Aboriginal languages have some key rules about pronunciation which are used to develop the written word so they can be pronounced the way they really sound.

Firstly the first syllable is stressed. Secondly there are only 3 vowels - 'a' as in 'cup', 'u' as in 'put' and 'i' as in 'pin'. Where the vowels are held longer they are written doubled (eg Ngiyampaa). Lastly, 'p' and 'b'; 'k' and 'g'; and 't' and 'd' can be used interchangeably as they are not distinguished in most Aboriginal languages.

The following variations for language groups are used in the Upper Darling: Baarkindji / Barkindji / Paakantyi / Paakintji (Darling up to Bourke), Ngiyampaa / Ngemba (Darling and Barwon - Bourke, Brewarrina), Murawari / Murrawari / Moruwari (lower Culgoa), Yuwalaraay / Yuwaalaraay / Euahlayi (Narran, Bokhara), Gamilaraay / Gamilaroi / Kamilaroi / Guyinbaray / Juwalarai (Barwon, Namoi, Gwydir).

In this booklet we have generally used Ngiyampaa, Murawari, Yuwalaraay, and Wangkumara (western NSW). However, where an interviewee has a spelling preference, this was used in their profile.

Gordon Brown - *It all depended on the river*

Gordon was born in 1929 in Gundagai. He learnt to fish with his brothers and sisters at Moruya Heads on the NSW coast, when once a year the family would travel to the beach in an old Chev Ford truck – Mum and Dad in the front and all the kids in the back under the canopy.

In the early days we never had any fishing rods. We only used to use a green bottle or even a dead stick if it was stout enough. We would catch a few yabbies or dig a few worms. In those days you could set half dozen lines and no one used to take any notice of it. There was a good amount of fish in the rivers those days.

Fishing the Darling

When he was 27, Gordon was a truck driver on the interstate route. He bought a load of decking to Brewarrina to repair a bridge damaged in the 1956 floods. When the bloke who was supposed to lay the decking pulled out, Gordon got the job, and has been living near the Darling River ever since. After the bridge was repaired he and his wife (Gwen) worked at Caringle Station, Brewarrina, for seven years.

When I first got married, before any kids came along, my wife used to say, "Do you want fish for tea tonight?" We'd go out mustering on the horses and come back that afternoon or night and she'd have fish waiting for us. You'd always catch a feed of fish, easy, in those days. There was a lot of fish about.

The people of Bourke were used to dealing with floods – here an army vehicle transports people across the flooded Billabong Bridge in 1950. Photo source: Barton Collection, Bourke Public Library.

Gordon was one of many workers employed at Caringle. Fishing was not only a way to put food on the table, but the river was a place for recreation where newcomers could learn about the Darling from other station residents.

Big animals on the floodplain

From 1835, grazing runs were established around Fort Bourke, doing well in good years when water and pasture were plentiful and folding after prolonged droughts.

The saltbush plains were covered with pockets of scrub and native grasses - fodder the cattle and sheep quickly depleted.

Stock trampled vegetation and eroded river banks as they went down to drink and cool off. The ongoing damage to and loss of native vegetation on the riverbanks and floodplains led to increased siltation of the rivers.

The drought of the 1890s, along with a worldwide recession, compounded these pressures on the river.

A 1901 *Royal Commission* focused on the damage done to the land by overgrazing in the previous 30 years. River species like fish had also suffered significantly due to the impacts of the drought and recession.[1]

The postwar years saw a conjunction of good seasons and high wool prices. Wool prices hit their peak in the 1950s, allowing smaller properties to be viable. Closer settlement brought more farmers into the area. However, by the late 1960s the pastoral boom had passed. Like much of inland NSW, this contributed to people moving away and a decline in population.

We used to have a lot of Aboriginal people working there. They were characters, real characters. They were all a lot older than me. They'd go fishing with you, no trouble. You just go into the big deep holes or on the edge of a deep hole. It all depended on the river, heights and all that sort of thing too. We used to have a lot of fun.

Spending time by the river Gordon learnt about all the different flows that would accompany the wet and dry seasons from upstream and how this would change the fishing conditions around Bourke. He noted fish not only lived in the river, but in all the backwaters too.

I've seen fish in all these streams. They seem to go up them all, especially in the high rivers. There was a waterhole out in the place I was working at Brewarrina. When the river reached a certain height, as soon as it was up near the top of the banks, the water ran into it, there was fish in it. As soon as it stopped, well you'd go back to the holes and you'd still get a fair few fish out.

Droughts often led to the Darling drying to a series of pools. Fish survival depended on how long the pool remained. Photo source: WJC Collection Bourke Public Library.

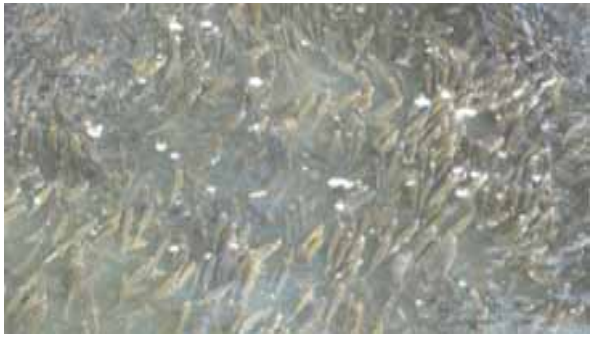
A really low river sometimes called for ingenuity about the best fishing gear to use.

There was a big deep hole and there was two great big cod in the water. They were doomed because the water was pretty stagnant. We got in with tennis court netting, you know, the big six-foot high netting? There was a guy on either side of the hole. We brought them up into the shallows and got in there and we just dragged the fish out. Oh, big, massive big fish.

A pup, pup, pup noise

The floods of the 1970s bought plenty of water to the Darling River, but they also allowed the movement upstream of a newcomer that Gordon and other fishers had never had to contend with before – carp. Gordon recalls:

You could see them in the water. It was just covered with this pup, pup, pup, pup noise. There were millions. We didn't know what they were. But we soon found out. They destroyed the catfish who used to build a nest in the river from bits of stone, or whatever he could find. And the carp would go along and they dribble their mouth in the mud and they upset the eggs. They probably eat the eggs. They upset the catfish' nests. Hence they're gone. Oh yes, they spoilt the Darling. Which is a big shame, I think.



When conditions are suitable carp can mass in their thousands. Gasping activity at the water surface is actually them feeding on zooplankton.[15]
Photo: Nathan Reynoldson.

History of Carp FAQs

Why were carp brought into Australia?

During the early days of settlement many different types of animals and plants were introduced into Australia in an attempt to imitate a European environment. Carp were seen as a good sport and food fish.

When did carp arrive in Australia?

The first records of carp in Australia were from Victoria in 1859 and NSW in 1865 where they were released into ponds. During the 1900s carp were released into the wild but did not become widespread.

Many early newspaper accounts in the Basin around the turn of the 20th Century refer to carp being widespread and abundant, however these reports are referring to 'golden carp' or goldfish (*Carassius auratus*).

Carp spread in the Basin after they were released into the Murray at Mildura in 1964. Their release and spread coincided with widespread flooding in the early 1970s, but their use as live bait probably also helped.

Is there just one type of carp?

There are many species of carp, and the fish is widely farmed overseas for food. In Australia there are at least three strains of the one species, *Cyprinus carpio*.

Genetic studies have shown there were two strains in Australia prior to their expansion in 1964: the 'Prospect' strain in Sydney and 'Yanco' strain in the Murrumbidgee Irrigation Area. However it is the 'Boolara' strain from a farm in Gippsland that was released at Mildura and is now the most wide-spread.[13]

Phillip Parnaby agrees with Gordon that the carp had an impact on particular fish in the river.

> *There was catfish, we used to catch a fair few catfish, right up until the carp came along and that sort of pretty well buggered the catfish.*

Dwayne Willoughby is not old enough to remember the Darling without carp, but he too has seen the changes that they have caused.

> *I've seen changes with the population in fish. When I was fishing as a kid, you could go down, catch yellowbelly, take it home, have it for dinner. Now you'd catch 20 carp.*

Carp move around in shoals in the shallow water of wetlands when they are looking to spawn. Often a single female is chased by a number of males. Photo: Luke Pearce.

1974 flood levels at the Bourke Bridge. Photo source: Bourke Public Library.

2010 flood levels at the Bourke Bridge. Photo: Scott Nichols.

Phil Sullivan – *the River's the essence*

Phil Sullivan, a Murawari and Ngemba man, was born in 1960 in Brewarrina. In 1966 the family moved between Dodge City in town and a camp at Billy Goat Bend on the Darling.

Both places are near Ngunnhu, the Brewarrina fish traps. Phil remembers fishing there as a youngster.

> *There was good fishing there. Once the water got up to a certain height the fish just swam in. If the river got up too high over the fish traps, it was too strong then. They couldn't catch them with their hands any more, so they had to chuck the line in to catch them. They're still catching them in the fish traps right now.*

Ngunnhu have always been at the centre of Aboriginal economic and social life. Its abundant fish provided resources for the Ngiyampaa, their neighbours, the Murawari and Yuwalaraay, and for large ceremonial gatherings when many Aboriginal people could camp over for events such as the initiation of young men.[2]

Aboriginal fisheries

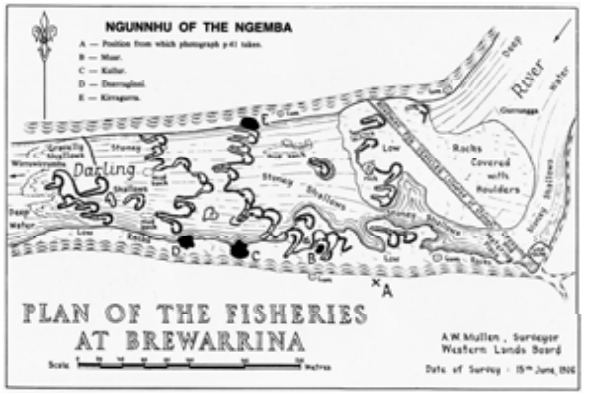
Ngunnhu, the Brewarrina Fisheries, are built over a length of the river where the bed falls steeply, so that the traps lie on different levels, with some underwater - even in dry conditions - ensuring harvests in all but the worst droughts.

In 1842 Aboriginal ownership was recognised in the gazettal of one of the earliest reserves in the state, covering Ngunnhu and a square mile of adjacent land. The gazettal prohibited non-Aboriginal people from fishing there. The local Aboriginal people and the police enforced this law until, at least, 1906. [4, 16]

Damage to Ngunnhu occurred in the mid 1800s when stones were removed to build a road across the river. A weir was then built on top of Gurrungga (the waterhole) itself in 1972.

At the time an attempt was also made to install a fishway over the weir by dynamiting a section of Ngunnhu. Both Aboriginal people and local white fishers were critical of this ineffective fish passage.

The weir is enjoyed as a swimming pool and picnic site, repeating the role that the perennial water hole Gurrungga had filled for centuries.



Local Aboriginal people knew their fisheries so well they explained the names of each of the stone pens to Surveyor A.W. Mullen who documented them in 1906.[3]
Photo source: Goodall 1996.[4]

The Darling River. Photo source: Wellbeing Project DECCW.

Ngunnhu, the fish traps, are still used today to catch fish. Aboriginal people today continue to use the same technologies of stone pens to store fish for short periods after they have caught them in the main traps. Here some modern adjustments (above) ensure a golden perch (below) doesn't escape.
Photos source: Phil Sullivan.

The sweet things

Fishing was always a family affair.

All the family used to go. There's Mum and myself, the second youngest, my sister's the youngest one and my brother was the eldest. It was always us four, and all the other family would come along. Extended family would come and we'd just sit down on the bank all day fishing.

This was always a time of learning for the younger generation. Not just about fish and fishing, but also about the river, the plants that grew around it and the other sorts of animals that also depended on the water.

We would all go and fish. But there was a lot of other things that happened. If it was too hot, we'd just jump in the river and have a swim. We would go looking for other little stuff. Maybe some quandong trees if they were in fruit. I remember one day the old fellas must have been checking the weather, checking the time of the year and they came across a native beehive. They just ripped the bark off and there was all this honey. All the kids were there doing a bit of fishing and getting some native bee honey. It was just awesome that day. That happened right back in the early '60s when I was a little fella.

Highs and lows

Over the years Phil has seen how the state of the river affects everyone who lives in Bourke and Brewarrina. The highs and lows of the river are also the highs and lows of the town.

In the drought the crime rate in Bourke was way up, and the moment the rain came, and the river rose, the crime rate went down, because everybody had that connection to the river. When we get a big rain after a drought everyone went straight to the river. You're not just seeing blackfellas sitting on the river, you see kids sitting on the river bank, whitefellas, police officers, DOCS officers, everybody: fishing. It's the essence of our physical life, particularly to Aboriginal people. Without it, we're done. We're dead. So it just draws us.

Another local, Phillip Parnaby, also remembers how freshes and small floods would turn the weir into the social hub of the town.

We used to go down the Bourke weir when the river was rising and we'd all fish down there. Before the river got too high the yellowbelly were all hanging around below the weir waiting for the wall to go under so that they could move upstream. You could catch 15 or 20 in a day. There would be 100 people down there doing the same thing.

Alma-Jean Sullivan ready to fish at the Bourke Weir. Photo source: Wellbeing Project DECCW.

A little fish…

In the 1960s and '70s, Phil Sullivan remembers the Darling for its abundance of fish.

> *Catfish. Black Bream. Cod. Yellow belly, they are the main four. There was this little fish, a blackfish, it used to be in the bulrushes along beside the river.*

Phil thinks that the floods in the 1970s – particularly the 1974 flood – completely changed the river.

> *It was after the 1974 flood that the river started to change. When I came back from school, the little black fish was not there anymore. The bulrushes were their habitat. It had gone. It was a good little eating fish. Catfish, not there anymore. Black bream: very rare.*

Phil's cousin, Alma-Jean Sullivan, is renowned as one of the best fishers on the Darling River. She also noticed that the 1970s bought changes to the district.

> *It was 1976, '77 I think they got cotton in Bourke. When they put all the cotton in and all the pumps in, they took all our water out of the river. So that was a big change for the river because every time we got a rise from up-river, they used to pump that water out before it got here. And then all our yellow-bellies were gone. There were hardly any fish biting in the river because all of the fish were being sucked into the pumps.*

Large scale developments like this one in Qld and NSW are often blamed for taking too much water. Photo: Scott Nichols.

Fish and other animals benefit from availability of new habitats during floods like those of 2010, especially when it gets out onto the floodplain (above). Birds like ibis take advantage of submerged lignum bushes to make their nests safe from predators (below). Photos source: Phil Sullivan.

Phillip Parnaby – *Grandfather, father and father-in-law*

Phillip, now 53, was born and bred in Bourke, growing up with his seven brothers and sisters a couple of blocks from the river. Phillip went to high school in Bourke, then straight to work at the local meat works before becoming the milkman 30 years ago.

Shoosh!

Although he thinks it was his Dad that taught him to fish, it was his Pop who he remembers as the family fisherman.

My first memories of fishing are when I was probably four or five year old. My grandfather, who was a World War One veteran, used to go fishing but he wouldn't take us because we were too noisy. He'd come back with some of the biggest cod that I've seen. Mum would tell us stories about Pop. He'd drop Mum and Nanna off and then he'd go up the river and fish because they'd be too noisy.

A different Anzac tradition

In the 1960s and 1970s, Anzac Day was a special day of celebration for the war veterans that lived in Bourke. Like most Australian towns the dawn service was followed by a parade and then two–up at the RSL or the pub. Aboriginal returned servicemen were invited to march in the Anzac Day parade, but were excluded from entering the RSL: then, or at any other time of the year.[5] Phillip's Pop did not march.

He had a brother who was a First World War veteran too. Pop was Aborigine. And in the beginning he didn't go to Anzac Day. He used to go fishing instead. He'd go away on his own the whole day, probably just because of the memories. He used to fish off the bank and also he'd row and use spinners too. He'd row up and down the river all day.

Phillip teaching his son William about the river.
Photo source: Phillip Parnaby.

The grass is always greener

As young kids in a country town, Phillip and his mates had to make their own fun.

We had a pretty good life. When I was ten or twelve, there was plenty to do. The grass is always greener on the other side of fence. We would see people with new pushbikes and that sort of thing. There was eight of us in the family so there wasn't a lot of money to go around. But we had the river and there was heaps of entertainment.

Other members of the family also fished – but usually not on their own like Phillip's Pop. Instead Phillip remembers that they fished in big family groups.

We used to go with Dad. He'd go and set a few lines and we'd catch a few cod. My brother, Robert, who's ten years older than me, he's a big fisherman too. Later I married Ann Marie and her father was a keen fisherman. We used to do a lot of fishing together. When the kids were little, we'd pack up and all go out fishing, camping for the weekend. It could be anything up to 10 or 12 of us.

Camping and fishing trips on the Darling gave Phillip a chance to spend time with his extended family.
Photo source: Phillip Parnaby.

Changes

Phillip's seen the river in all different kinds of conditions. In the 1990s drought started to dry out the river. The effects of the water storages and irrigation upstream started to show up in the Darling around Bourke.

Well, you could see it in the water, it goes clear, right? And then it'll get stagnant and the algae came in. You could see the greens and the brown coming in, you'd know then it wasn't healthy.

Seeing the changes in the river over his lifetime makes Phillip wonder about the longer term dry and wet cycles of the river.

In 1938 the river was dry here. The Bourke weir pool went dry and they had to dig a trench from up river to get the water back down to the Bourke weir pool to replenish it. Mum lived between Bourke and the weir. It got that dry there they had their goats over the other side of the river looking for food. They must have had massive rain up north somewhere and it came down like a big wall of water. She said they could hear it coming. They had to go across and get the 20 goats back. In the last 50 years the river has never been dry like that between Bourke and the weir. Must've been a massive drought in '38.

Unloading cargo at Bourke during a low Darling.
Photo source: Wentworth Public School via Wentworth Historical Society.

Importance of variability

Flows in the Barwon-Darling are highly variable, with 90% of all flows retained in the river channel, and only 10% reaching the floodplain.

Fish and other aquatic plants and animals have adapted to this variability and rely on it to survive.

Native fish use increases in flow as cues to undertake spawning migrations and to access different habitats, such as floodplain channels and wetlands.

The flow in a river controls the movement of materials like sediment, nutrients and organic matter and creates characteristics such as deep holes, sand bars, undercuts, and benches (flat sections of the river edge). These all provide habitat for different plants and animals.

The link between the floodplain and river is almost entirely dependent on variations in flow.

In muddy rivers like the Darling, light can't enter the water column to great depths, meaning the growth of water plants is limited. Here snags provide much of the structural habitat for fish.

In this type of system organic material from the floodplain becomes an important source of nutrients to the plants and animals living in the river itself.

River regulation (dams and weirs) and diversion of water (irrigation) decreases the variability of flows and therefore limits opportunities for different floodplain habitats to be accessible and materials exchanged.[14]

Dwayne Willoughby – *A Beemery shack for family and fishing*

Dwayne was born in Bourke in 1976 and has lived there all his life. Family has always been central to Dwayne's fishing, since the very first day that he learnt to thread a worm onto a hook and cast out into the Darling River.

My first memories were sitting there with my Nan and Pop and them saying to leave the worm on the hook, and leave it in the river. I kept pulling it out to see if I had a fish on the end of the line. That was a time when I always got to sit with my Nan and Pop and have a good old yarn to them, bit of a talk. I used to ask a thousand questions.

He and his family have a fishing shack at Beemery – about half way between Bourke and Brewarrina. They head out on weekends and school holidays with the tinnie and the camp oven and as many kids and dogs as they can get into the cars.

It's really great snags up that way. It's where the Bogan runs into the Darling. We're pretty lucky up there - it's what we call virgin territory. It hasn't been over fished, which is why we're really lucky. We don't tend to overfish it either.

We're not out there every week and we catch and release everything, anyway. We're pretty lucky to be fishing in these sort of areas.

A yellow sheep tag attached to the tail allows this cod to be recognised if it gets caught again. Photo: Dwayne Willoughby.

Sheep tags and fish

Dwayne and his family have always preferred to catch cod and yellowbelly. They normally take one or two smaller fish to eat and let the big ones go back to the river. They photograph most of the big ones and in the past five years have marked 47 fish with sheep tags. That way they can tell for themselves which fish live in the reaches around the shack.

It also allows them to see what the changes in the river are doing to the fish.

Sometimes you'll get a cod that will have a few little sores, they're like a little mite, from what we can find out about them. We think that they are just a parasite.

An anchor worm (*Lernaea* spp.) is just one of the parasites found on fish.
Photo source: http://www.heems.nl/arob0409.htm.

Changing colours

The Darling River is famous for the changing colours of its waters – from milky tea colour in steady flow, to clear and green as the water slows, to muddy and dark when upstream floods bring raging waters.

The colours depend on which upstream river is in flood and carrying the silt down, whether it's the black soil from the eastern plains or the red soil from the west. Phil Sullivan explains some of the differences:

Fish parasites

A number of parasites and diseases affect native and introduced fish. One of the more visible is an 'anchor worm' (*Lernaea* spp). Anchor worms are actually an ectoparasitic copepod, which means they are a parasite living on the outside of the fish and are actually a type of tiny crustacean (like a crab or shrimp).

Lernaea spp. progress through 3 free swimming life stages before entering a fish through its gills. When sexually mature, the females are fertilised and move to the fish's skin where they secure themselves by burying their now anchor-shaped head into the skin. Where the female detaches from the fish, an infection can occur, leading to ulcerations.[11]

Like all parasites, their abundance is often a sign of stress for the host. A long term study of fish communities in the Lower Darling noted an increase in proportion of fish affected by anchor worm between 1994 and 2009,[11] but lower levels in 2010.[12]

A big cod with what are probably ulcerations from parasitic *Lernaea*. Photo: Dwayne Willoughby.

When it rained in Bourke. Nice and clear. Beautiful. Drinkable water. You could actually put your head down there and drink it. Not murky and muddy. If it was water from the top end coming down, then it was the dirty coloured water.

Clear water at the Bourke Weir. Photo source: Wellbeing Project DECCW.

Dwayne has noticed that the colour of the water changes the colour of the fish.

When it was dry a couple of years ago the cod were not a very dark colour. I know in the last 12 months, because of the flows in the water, they now have a real dark appearance. They have changed. I don't know why but they are a different colour to when there's a fresh in the water. We sometimes go to a place called Black Rocks and there's some very deep water around there. I don't know if they get down into the rocks, into the deep water and just sit there. But the cod there are nearly black.

Sharing

Although they mostly release fish back into the river, the Willoughby family still like to take some fish to eat.

All the time we go fishin, we've only taken four or five fish out of the water there. One year, two were donated to the local golf club for a pro-am. We also do try to give a fish to the Rivergum Lodge, the old people's home once a year.

Phil Sullivan also remembers sharing his catch around.

It was about us. It was about not just the family – my immediate family – but it was about all of us.

Snags are an important of the river, providing protection and breeding sites for native fish like golden perch and Murray cod. Photo: David Cordina.

Dwayne and his family stick to the main river channel – even when the water fills all the lagoons, wetlands and creeks that run into the Darling. He explains why they don't fish in the backwaters:

> *We leave that, because that's where they're breeding, up in the shallow lagoons. That's not for me, you know. It's always been the river. We don't touch the lagoons. That's been passed down that the lagoons are the fish's breeding ground. That's your bread and butter for future fishing.*

Darling River in flow at Brewarrina Weir, submerging Ngunnhu. Dwayne likes to fish up the river closer to Brewarrina too. Photo: Scott Nichols.

Fish and chips

Fish tagging programs are widely used in scientific studies as a means of keeping track of fish movements.

There are several types of tags in use – external, internal microchips (passive integrated transponder or 'PIT') tags and radio transmitters.

Both external tags and microchips (PIT tags) need the fish to be caught or pass in close proximity to an automatic PIT tag reader in order for it to be identified.

Radio transmitters allow fish movements to be recorded without human interference (other than the initial capture and transmitter insertion). As the name suggests, fish fitted with radio transmitters emit a signal that can be picked up at permanent or mobile monitoring stations and downloaded to a researcher's computer.

Fish are being externally tagged as part of the Brewarrina to Bourke Demonstration Reach project to determine what habitats they prefer and where they move. If you catch a tagged fish, please let NSW DPI know by visiting our website to enter the tag details at: www.dpi.nsw.gov.au/research/fishing-aquaculture.

Golden perch with a yellow external tag near its dorsal fin (circled) which will have a unique number and contact details for you to get in touch with researchers. Photo: NSW DPI.

Like Dwayne's sheep tags, external tags (being inserted – top right hand corner and circled above) allow fishers and scientists to identify individual fish. Care must be taken when tagging all fish as the wound can easily become infected. Photos: NSW DPI.

Anti-clockwise from top right: Internal microchips, shown being inserted into the fish's body cavity under anaesthetic, can also be used to identify fish using handheld scanners (bottom right) or as fish pass scanning stations located in fishways. Photos: NSW DPI.

Making connections

Feli McHughes is a Ngemba man on a mission. He wants to continue to rehabilitate the Old Brewarrina Mission Wetland with the Ngemba Billabong Restoration and Landcare Group and integrate it into other activities for the local Aboriginal people.[6]

About 15 years ago one of the government agencies decided to pump water into a billabong that was two kilometres long, just to see what would happen. We had no science or anything. We just allowed the billabong to demonstrate it's natural forces. It was awakened and nature seemed to understand that something was happening there. So birds and fish and all the appropriate wildlife around billabongs started to get involved again. It dawned on me that billabongs were very important part of the river system. I'm saying that it actually develops antibiotics for the rivers' immune system. Should the billabongs be activated, then the river's immune system will have a chance to develop and get stronger and then we have a healthier river.

Circle that never stops

Phil Sullivan explained the special Ngemba - Murawari relationship that his family have with the yellowbelly.

His example shows how the stories are about places and people at the same time. He talks about places as having brothers and sisters in the network of connections through the stories - and also about living people, whose family responsibilities link them to places and to other living creatures.

I think traditionally, everyone would have had a responsibility. My family's totem was the yellowbelly, and so our responsibility towards the Yellowbelly was in the water, in the river and everything about the river. That would entail looking after the river, but also looking after the sister who's totem was the little lily on the river. There was a circle that never stopped. The reeds might have been important, or maybe, there was a responsibility to look after the Brolga. The river has always been important because it holds the essence of life, which is the water.

Through his job with Bourke Shire Council Dwayne Willoughby has been able to help with some of the programs going on in the area including the Bourke to Brewarrina Demonstration Reach project. He says:

We had a big program doing a re-snagging project in Bourke. It was great for the river.

Golden perch

(*Macquaria ambigua* - callop, yellowbelly, Murray perch, white perch)

- Grows to 76cm and 23kg, but usually less than 40cm
- Likes warmer, slow moving waterways, floodplain lakes
- Found around fallen timber, undercut banks, rocky ledges
- Occupy a territory of about 100m for several months before moving to a new home range
- Known to migrate over 1 000km in spring and summer
- Migration cued by warmer water and rising water levels
- Eggs drift downstream on floodwaters
- Eat shrimp, yabbies, small fish and aquatic insect larvae

Yellowbelly caught at Bourke. Source: Wellbeing Project DECCW.

We need to protect fish

Mick Davis lives on a family farm on the Darling River about 40 minutes out to the west of Bourke. They have farm stay accommodation that attracts fishers from all over Australia.

> *We need to protect the fish that are there. And protect the banks and the water. The water is needed for household purposes, stock and domestic use. I believe once the river comes down well, the flow can run, fill up quicker. What Dave Cordina's trying to do now is to get good fishways all the way through. I think that's very important.*

Aboriginal community organizations have successfully undertaken rebuilding programs with young people working to restore the remaining fish traps. Today the Aboriginal Museum in Brewarrina retells the story of Ngunnhu's creation and its ongoing importance to the Ngiyampaa and to everyone of the region. Aboriginal people today take an active role in the annual Brewarrina Festival of the Fisheries, with celebrated Murawari elder, the late Essie Coffey, saying in 2000 about their participation in this event:

> *The Kuris themselves wanted to do something because this is our fisheries, our fish traps.*[7]

This installation at Brewarrina Information Centre shows how important the fish and fish traps are to the local community. Photo: Scott Nichols.

If you catch a fish it's a bonus

Dwayne explains what it is that he loves about fishing with his family.

> *I just like the wide open spaces and you can forget about things. It's a good time to relieve stress, I suppose. When I was a kid it was a bit different, it was the thrill of catching a fish, thrill of just being out in the outback. You could pick up a rock, throw it in the water, or get a stick and light a fire. But now it's changed. Its great just to get away and relax and lay on the banks, listen to the birdlife, a couple of cold beers and good mates. We always seem to have good mates when we go out. I like being with my family. If you catch a fish it's a bonus.*

Feli McHughes sees the rehabilitation of Ngemba Billabong as part of the process in developing a healthier river. Photo: Feli McHughes.

Just being on the banks of the river relaxes you. Photo: Jodi Frawley.

Visions for the Upper Darling

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

Water is the essence

Phil Sullivan is a delegate on the Northern Basin Aboriginal Nation group that are working with the Murray-Darling Basin Authority.

For Aboriginal people, water is the essence. We argue and fight not because there's an economic base for us, we argue and fight because we have a responsibility. We want to look after the water, look after the river, and look after everything around it. We get obstreperous and row and argue because we see it being destroyed, we do see it being abused. We do see it in a sad way, you know. Not good way.

The Bourke and Brewarrina areas do not have too many fishing inspectors. Dwayne Willoughby thinks that one way to ensure that people do the right thing of their own accord is through education.

It's hard because the rules don't get enforced a lot out here due to our locality. We should continue to educate the people about catch and release fishing. I think a lot of people just take it on board and say, "oh, ok, we're in the same boat, we've got to release the fish because we want to be able to come back here in another five years and catch one."

It's a big thing to us

Phillip Parnaby owns one of the motels in North Bourke and understands that a healthy river will mean that many different sorts of people can stay in the Darling River area.

I say we have got to look after the river because it's a big thing for us. It's a big thing for our future. Two of my sons are heavy vehicle mechanics on cotton farms. So, it's given them a future. And my other son, one runs a milk run, and one has his own truck. So, it all creates an industry of Bourke. I believe that when the fishing people come to fish, they come to see the outback. And it's all got to be sustainable or we won't have Bourke.

Dancing the billabong's tune

Feli McHughes sees the interconnectedness of the animals in the river as a vital link.

I think that fish will have their natural role in the future of the billabong. We're still to define what that is, but like anything, the swallows, the rainbow birds, frogs, the trees and the weeds, and the grasses, well fish fits in with that whole process. They're an integral part. If one little bit's missing, then the billabong isn't complete. So we need to make sure that everyone is dancing to the billabong's tune.

Everything is interconnected – fish are an important food source for many creatures including the elusive water rat, whose tracks in the mud are the only thing to give its presence away. Photo: Scott Nichols.

The people's river

Alma-Jean Sullivan is a Wangkumara woman who has a reputation across the whole of the Western plains for her prowess as a fisher. A calendar with her fishing tips has been reprinted three times and the 'Paroo Queen' has won the local fishing competition for a number of years, beating other recreational fishers from far and wide.

When asked in 1997 how the river might be fixed, she replied:

> *Well, I would stop the cotton for a start. I'd just stop them taking so much water out. Let them take the water out when the rise gets down properly. When the rise is getting to the Darling River, they start pumping the water out. And it takes so much water, millions and millions of gallons of water out of the river, into the channels and I don't think that is right. I'd like to see them stop the pumping, let the water come down, give the fish a bit of a break, get used to it and let the town people get back what is ours! It's for everyone, not just for Aboriginal people, but for white people too. It's a lovely river when it's running... so the people should have a fair go.*

The 'people's river'. Photos: Wellbeing Project DECCW, sourced from Phil Sullivan.

State of the river 'moderate – poor'

The Sustainable Rivers Audit (SRA) is an ongoing systematic assessment of river health of 23 major river valleys in the Murray-Darling Basin. Environmental indicators (themes) include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.[8] The Darling Valley was surveyed in 2005. The Darling Valley fish community in the 'Upper Zone' was considered to be in Poor Condition and Ecosystem Health overall in Moderate Condition within this zone.

A little under half the native species predicted for this zone were collected during surveying (47%) with alien fish comprising just over one third the fish biomass (35%).

Bony herring dominated the fish catch during sampling, with Australian smelt, carp gudgeon and spangled perch also numerous. Golden perch and Murray-Darling rainbowfish were also common. Three alien species, Eastern gambusia, goldfish, and carp were captured frequently.

Eastern gambusia (circled) are a pest fish now found throughout the Basin. They were introduced to control mosquitoes, a job actually done much better by native gudgeons. Photo: Charlie Carruthers.

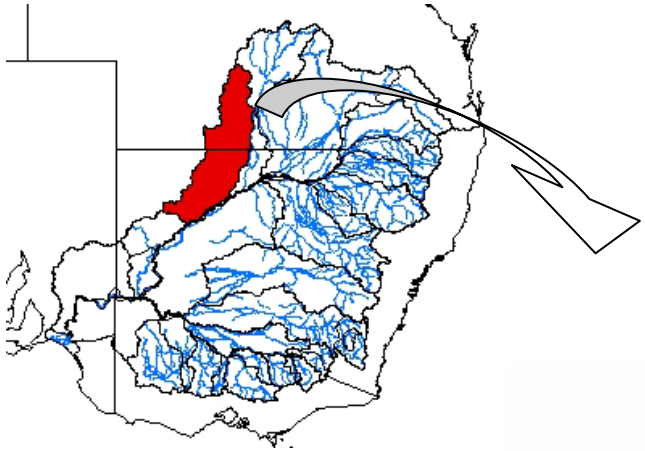
Paroo

Source: Colin Leigo.

Source: Ron Heinemann.

Source: Greg Ringwood.

Source: Greg Ringwood



Beryl and **Colin Leigo**. Colin has lived all his life along the Paroo River, as did his parents. He remembers the house he grew up in being right on the banks of the Paroo River for easy access to water and the fish. Photo: Greg Ringwood.

Douglas – Dougie - MacGregor has lived in Cunnamulla for 82 years. Being in the transportation business gave him the ability to go to the river and fish regularly. Photo: Greg Ringwood.

Ron Heinemann's first memories associated with Paroo include lots of large floods. They used to be cut off for a week or so at a time due to flood. Photo source: Ron Heinemann.

Ron Gardiner's (seated, right) first memory of the Paroo is being taught to swim by being thrown in by one of his teachers. Fortunately memories of being taught to fish by his grandmother are less traumatic and led to a life-long passion for fishing. Pictured here with his wife Bridget (standing), and Ron and Hazel Heinemann (both seated). Photo: Hamish Sewell.

‘But where,' said I, ' 's the blooming stream?'

And he replied, 'We're at it!'

I stood awhile, as in a dream,

'Great Scott!' I cried, 'is that it?

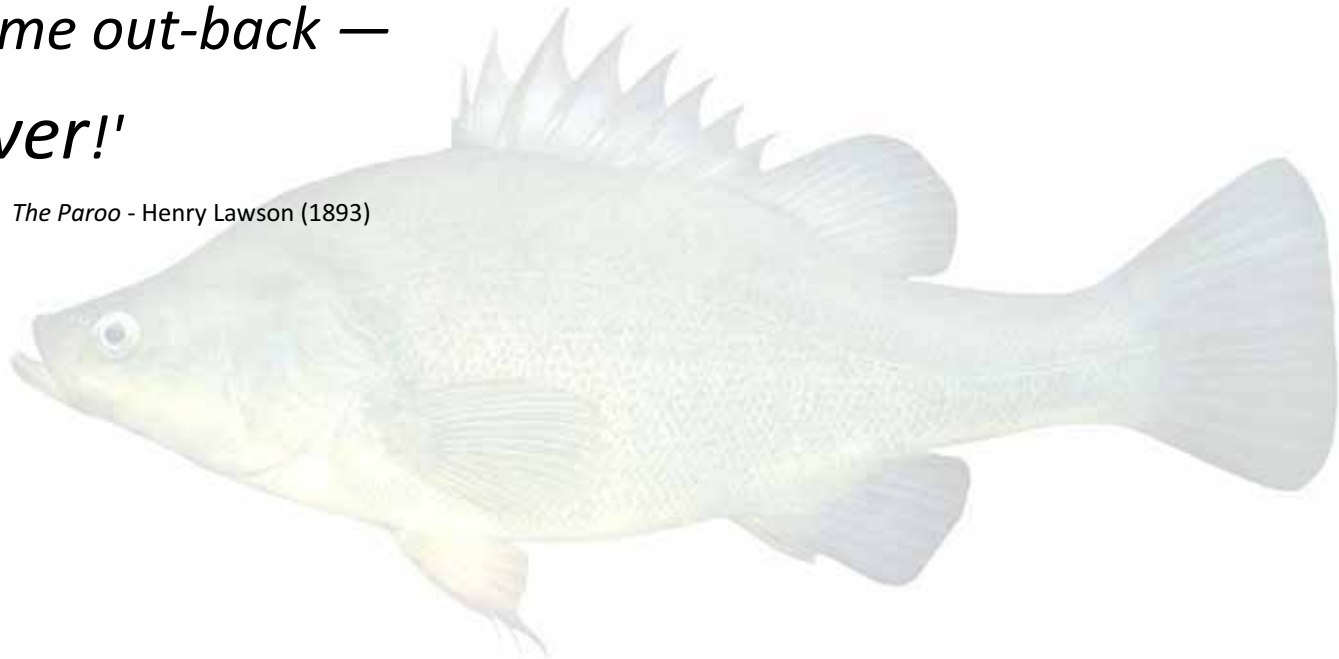
'Why, that is some old bridle-track!'

He chuckled, 'Well, I never!

'It's nearly time you came out-back —

'This is the Paroo River!'

The Paroo - Henry Lawson (1893)



Introducing the river and its people

The Paroo River is the last remaining free flowing tributary of the Murray-Darling Basin. Its 76 000 square kilometre catchment is located in the north-western corner of the Murray-Darling Basin, half in Queensland and half in New South Wales. The Paroo starts in the gorges of the Warrego Range in western Queensland. After crossing the border into New South Wales it spreads over the vast floodplains near Wanaaring, helping to sustain many significant wetlands. About 600km later it reaches its overflow lakes between Tilpa and Wilcannia. Although one of the major tributaries of the Darling River, the Paroo rarely flows into it because its waters dissipate before they reach it.

Over 20 000 years ago, the Maranganji, Kalali, Badjiri, Parundji and Kunggari people knew a very different Paroo River. A cooler climate, markedly different plants and animals and, probably, a river that flowed constantly.[1] Since then, a hotter climate and other changes meant the Paroo has become an ephemeral river.

The river has always been very significant to the Aboriginal people. The region has a dry climate and the river is a lifeline. The river remains a water supply for the people living in the catchment, but it is also a channel that binds the communities together. It provides water, food and hope for the creation of a comfortable life. People gather along the river banks and water holes to relax in the shade, maybe going home with a meal obtained from the river: yellowbelly, cod or yabbies.

The Paroo River. Photo: Greg Ringwood.

Created by a spirit

In the ancient dreaming, the Moonagutta was a water spirit with unknown shape and size. He lived deep in the waterholes along the river. In fact the river was made by the Moonagutta. The Moonagutta became the only spirit and soul left, wiggling in the silt left next to the receding water, after swallowing all the other Moonagutta. He started to shape the first rivers of life through the tracts he created when he tried to escape from the floodwaters. When he came to a sandy stretch, he was able to bury down deeper and created the waterholes.[1]

The Maranganji, Kalali, Badjiri, Parundji and Kunggari people established themselves in the Paroo and the surrounding catchments approximately 20 000 years ago. The Paroo River gets its name from a variation on the name of an Aboriginal Paakantji group, the Parundji.

The arrival of the Europeans

The Paroo-Warrego catchments weren't explored by Europeans until 1845. Thomas Mitchell passed through the region in 1846. By 1862, there were already some established pastoral stations in the area.

One settlement arose beside a reliable waterhole at the intersection of two major stock routes. This settlement became Cunnumulla in the late 19th century.

Until the end of the Second World War, the area had a small number of large pastoral stations and a small population. After the war, with the increase in wool prices, the area experienced significant economic and population growth.

Beef cattle grazing and sheep for wool production are still the two predominant industries in the catchment. There are very few, small-scale irrigated crop operations. Due to the small irrigation industry and the sparse population, demand on freshwater has stayed low. As a result the Paroo River is the least regulated river in the Murray-Darling Basin.

Transporting sheep across the Paroo for shearing in Willara in 1935. Photo source: Colin Leigo.

Fishing has been very important activity for the local community. For the Aboriginal people and early settlers fishing was a daily activity providing a stable diet.

In later times, wetting a line has become a significant leisure activity. People living along the river have unforgettable and intimate memories of the river, the fish they caught and 'the ones that got away'.

An unregulated river

The free-flowing Paroo River. Photo: Greg Ringwood.

The Paroo River is the last remaining free-flowing and unregulated river in the northern Murray-Darling Basin and is likely to stay that way. In 2001 the Queensland Government applied a moratorium on new structures that could capture overland flow. In 2003, the Queensland and NSW Governments signed an intergovernmental agreement to manage the Paroo's water resources in a sustainable and culturally sensitive manner, recognising the cross-border nature of the catchment and its links with the sub-artesian waters.[5]

Fish need to be able to move up and down rivers to access food and habitat suitable for spawning and to avoid poor water quality or other unfavourable conditions. Many of the fish species found in the Paroo migrate as part of their life cycle, including Murray cod, silver perch, spangled and golden perch. The Paroo and Ovens (in the southern Basin) are the only rivers in the Basin where fish are not faced with barriers, such as weirs and dams, when migrating.

Colin Leigo – *The Paroo River means life*

Colin Leigo is a 60 year old farmer who lives at Mooreland Downs, about halfway between Wanaaring and Hungerford on the Queensland-NSW border.

He's lived here all his life. The river has always had a significant influence on the way Colin and his family live and work on their property.

A river runs free

It seems the Paroo is a lucky river - most of its ecology and biodiversity are in good condition compared to other rivers.

You've got all your vertebrates, all your frogs in this ecosystem – everything is still all intact with this river, that's one thing with it. When you talk to people on other rivers and they just haven't got those things. I think it's tremendous.

A little fresh down the river – a vital feature for native fish. Photo: Greg Ringwood.

Colin sees the little rises in water level as being a good part of being on the Paroo.

The smaller floods are always terrific. It's always great to see the little rivers come down because it's terrific just to see the river run. When you've been here and you go through drought years and you see what doesn't happen with the river. When you've got no water at all or very little water, and you always look and say, 'Well, it's terrific just to see it running'. Even though it might only be a little run (and there are a lot of those come through, over the year), they're a terrific thing just to see and to have. I think a lot of the other rivers, now that they're all regulated rivers, probably get very little of those at all. They probably don't even see them whereas this river being a free flowing river, we get all those little rises that come down.

Fishing – part of life on the river

When the river runs, Colin catches fish using a drum net – a technique he learnt from his father. When he was a child, Colin also used lines to catch fish.

Fishing? Oh, well, fishing, it's been part of my life on the river. Probably I would have done it ever since I was a kid. We've fished on the river and probably in all forms and all sorts of fishing. We are there just to catch ourselves a meal of fresh fish because we don't live on the coast, so we can't go and buy fresh fish every day or anything like that. So we just catch a few fish when the river runs.

There were plenty of good size fish back when Colin was a child, particularly yellowbelly, he remembers. Colin also remembers many catfish in the past, with some being three pounds in size.

There used to be catfish in the river, but I think since the carp have got in, they must have eaten all of the catfish eggs, because there's just no catfish in the river any more.

Colin also remembers catching moonfish for the first time during the 1980s. Initially they thought the freshwater catfish was back. Moonfish look like catfish, but they are four or five inches long and seem to die out regularly and came back again.

There are plenty of these moonfish in the river and another Paroo fisher, Ron Heinemann, reckons they're good bait for cod. Across the Basin, these fish are commonly known as Hyrtl's catfish, Hyrtl's tandan, yellow-finned catfish or moonfish.

They always caught a feed when they went to the river. These days it seems it is the luck of the draw whether you will catch a fish or not.

You could catch 8 to 10 in no time – good yellowbellies. Sometimes you'd catch small ones and you'd throw them back in. When I was a kid, you could nearly always catch your feed of fish.

The river is also full of shrimp and yabbies. There also used to be a lot of mussels.

There's mussels in the river, if you want to walk around or feel around in the mud with your hands. Mussels are about four or five centimetres. They are a blacky dark colour. And when you open them up they are white inside the shell. Very muddy but I've seen people eat them, but I've tried it, but they are just full of mud to me.

Yabbies are a favourite across the Murray-Darling Basin. These two were caught in the Paroo River.
Photo: Greg Ringwood.

Moonfish

(*Neosilurus hyrtlii* – Hyrtl's catfish, yellow-finned catfish)

Photo: Gunther Schmida.

- Medium sized fish, usually less than 28cm, with smooth skin without scales
- Likes a variety of habitats from flowing water to still lagoons
- Eats aquatic insects, microcrustaceans, molluscs and detritus
- Spawning in north Australia occurs in Summer, possibly stimulated by rising water levels and temperature

Catfish

(*Tandanus tandanus* – eel-tailed catfish, jewie)

Photo: Gunther Schmida.

- Medium sized fish, usually 50cm or less
- Prefer slow moving waters of rivers or creeks
- Eat aquatic insects, yabbies, molluscs and small fish
- Eggs laid in a circular gravel nest which the male guards until the eggs hatch
- Now presumed extinct in the Paroo

When the floods come

The Paroo rarely flows into the Darling River. It did in 1974 and Colin remembers it happening in 1976, 1990 and 2010 too. Being flooded in was a regular thing for the family in the 1950s, '70s, '90s. Because the shearing shed and quarters are close to the river, they get cut off even during the medium floods. The farm trucks and motorbikes are left outside the flood line just in case. Around Colin's place, the Paroo flood can spread a kilometre or a bit more. Further south it can spread over 30km according to Colin.

The river is the same

Colin doesn't think the river has changed very much. He collects data on the river and its flows, just like his father did all his life. From this he knows how far the river will rise and what he needs to do to safeguard his farm and stock.

When the river flows it fills the waterholes as it journeys downstream: if the waterholes are dry or low, the amount of flood downstream gets smaller. Colin saw this at his place during the 2010 flood. It normally takes about a week for flows from Eulo to reach Colin's property, but if the river is dry it may take 10 to 12 days.

The Paroo flood of December 1942

1942 flood - The Flat and Tanks. Photo source: Colin Leigo.

… We are all well and safe and I think most of our personal belongings are safe, but there won't be too much left of Willara … . On Sunday morning the river was just coming out of the channels and it was rising fast … . About 3 the bank broke…. It started as a gentle stream and in a few moments was a torrent … . I don't dare think any further ahead than a few weeks, all our garden that we have put so much work into and my heart just aches for poor old Ivan with his trees. He was so proud of them and they were growing so beautifully. I don't think more than 3 or 4 will survive, at the most and as the water will be right over the top of them. …. Oh well I suppose we are really lucky as we are safe and the menfolk seem to have saved all our personal belongings. They must have worked [hard] to get all the things out that they have done.

Extract from the Letter of Isobel Doyle

Prior to 1928, a punt transported people and their chattels across the Paroo. Photo source: Ron Heinemann.

The amount of water already in the waterholes has changes the time it takes for flood waters to make their way downstream. Photo: Colin Leigo.

Dougie MacGregor – *a lifetime on the Paroo*

Dougie is 82 years old and throughout his life has seen many changes in Cunnamulla and in the Paroo River.

Driving, not droving

Dougie remembers the river as always having water and plenty of fish. He remembers the droughts as well. When the drought started in 1957, Dougie went into the livestock transportation business. Most drovers had gone to war and not come back. Dougie remembers most of the younger generation not being interested in droving. Livestock transportation filled the gap.

The floods had significant impact on the roads. After a big wet in 1950, one of two main roads were replaced with a new one on the western side of the Paroo to, as Dougie puts it, *get way back off the river.*

The road and a good vehicle were important ways to get access to the river for fishing. In the 1950s and '60s, not many people had cars, so people would car-pool to get to the river to fish and camp.

Flooded in. Photo source: Gordon Warner.

Dougie was too busy to go fishing during the early days of his business. But later, when the business was well established, he had more time to go fishing for a couple of days at a time.

An ant-bed floored house. During the Depression no one had much, so if fish were caught they were shared. Photo source: Gordon Warner.

The boom years

Towns around the Paroo have experienced cycles of boom and bust that mirror the cycles of flood and drought in the river itself.

The postwar years saw a conjunction of good seasons and high wool prices and the town experienced unprecedented prosperity. Dougie remembers the 1950s:

> *They were the boom years just after the war, and wool was big money. There was plenty of work around here.*

The government had subdivided some of the big properties for soldier resettlement. They went up in a ballot in 1951 and many returned servicemen moved on to the newly subdivided land.

For Dougie and others, this meant work:

> *There were new homesteads to be built, and shearing sheds, and fencing, so there was plenty of work around and plenty of money. And the population of the town went up to 4 000.*

By the late 1960s the pastoral boom had passed. These days Dougie sees a consolidation trend: large companies are buying small properties and joining them up. People are moving away and the population in the area is declining.

Sleepy cod and spotted cod

Dougie and his friends caught big cod in the hidey-holes of Caiwarro and Currawinya, as well as yellowbelly, jewfish and big black bream (silver perch). The cod Dougie and his friends caught were anything up to 110 pounds, but they averaged 15 to 30 pounds.

He thinks there were two distinct types of cod. One he says is a very short, stubby cod fish, and the other one is a long, leaner one. He and his friends called them sleepy cod and spotted cod. The big ones were always the stubby cod.

During the war, when food and petrol were rationed, the Aboriginal people living close by used to ask Dougie to take them out fishing. Dougie only had 40 gallons of petrol to do his town carrying job. But on a quiet day he used to take his Aboriginal friends out fishing.

In the afternoon of a quiet day, I'd pick them up and I'd say, 'Which hole do you want to go to?' and they'd say, 'Oh, the Eight Mile,' which is up the river. They'd only have a corn bag with them. When one of them got off and put his nose up in the air, and took a sniff around, and he'd say, 'Not today, mate.' We'll go up to the Ten Mile or up to the Fourteen Mile. We'd park up there, and they have another sniff around, 'Oh, yeah, this will do, mate.'

Two of them would just tip into the water, they would hardly make a splash or anything, they'd just go in, and they'd be under the water for that long you'd think they'd drowned. And the next thing, up they come and they'd have a cod fish each in their arms. Just like that.

When Dougie asked them how they did it, an old Aboriginal man told him that the fish is called sleepy cod - all you had to do is rub underneath the belly and they'd go back to sleep again.

The Aboriginal fishers took only enough fish for a meal then they would go back to town. And they always shared their catch with Dougie, for taking them to the waterhole.

Dougie MacGregor and his friends caught big cod in the hidey-holes of Caiwarro. The river at Caiwarro (pictured) has snags, reeds and overhanging trees - ideal fish habitat. Photo: Greg Ringwood.

Murray cod

(*Maccullochella peeli* – Cod, Codfish, Guduu, Pondee, Pondi)

Photo: Gunther Schmida.

- Largest Australian native freshwater fish, growing to 1.8m and 113kg (average 40cm)
- Found around deep holes, woody debris ('snags') and overhanging vegetation or rocks
- Ambush predator eating other fish, crustaceans, molluscs and frogs
- Migrate in Spring – often 100s of kilometres upstream with water level rises
- Males guard the eggs which are laid on logs or rocks
- Last recorded in any numbers in the 1980s
- Cod may have moved back into the Paroo River from the Warrego and Darling Rivers during the 2011 floods while the waterways were connected
- Listed as 'Vulnerable' in Victoria and by the Commonwealth

It's all about the bait you use

Dougie and his friends used all sort of bait to catch fish in the waterholes.

You go out to some of those holes, and pick in them, and you can't get a fish out of them, but the fish are in there. It depends on what feed is in the rivers. We normally caught them on worms, shrimps, crayfish and mussels. We've caught them on bits of saveloy skin, we've caught them on grasshoppers, on centipedes, on frogs, and they tell me further down the Murray, they catch them on a grub.

Dougie and his friends also used to look in the fish stomachs to see what they'd been eating.

What we used to do when we got two or three catfish, we'd open them up to see what they were feeding on. It's a funny thing with the catfish I opened up at different times, sometimes their belly would be full of little mussels about the size of your thumbnail. And they were still whole.

So Dougie used to dig for mussels along the banks of the river, mainly in the areas with black dirt and silt. When he was a kid he used to get mussels about 10cm long. They used to throw them on hot coals and when the mussels were opened they were ready for eating.

But Dougie has not seen mussels that big in the Paroo since he was 15 years old.

I reckon down through the years it's come about that the poisons that they've used for dip for the sheep and the cattle, and the stuff they sprayed with. Especially after the war, they had all these new modern sheep dips and sprays and I reckon that's what's poisoned the river holes.

Keeping the catch fresh

Some people Dougie knew were very good fishers and always used lines but never nets. Dougie mainly used bobbing rods and hand lines. And it was successful as there was plenty of fish in the river.

If you took a boat out and you put drop lines in, you were nearly always sure to get two or three cod. In those days you'd catch as many as 20 or 30 fish a day. We would only have to go out for a day. But when we went right out, we had to stay out two days to make it worthwhile.

If people were camping, they had to keep the fish until they went home. He remembers:

They used to make a big hole along the river and they'd catch their fish and turn them loose in this big hole to hold them there alive.

Mussels

(*Velesunio ambiguous* - river mussel, *Alathyria jacksoni* - floodplain mussel)

Photo: www.environment.nsw.gov.au

- Definitely two species, potentially three
- Was a primary food source for Aboriginal people
- One species prefers wetland environments, the other, cooler riverine environments
- Floodplain mussel – grows to 10cm, and can live for 10 - 15 years
- Found in creeks, billabongs, backwaters, lakes and weir pools but not in fast-flowing water
- Probably extended its range with river regulation, and changes to water regimes
- Tolerant of drought, low dissolved oxygen
- River mussel – grows to 15cm and may live for more than 30 years
- Grows in main channel habitat, often below weirs with turbulent water
- Prefers high oxygen levels, and not tolerant of drought

Dougie and his friends used to take plenty of coarse salt.

There was no esky, there was no ice, so you couldn't stay out too long, the fish would have gone off. We used to take plenty of coarse salt and we'd clean the fish and fillet them. We'd put a layer of coarse salt in a container or tucker box, then put a layer of fillets in, and then another layer of salt, and that would keep it pretty cool. It would preserve them. And in the cooler weather it would almost form ice.

Silting up

In the 1960s, Dougie started to notice that the holes were silting up.

Being a carrier and getting around the country I would see the way the soil was getting pounded up from the sheep and the cattle. The graziers were cutting scrub down – in the dry times trees were dead, the roots were gone, and the grass was gone, it was dusting up the soil. When it rained the soil would get washed down into the river. You could see where the silt was building up, out like a promontory, out into the river. The rivers had big still water holes - if it haven't run for 18 months or more, there were still deep holes. Then we started to notice that they were getting shallower and shallower after a shorter time without a flood.

Dougie reckons the graziers are overgrazing the land along the Paroo.

There used to be reserves all along the rivers. In the early days the drovers had to have somewhere to let their horses and their working bullocks go. And the reserve is where the seed grows. The country is not flogged out like the grazing properties. They weren't satisfied with the beautiful country they had. They wanted the stock route reserves too. But they won't let the grass come up and shed a head of seed. They are over-grazing.

Both wildflowers and native grasses benefit from rain and periods of rest from being grazed. Photo: Greg Ringwood.

Carp – it got out of hand

The river these days has a variety of weeds and animal pests. Dougie first noticed carp in the Paroo about 30 years ago.

Well, we were catching an odd one or two of these strange sort of fish, and they were nice looking fish, too. But you couldn't eat the bastards, they were full of bones. We tried. Then I found out that they were imported into Australia to clean the irrigation channels out. And the politicians that have allowed them to be brought into this country ought to be caught and shot. That was criminal. Exactly the same thing as the cane toad. And of course, any river or stream or creek that's connected to the Murray have got carp in it.

According to Ron Heinemann, there were goldfish in the river ever since he can remember. When the carp came they affected the native fish community and changed the river.

They came on very quickly. I think it's a rare curse. And naturally, it got out of hand. You hear of the odd catfish being caught now, because they nest in the bed of the river and they protect it. And naturally, the carp clean them out. And they eat their young as well. Also, the gold fish and the carp eat the cod fish eggs, which they lay inside big hollow logs of trees that have fallen in the river.

Ron Heinemann - *what I know of the Paroo is what I've learnt myself*

Ron Heinemann is a grazier who has lived along the Paroo all his life. His parents came to live at the sheep station 'Springvale', about 10 kilometres west of Eulo, around 1920.

They lived in tents for several years until they built sheds with a cane grass roof. Ron was born in 1922.

The remains of Ron's parents' house. Photo source: Ron Heinemann.

Fishing: as simple as A, B, C

Ron was taught to fish by his mother, who came from a family of fisherwomen.

> *I've been fishing in the river since I could almost walk. Mostly my mother taught me how to fish.*
>
> *My father wasn't a fisherman, but my mother and her relatives, the Gardiner family, they were all fisher women. In those days, we used to have a rod with a short line on it, with a cork. Three foot off the bottom there was the hook, and you put a shrimp or a worm on it, and you just bobbed away, and the fish take it and you just pull them out on the bank – it's as simple as A, B, C.*

Ron's passion for fishing continued as he grew older.

> *I was a mad fisherman all my life. I like fishing because you never know what you are going to pull out.*

Remembering cod

Ron recalls his mother's memory of catching cod in the Paroo:

> *My mother remembers, when she was a little girl, catching cod up on the banks of the Paroo. As fast as they took one off the line there'd be another one on. They must have been there in plentiful supply in those days.*

Ron remembers catching cod at Caiwarro waterhole and recalls the fishing exploits of a good friend:

> *He told me he caught two 20 pounders on the one line one day. He did not know what was coming up because they were probably both pulling different ways. Another cod he caught was 73 pound. But I saw an 84 pound cod at the Station's butcher shop, it was a big fish. The biggest I heard caught there was up to 102 pounds.*

But Ron recalls that cod were once more plentiful in this waterhole.

> *Down at Caiwarro there were so many cod fish. In 1950s they put a road across the bottom end of the river there, and so many cod fish died at the crossing, that they used to take them away in a truck to get rid of them. The station was only a few hundred yards away, and the smell was terrific. Every kind of fish. Cod fish, yellowbelly, catfish.*

Although not common since the 1980s, the floods of 2011 allowed the Paroo to connect with the Darling and Warrego Rivers for a relatively long time, possibly allowing cod access back into the Paroo. Photo: Luke Pearce.

The black flood

Ron remembers fish as plentiful, but reckons drought and rain have big impacts on the life of the river:

> *In those days there was any God's amount of fish. You could go down to the Five Mile water hole years ago, and you'd catch at least two meals in an hour without any trouble at all. But in 1935, the black flood came down and killed almost every fish in the waterholes.*

When the river flows the first time after a drought it moves slowly; an almost black, ink-like water. Colin Leigo says the colour of the water changes: if there are storms in the upper part of the catchment, the colour of the water turns yellowish, then red.

Dougie has also seen the river flowing black after a big storm, particularly when the waterholes go black due to the fallen leaves. It does not last long, but can kill the fish. He has seen fish starving for oxygen during the black flood, dead and dying against the banks of the river. There would be, he says:

> *There were more there than what the bloody birds can eat.*

A 'tide line' of dead fish is not a pretty sight, but blackwater events are part of the cycle of drought and flood in the floodplains of the Basin. Photo: David Ward.

But Ron has seen something odd happen after the black water has cleared:

> *Another thing I noticed in 1935, nature has it that those fish spawn before they die. And a few weeks after the flood, the waters tended to clear gradually, six or eight feet from the bank of the river you could see umpteen million of tiny fish moving – just a mass of fish. I have seen this only four or five times in my life.*

They're beautiful to eat!

For Ron, fishing is not the end of the activity – eating the fish is definitely part of the enjoyment!

> *If you stayed overnight, you'd eat them on the spot. Cook them in a camp oven. A 20 pound cod fish – you wouldn't get much better to eat. Cut it into steaks, roughly an inch thick – and put it between two pieces of wire netting and cook over gidgee coals. You wouldn't get better anywhere. Because cooked that way, all the fat runs out, they get very fat. And they are beautiful to eat.*

Colin Leigo often used to cook yellowbelly on charcoal along the banks of the river.

> *We used to use wet brown paper and wrap it up, you wrap the fish up whole like that, and just put it in some coals on the fire for about 20 minutes. Cover it on top as well with the coals, and when you pull the wet brown paper off, the skin would peel off stuck to the paper. We didn't have to scale it or anything. Then you'd just eat it with a fork.*

The disappearing water

The Paroo River is unusual in comparison to others in the Murray-Darling Basin. Most of its water disappears underground and it very seldom flows in to the Darling River.

The artesian is important for our survival here. I think trying to drill into the artesian basin to get gas is a problem. If they happen to destroy the artesian basin, it will be the end of Australia. I can tell you one thing. We had a big flood at Springvale once. I was out walking on an island there, and I thought I could hear horses trotting through the water in the distance. I got over a bit further, and I found that I could stand on top of this noise. It was water running over rocks. That flood had been up two foot six and fallen away two foot six in about a week, and it would have been a hell of a lot of water going down underneath. The water was disappearing into the earth. You could hear it running over the rocks. And yet it might have been 100 feet or so below me. So you could hear the water percolating down.

Paroo wetlands artesian spring. Photo source: NSW DEC.

The river at Caiwarro where waterholes are fed by artesian water. Photo: Greg Ringwood

Great Artesian Basin

The Great Artesian Basin is the world's largest underground aquifer, storing 65 000 million megalitres of water. Although usually associated with central Australia, it stretches from 2 400km from Cape York to the Lake Eyre Basin, and east to Toowoomba and Dubbo. The basin's vast water supply is recharged from rainwater that penetrates from the surface. Natural artesian springs bubble to the surface as a result of the water being held under pressure.

These springs have always been vital sources of water for Aboriginal people and are also significant elements in stories associated with Ancestors, who often live in the deep pools of mound springs.

The artesian springs enabled the first pastoralists to move into the Queensland interior and provided important watering points. In 1886, JS Loughead drilled the first bores in the area at Thurulgoonia Station near Cunnamulla. Drilling produced 80 000 gallons of water per day and although very expensive, it did attract more people and stock.

Once a bore was in place watering facilities included tanks, dams and bore drains. Artesian water was also used on stock routes, for woolscouring and as a supply for steam driven railway engines. Towns in the Paroo district use bore water for urban supply. Artesian baths and spas were once common.

The extraction of water from the Great Artesian Basin has changed the ecologies of many places in the basin area. Many natural and mound springs now have reduced flow or have stopped altogether. The Paroo River waterholes at Curriwinya and Caiwarro are fed by artesian water.[3]

Ron Gardiner – *Riding the river*

Ron Gardiner was born in 1918 in Cunnamulla. He had to go to school in Eulo, initially boarding at the Eulo Queen Motel as there was no bridge across the Paroo River. But after the bridge was built, Ron started to commute to the school on horseback. That was in 1928.

He remembers his first contact with the river as it was rather challenging:

The first year I went to school in Eulo, the teacher there was a Mr Skinner., He took us all down to the river, to a big water hole, which was a quarter of a mile away. He said, 'We are going over to the other side.' And I said, 'I can't swim, Sir.' And he said, 'Well, hop on my back.' We got half way over, and he pushed me off, and said, 'Now, swim.' So that was a good early lesson.

Fishing tricks

Fishing the Paroo was a common activity. Ron has fond memories of fishing with his grandmother who showed him a trick or two.

I used to go to the river when I probably would have been around about 10 or so with old grandmother Gardiner, my father's mother. And she used to go down to the Paroo with a bamboo rod, and do bobbing. Every now and again she'd get a handful of sand and she'd throw it across the cork, and she'd say to me, I'm just putting a bit of pepper and salt on whatever I catch later. And she always caught a fish or two.

Ron had his share of funny things happen when fishing too.

The Caiwarro hole, it was at least three miles long, never dry, 20 or 30 foot deep. At one stage when I was down there with a cousin of mine – when I was about 18 years of age – and we were fishing at night in the middle of the river. I said, 'Fred, I don't think we're moving.' And he was a good rower, and he said, 'Of course we are moving.' So after a while we had a lantern with us, and we found we weren't moving. Apparently a big old tree had washed into the river, and we were sitting on a limb, and there was great big heaps of grass growing, I'd say in about ten feet on either side, and I said to Fred, 'Oh, for goodness sake, don't have an accident here, I don't think I could get through that grass.' But I believe it's all gone since the carp came.

The Caiwarro hole. Photo: Greg Ringwood.

Yellowbelly is a favourite

Ron sometimes caught large numbers of fish. He'd keep them in the fridge and eat them over the following days. It was always the good old yellowbelly.

It was the easiest one to catch. We didn't catch many cod in those days. I think I only ever caught one cod fish. Once, when I was going to school, I went down to Five Mile. I caught a five pound cod. Then one day I went to Five Mile hole and there was a black flood. The fish was getting closer to the top until they started jumping out of the water. And I got enough yellowbelly to fill the back of a ute – the floor, just flat. And they were beautiful. And the biggest fish I know that was caught there that day was a 25 pound cod.

When the fish weren't around, Ron would catch crayfish – or 'yabbies' as they're known in other parts of the Basin.

My son Andrew told me about ten years ago that the flood killed all the fish. The locals said, 'It's no good going fishing, because there aren't any fish in the river.' After that a fellow named Charlie Mackenzie and Andrew went out to the river, put a tin in, and came home with a bucketful of crayfish. It was much easier to catch crayfish, because there are no fish there to keep the crayfish down.

Riding the river

Eulo was and still is grazing country. Sheep often get access the river and regularly get caught in it during floods. The best way of finding sheep caught in the river is to wander up and down in the river on a back of a horse. Ron called this 'riding the river':

Well, whenever there is a flood in those days, you got on your horse and you rode the river, to make sure if there were any sheep caught, you'd swim across the river. As soon as there would be a river, we'd ride. We had two good horses that swam and they'd swim across any river. Marvellous. We'd get sheep and cattle out of the river by swimming them across.

Ron Heinemann had similar experiences. In 1964, he bought a boat and a motor so that during the flood he could look for stranded sheep.

We used to cruise the Paroo, looking for sheep on islands. If you found five sheep on an island, they'd go five different ways in the mid-stream, and you had to go and pull them out of the river onto the boat, which was hard work, I can tell you.

Moving sheep by boat. Photo source: Colin Leigo.

Goldfish

(*Carassius auratus* – golden carp, carp, common carp, crucian carp)

Photo: Gunther Schmida.

- Small deep bodied fish up to 40cm but more commonly 20cm
- A native to eastern Asia, first introduced in 1860s as an ornamental fish, now present in all waterways of the Basin
- Although ornamental fish have various bright colours, wild goldfish quickly revert to a bronze colour
- Usually associated with warm, slow-flowing waters, weedbeds and is known from slower flowing areas of upland rivers
- Spawn when water temps are 17-23°C, eggs are laid amongst submerged vegetation
- Feeds on small crustaceans, insect larvae, plant material and detritus
- Generally considered benign (not harmful, low impact on native species)

Making connections

Survival from the river

Early settlers and Aboriginal people relied on the River to supplement their protein intake. They caught yellowbelly, Murray cod, catfish, yabbies as well as freshwater mussels, all for eating.

They fished almost every day and took what they needed for the day. Those who lived far from the river took larger quantities of fish home.

Until the first half of the 20th Century, there were plenty of fish in the River, as Dougie MacGregor recalls:

> *Those days if you got on a boat and dropped a line, it was sure that you would get 2 or 3 cod. Most holes in Paroo were known for holding plenty of cod.*

Over the years, overfishing, introduction of carp and pollution resulted in the decline in the number of fish. Colin Leigo sums up the situation:

> *Now it is very hard to catch a Murray cod. These days it seems it is the luck of the draw whether you will catch a fish or not.*

It was important to catch your own fish as there were no fish shops. Photo source: Gordon Warner.

Knowing the fish

People who fish the Paroo know their fish well. Ron Heinemann gives some examples:

> *No eels out here. But tonnes of yabbies. There is another small fish out there we call the moon fish. … Oh, there are also tiny fish – oh, grunters and bony bream – that sort of thing which are used for cod bait too. Also, black bream, which you get a lot of them out in the Currawinya Lake, and they come up into the Paroo, and they grow to three and four pounds and are good eating, too.*

The river provided plenty of fish: but you do have to catch them! Understanding the river and the fish is important. As far as Tud Murphy is concerned, the local aboriginal people do it the best way.

> *One bloke put his hand into the log and he'd come up with a big yellowbelly in his hand, every bloomin' time. He used to tell us, all you had to do was rub them on the belly and suddenly they'd just lay there, and you just slip your fingers over the gills and bring them up.*

Dealing with 'dry floods'

Sometimes living along the river brought unwelcome surprises – like floods. The coming of the telephone helped locals deal with some of the difficulties of living near the Paroo. Donald Cooney remembers how the coming of the telephone lines to the Eulo area changed the way that people were warned about the floods.

> *You get what you call dry floods – it'd rain heavily up the river and you'd have nothing, you'd have dust blowing. You wouldn't see a cloud in the sky, and you didn't know the water was coming because it was raining 200 miles up the river, then down she'd*

come. They decided that this was no good. So when they first got the telephone down there everybody got busy and built the party lines. Four or five properties would get attached to just one wire that ran into Eulo. It was the start of the modern era.

The children of the river

According to Colin Leigo, during his childhood life, was a lot easier for the people along Paroo. The lives of his parents and grandparents revolved around the river. They'd fish the river and socialised by organising picnics and other events on the banks of the river.

My father always enjoyed the river, enjoyed the fishing and the social days on the river bank. Everything seemed to revolve around the river; they had their picnics and what have you, they were always held on the river.

Kids spent the summer days cooling off in the river. The river closest to the house was about 1.8 metres deep allowing kids to dive and jump into the water. Colin and his brother learnt to swim by tying a gallon-tin around their back and dog-paddling. The brothers spent most of their spare time swimming, catching fish and yabbying in the river. They created games, built swing ropes and diving platforms.

His childhood relationship with the river continued into the next generation with Colin's daughters.

Even though our house has since shifted about a kilometre off the river, they've done the same thing as I did over the years, swam and fished and yabbied and everything in the river. They've both had their twenty-firsts on the river.

It's a big (fishing) adventure

Fishing can be exciting but Ron Heinemann believes before, during and after catching fish is all part of a big adventure.

It is all a big adventure I used to swim in the river as well. Sometimes four or five of us used to go fishing together. We sometimes spent the night out there. Just a swag and gidgee coals. The fishing was just the thrill of catching a cod on a line. I've seen them get on a line at times and you'd think a bullock had fallen into the water. They really go to town when they hit. One of the first 25 pounders I ever caught was down below Springvale. I looked over the bank, and it came right over the water, a 25 pounder. I can tell you, it's a nasty job trying to carry them back on a motorbike – on your lap!

Picnics along the river

The river also created a good atmosphere for socialising. Gatherings of families and friends along the river banks for fishing and having picnics were a common event as Ron's daughter Bridget remembers:

Mum used to invite the nuns out quite often for picnics along the river. They'd come out and they must have stayed overnight. It was quite amusing, because our governess took her clothes off in front of the nuns to go and get the bull out of the river. We thought that was very naughty. We used to go on these picnics along the river and go fishing and swimming. I remember us going fishing quite a lot. Dad would take us. We'd get into trouble, because you weren't allowed to make noise while you fished.

Fishing was often a family, as well as a social, event.
Photo source: Gordon Warner.

Visions for the Paroo

The fishing people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

Stock management

Donald Cooney was born in the 1930s and grew up on 'Turn Turn' with his eight brothers and sisters. He and his wife Faye lived in the Paroo River district most of their lives, raising their three children, Alan, Donna and Stacy and running sheep at Wittenburra, an hour west of Eulo. They fished the Paroo and the Warrego rivers and saw how it changed over their lifetimes. Donald remembers:

> *We lived on it for a long time. And it was in the early days – it was useful mainly from a stock point of view, for the water. You had to have water during drought. The stock route ran along the river. In those days we had no trucks to move the stock away from the drought. Mobs of drovers took mobs of stock along the river, they walked along the river.*
>
> *They just absolutely devastated along the edge of the river. That was one negative – the fact that the stock route was right on the water. It was detrimental to the river's health because of the huge movement of stock up and down the stock route. The best thing that ever happened to the river, of course, was the fact that trucks finally took over and there was no need to travel stock along the route.*

Ron Heinemann lived not far from the Cooneys on his family property, Springvale. He remembers the impact of stock on the river differently:

> *The banks of the river have not changed either. I wouldn't say so, no. A lot of people say that stock watering is damaging in the water holes, but I think the floods clean that out and take care of that.*

Colin Leigo has seen how the riparian vegetation has changed with changes in agriculture. He noted that after dairy farming declined, lignum vegetation along the riverbanks increased because it was not being eaten by the cows. Colin has worked with the Western Catchment Management Authority to fence about 12km of the river on one bank on his property.

He uses the fence line to manage the herd for grazing rotation rather than preventing access to the river and riparian vegetation.

State of river: 'moderate – good'

The Sustainable Rivers Audit (SRA) is an ongoing systematic assessment of river health of 23 major river valleys in the Murray-Darling Basin. Environmental indicators (themes) include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.[4]

The Paroo Valley was surveyed in 2006. The Paroo Valley fish community was considered in Moderate Condition, and Ecosystem Health in Good Condition. 58% of predicted native species were caught, comprising most of the total catch (97%), and 78% of the total biomass.

Catch was dominated by bony herring, with golden perch, Murray-Darling rainbowfish and Spangled perch also common. Carp dominated the alien species captured, with goldfish also captured.

Dry times

For Colin, managing stock in the arid zone meant keeping a close eye on their water and observing its permanency in the river.

Colin noted some water holes would go dry after 20 years or so for a short period but then fill up again. The longest he recalls the water holes going dry was during the 2003-2004 drought when he had to cart water for about three months. Prior to this Colin carted water for the stock for about six weeks in 1965 and remembers helping his parents to cart water for a while in 1958 – illustrating the long dry periods that can be experienced in the Paroo.

Benefits of floods

Ron Heinemann remembers how crucial the floods were to maintaining the lakes and off channel areas of the Paroo:

Lake Wyara is a fairly big fresh water lake which the Paroo will run into it during any big flood. It's five miles across. The river will go up to the other lake on the western side, which is a salt lake. I have camped there. And the birdlife that comes in after dark, the noise, the swish of their wings coming in from the salt lake to the freshwater lake to feed - that's something to hear. We're talking about a very wide range of birds. Pelicans, swans, ibis, you name it. I've flown over twice and the bird life there is colossal. They are obviously coming in to feed on the fish and other things. There'd be a lot of fingerlings.

Floods changed the whole landscape and as the water subsided, Ron knew where to find the fish:

Well, you go along a certain distance and it would be quite a fair water hole. Then there's nothing for miles, only just channels and small water holes that dry up fairly quickly. Right along the Paroo there's a series of larger water holes that are permanent. And it's in those holes that you go fishing that the fish congregate in.

Being a keen fisherman, Ron joined the local fishing club. He recalls restocking native fish into the Warrego River:

In 1985 I joined the fishing association in Cunnamulla. We did put 2 000 Murray cod fingerlings, about three to four inches long in the Warrego River below Cunnamulla. When we let them go, they just dispersed in a flash into the water, out of their plastic bags. And some ten years or so later you'd hear of a 20 to 30 pound cod being caught.

Declaration of Ramsar sites

Three major wetlands within the Paroo catchment have been protected under the International Ramsar convention, protecting the ecological integrity (flora and fauna diversity, including native fish populations).

One of the wetlands, Currawinya National Park, was included within the International Ramsar Convention in September 1995, and the Nocoleche Nature Reserve (approximately 180km west of Bourke) and part of the Paroo - Darling National Park (240km south west of Bourke) were included in September 2007. Their total area within the Paroo catchment covers over 280 000ha.

For more information go to http://www.environment.gov.au/water/publications/environmental/wetlands/paroo-river-factsheet.html.

Detail from the interpretive sign at King Charlie's Waterhole, within the Nocoleche Nature Reserve. Utilised by Aboriginal people for tens of thousands of years, this waterhole also played an important part in the development of Nocoleche Station in the 1880s.
Photo: Greg Ringwood.

Culgoa - Balonne

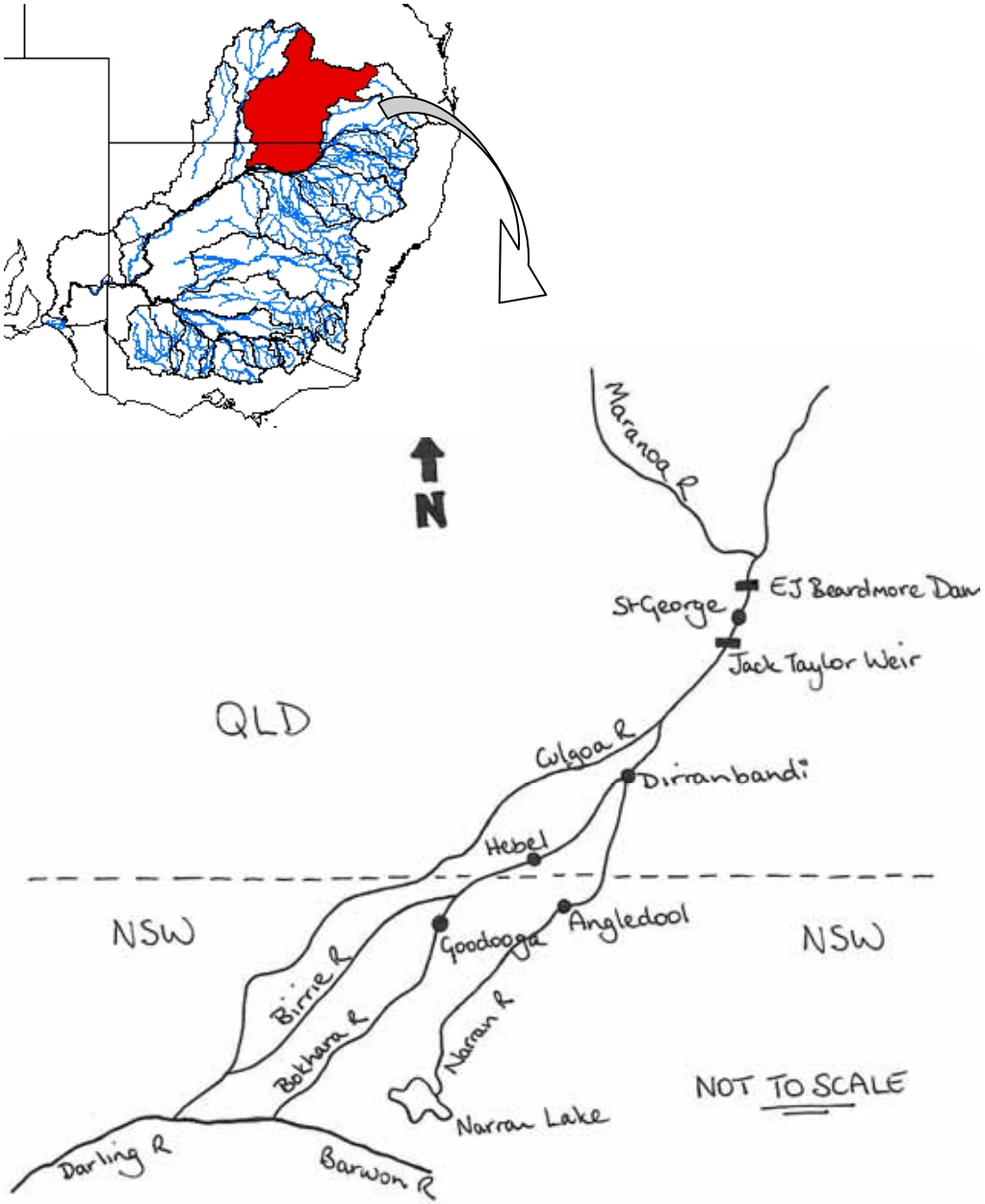
Source: Pop Peterson.

Source: Robert Worboys. Bob Worboys and wife with cod caught from the 'Garden Hole' in 1951.

Source: Pop Peterson.

Source: Pat Cross. Children after swimming.

Source: Greg Ringwood.



Ned and **Lynette Underwood** live beside the Balonne River, calling it their "little piece of paradise". Photos: Greg Ringwood.

Roy and **June Barker** now live at Lightning Ridge, but both call themselves river people. Photo: Jenni Brammall.

Robert Worboys (left, pictured, in 1957), **Keith Codrington** and **George Thomas** are some of St George's fishermen. They have fished the Culgoa-Balonne catchment for over 50 years. Photo source: Bob Worboys.

Rory Treweeke (right) likes to observe the floods and the way the floodplains get inundated. Photo: Greg Ringwood.

'The Balonne River is well known as the home of the big Murray cod, and this excellent fresh river fish has been biting freely at different periods this year.'

The Brisbane Courier, 29 May, 1922

'The Culgoa is as twisty as a ram's horn, and so narrow and the trees interlock so closely over the water that we had to take down the mast to get along.'

R.C.Minter and R.H. Webster, The Advertiser, 26 May, 1934

Introducing the river and its people

The 123 000 km^2 catchment of the Culgoa – Balonne Rivers is semi-arid with a highly variable rainfall. The rainfall is reflected in the rivers' flows which often cease for long periods of time, sometimes for up to a few years. During such prolonged droughts only very large waterholes continue to hold water. When the rains are good, the whole floodplain may turn into a slow flowing river around a metre deep.

Geographically the Balonne is an extension of the Condamine River and starts near Glenmorgan. It flows through gently undulating country before reaching an expansive flat plain where it splits and forms several smaller rivers including the Culgoa.

The Culgoa River twists and turns across the floodplain and through coolabah woodlands before flowing into the Darling River between the towns of Brewarrina and Bourke.

These rivers are significant to the Bigambul, Kooma, Muruwari, Gungarri, Mandandanjii and Gamilaroi people who have traditionally lived, fished and told stories about these rivers and the life they support.

The reach of the Culgoa, and its floodplain, adjacent to *Brenda* homestead. Photo source: Pop Petersen.

Shared landscape-shared stories

Several Aboriginal language groups shared the inland delta system created by the branching of the Balonne River. The Bigambul, Kooma, Muruwari, Gungarri, Mandandanjii and Gamilaroi people[1,2] relied on the rivers' rich resources of fish, mussels, yabbies, birds, aquatic plants and grass seeds to survive[3].

These groups found a way to share this area equally between each other, especially during times of drought when clans would need to move between river systems in order to find water.

This strong connection to the rivers and land meant the rivers have a deep spiritual significance as pathways for important creation stories – variations of which were shared between the groups.

Some of the Aboriginal relationships with the river can still be heard in some of the local town names. For example, Dirranbandi means 'frogs croaking in a swamp at night' and Mungindi was named from a word meaning 'digging for water place' in the local dialect[2].

A child 'running the flood', celebrating the arrival of the flood's leading edge down the Culgoa River at Weilmoringle. Image source: Merri Gill 1996.[14]

The arrival of the Europeans

After the area was first crossed by Major Thomas Mitchell in 1846[2], the rich alluvial soils drew a steady stream of settlers toward the Culgoa – Balonne.

The first two grazing licences were issued in 1848. The Balonne River floodplain's heavy, sticky, black soils created excellent conditions for pasture growth and forming rich grazing land.

The area soon developed a reputation for its sheep and wool production, and runs of over a million sheep were requested[4]. As the need for workers increased, Aboriginal people gained work as stockmen, allowing them to maintain their connection to Country.

In the early days properties were very large, the smallest being around 10 000 acres to help survive the long droughts. Slow flowing, large floods were seen as a blessing rather then a curse as the floodplains soaked up the water and grew lush nutritious pastures[1].

Water security remained an issue in the early 20th Century. The relatively undisturbed Culgoa – Balonne prior to the 1950s underwent major changes from the 1950s and 1970s and through to the 1990s. Major water storage works were constructed and increased capacity.[1,2]

'Boating' in washtubs on the river. Photo source: Pat Cross.

As well as private landholder investment, the Queensland Government also constructed the first large dam at St George as a pilot to supply water for irrigation. When the project proved successful, a weir ten times larger than its predecessor was built.[1]

The area became a major irrigation area, although, like elsewhere in the Basin, this has come at the cost of problems associated with high native salt loads[5].

Today the locals continue to use the river for recreational activities including fishing – the residents of St George say it's the fishing capital of inland Queensland[6].

Weilmoringle waterhole

The Weilmoringle waterhole. Image source: Merri Gill 1996.[15]

The Weilmoringle waterhole on the Culgoa River was an important place for the Muruwari people. Its spiritual significance was connected to their rainbow Serpent creation stories.

European settlers were attached to the waterhole's relative reliability and by the 1850s it was being used to water stock. Weirs followed in the 1880s and the first artesian bores were sunk in the 1890s. The pastoral camp grew into a self-contained homestead, with its own butchery and telegraph office.

By the 1970s there were more demands on water than could be met, despite ongoing development of weirs and bores.[15]

By 2004, Weilmoringle Station had been purchased by the Aboriginal Lands Trust for the Muruwari People.[16]

Ned and Lynette Underwood – *belonging to the Balonne*

Ned and Lynette Underwood live at *Warroo*, a sheep and cattle station that Ned's grandfather bought in 1890 after the flood of the same year.

Ned was born on the station, Lynette came to live there after they were married.

Fishing from an early age

Ned was born in 1932 and has fished since he was about nine years old.

> *You set your lines, which always had a cork on. You'd see your cork bobbing and hope it disappears then it'd give you a thrill.*

Back then Ned used cord line, not the clear nylon used today. Ned doesn't think it matters much.

> *We'd still catch them on the cord line. I don't think the fish looked at the line. They only looked at the bait.*

Ned caught mainly yellowbelly, jewfish and the occasional silver perch, which he calls black bream.

He never caught many cod – the biggest one being 20 pounds. Ned recalls the ease at which he caught a feed:

> *You'd go down and in a couple of hours you might catch half a dozen fish. A couple of good meals. I used to go every week, sometimes twice a week. You see, it was a good pastime. You know, you made your own pastime in the bush.*

Ned soon got to know the best way to prepare and cook his catch:

> *I'd just fry yellowbelly. Didn't skin them, just scale them. Skinned the jewfish* [catfish]. *We didn't even bother using the black bream - we usually threw them back into the river. I never tried bony bream. Never caught a bony bream or never heard of anyone catching a bony bream on a line.*

Ned at home beside the Balonne. Photo: Greg Ringwood.

Bony bream

(*Nematolosa erebi* – bony herring, pyberry, hairback herring, melon fish, thukari)

Photo: Gunther Schmida.

- Medium sized fish to 47cm, but commonly 12-20cm
- Widespread and abundant throughout the Basin, mostly in lowland rivers
- Hardy fish tolerating high temperatures, high turbidity, high salinity and low dissolved oxygen, but don't like cold water temperatures
- Spawn from October-February in shallow, sandy bays
- Migrates upstream when as small as 2.2cm
- Eats algae, detritus, microalgae and microcrustaceans
- Important food source for large fish (cod, golden perch) as well as birds (pelicans and cormorants)
- Threats include cold water pollution and barriers to fish passage

A little piece of paradise

The river was Ned's little piece of paradise. It always had water, rain or drought. When he was a kid Ned and his family used to go to the river to swim.

> *We'd have picnics occasionally and we'd all go swimming. We've got about 12 mile of river frontage. There was plenty of water, even in a drought. In the biggest drought you'd never go more than a quarter of a mile without water. The amazing thing was these water holes got down to a certain level in drought and they never went down much further. I think there must have been underground springs keeping them full. We learnt to swim there.*

Ned also spent a lot of time in the river with his brother Dick whenever he had the chance.

> *When we got a bit older, nine or 10, Dick and I would go ourselves every afternoon. We were taught early, be responsible and not to go near the riverbed when the floodwaters were running. So keep back from it. I'd go down there and paddle in, playing in the sand and – it was a wonderful life.*

Water baby

Lynette was born in 1931 and, as she says, is one year older and one year wiser than Ned.

Lynette recalls family life on a changing river:

> *Ned and I lived over the river, at Yarran Downs, when we were first married. When I took my second baby home we had to be boated over the flooded river.*

Ned came to learn the easiest – and safest – ways to cross a flooded river:

> *There are two ways of rowing across the river in a flood. If you angle the boat, the nose of the boat upstream in the water just right, you can go virtually straight across, but you're rowing all the time. If you turn side on the stream will just take you. The other way is to take off and pick a spot down about 50 yards on the other side that's open and just go with the stream.*

Shrimp, mussels and middens

Ned recalls that the river had plenty of mussels:

> *Mussels were fair bait but not as good as shrimp. You used to get them in the river. They're still there, mussels. I don't know if they're in the same quantity.*

He used them as bait but prefers to use shrimp as he thinks they are better.

Shrimp

(*Macrobrachium australiense, Paratya australiensis* – glass shrimp, *Caridina mccullochi*)

Paratya australiensis. Photo: NSW DPI.

- Three species common in the Murray-Darling Basin, often forming a large proportion of the invertebrate biomass[12]
- *Paratya* and *Macrobrachium* also known from coastal drainage systems and estuaries[13]
- All widely distributed within the Murray-Darling Basin but numbers and species proportions vary between catchments[12]
- Found in different habitats including main river channels, backwaters – associated with submerged vegetation, silt/muddy bottoms and snags[12]
- Feed on decomposing plant material and algae
- Females brood eggs under their tails like yabbies
- Fast growing and breed in Spring/Summer[13]
- *Paratya* and *Caridina* live for 12 months, *Macrobrachium* for 2 years[13]
- Loss of backwaters, floodplains and billabongs are likely to be their biggest threat

I can remember the shrimp bucket, a bit of meat here, down to the river, put your shrimp bucket in. You only had to wait a few minutes and you had a few shrimps.

Mussel middens are also common in the area according to Ned, a reminder of the importance of the river to Aboriginal people.

There are a lot of middens around here too. That was heaps of mussel shell. The Aborigines used to eat the mussels, and where they had their feeds they'd throw them in a pile and they were known as middens.

Straight from the river

Ned and Lynette remember in the early 1900s the water was considered so clean the locals got their drinking water directly from the river … although you had to be careful. Lynette says:

You had to have a good look first to see there wasn't a dead beast a bit further up.

Ned replies:

It's never killed anyone that I've heard. You'd go down to the river and get a bucket of water. Before about 1940 we had big log over the water hole and we had one of those little hand pumps.

Middens

Midden at Lake Mungo. Photo: National Archives of Australia A6135/1.

Mussels were an important part of the aboriginal diet of this area as is evident by the large numbers of shell middens found along the rivers and floodplains. Numerous artefacts, including clay ovens, quarries and scar trees, are also found near the shell middens.

There is evidence of the mussel species within the shell middens changing over time, from a flowing water species towards lake species. Bones found within the middens also show a shift from aquatic foods towards terrestrial animals in more recent times.[14].

Water storages

To improve water security many properties including *Warroo,* built large dams to catch floodwaters. This allowed for irrigated crops, but as Ned explains, it led to other changes:

In those days there weren't many kangaroos out there and they didn't congregate because there wasn't any permanent water. It wasn't until 1939 that the ring tank was put down in Warroo *and there's been a big difference – it's built up the kangaroos. I used to do a lot of kangaroo shooting when I was young and seven or eight kangaroos in a day was good. Now you'd get seven or eight before breakfast.*

It was a beautiful river

The push for improved water storage wasn't just on individual holdings. Beardmore Dam was constructed from 1968-1972 in an effort to open the area to irrigation. The scheme proved very successful but the changes weren't always for the better. Ned recalls:

The river was just a beautiful river. One of the prettiest rivers you'd find anywhere. All up here in Warroo*, you'd be seeing sandy reaches and waterholes and plenty of gum trees and tea trees. It's still a nice river. It gets better as you go up. Right here, you might have noticed a lot of dead gum trees and dead tea trees. Soon after the weir came in they started to die. They like to be near water, but they don't like their root system under permanent water.*

Drowned trees on the Balonne. Photo: Greg Ringwood.

Roy and June Barker – *continuing the traditions*

Roy Barker was born on the old Brewarrina Mission in the late 1920s and he lived there until the early 1940s. He is from the Murrawari people on his father's side and the Bogan Wiradjuri people on his mother's side. June was born in 1935 on the Cummragunja Mission on the Tongala (Murray) River. Her father was a Wiradjuri man and her mother was a Yorta Yorta woman.

River people

Both Roy and June call themselves river people. Roy started fishing when he was about 6 or 7 years old. June learned the language, customs, legends and stories of the Ngemba people while she was at the Brewarrina Mission on the Barwon. They spent most of their time near the river.

> *The beautiful river. Always beautiful clear water, and we'd be fishing every day and swimming. The girls had their special place to swim, and the boys had their place to swim. We weren't allowed to swim together. And all along the river, the women would be fishing, nearly every day. That was our means of surviving, too.*

Hooks like gold

Roy says Aboriginal fishing with line has a long history. Before European contact, he says, the lines were made of spun and waxed possum fur. Hooks were made of shaped bone. By the time he started fishing they were using introduced fish hooks and, as Roy tells it, these were valued possessions:

> *They were like gold. In the cold winter months some of the old women would throw in and get their line snagged on a log seven or eight feet down under the water. They'd sing out to us, 'Come on, you boys, go and get in there now and try and get our line off'. They'd have a big fire going there for us and we'd strip off, right to our shorts, dive right down and follow the line and unhook the hook off the snag. And we'd come out and warm up by the big fire.*

Home made fishing gear was common amongst the non-Aboriginal fishers too in the 1930s and 1940s. Not only hooks made of wire but also the line they used, as Keith Codrington explains:

> *Those days there was no such thing as nylon line. You bought what they called Irish Linen. It had a two hundred pound breaking-strain.*

Roy makes fishing spears, continuing a tradition thousands of years old. Photo source: Roy Barker.

Knowing the fish

By fishing from such an early age Roy got to know the names of the fish and the ways to catch them.

> *Cod was the Goodoo. Catfish was the Mungulla. Yellowbelly, that's Gulidah.*

There are many ways of catching fish and knowing the behaviour of the fish you want to catch helps.

Roy explains how they would catch 'Mulgu':

'Mulgu', he's a small, spotted native fish, something similar to a cod. He never grew any more than about 10 inches long. He used to always be in the weeds. He'd never venture out into the deep water because other fish would grab him. When the bigger fish went off biting in the cool weather we used to cut a big forked stick about 8 feet long, with a fork on the end of it. We'd plunge it down into these weeds, twist the weeds around and it would all gather around the forked stick. We pull the weeds up and get the shrimp and two or three of these Mulgus.

A nibble isn't a nibble

A good fisher knows what fish is biting at the end of the line before it is landed. Roy can tell from the way the fish nibbles the bait.

If he was a cod, he'd just touch the bait for half a second and he was gone with it straight out. A yellowbelly'd nibble at it for a while before he'd take it out slowly. The catfish had another bite, and the black bream, he was a little, quick nibbler. You'd pull the line two, three times, next minute you'd hook him. You'd know exactly when to pull the line and you'd get him nearly every time.

Shrimp were caught by hand. When June was young catching and eating shrimp was part of being by the river.

Mulgu?

(*Mogurnda adspersa* – purple spotted gudgeon)

Photo: Gunther Schmida.

- Other names – Southern purple spotted gudgeon
- Attractive, small robust fish, maximum size 15cm, commonly 6-12cm
- Usually associated with good cover such as rocks and cobble in Qld part of its range, and aquatic vegetation in the southern part
- Found in slow moving or still waters of creeks, rivers, wetlands and billabongs, prefers slower flowing, deeper habitats
- Undergone significant decline in the Basin
- Current distribution limited with records after 1980 from upper catchment in Qld, Macquarie and lower Murray (near Mildura, Vic/NSW, and Murray Bridge, SA – where it was thought extinct)
- Spawn when water temperature is greater than 20C, laid on a rock, log or plants
- Male guards and fans the eggs
- Threats include interactions with alien species (redfin and gambusia) and fluctuating water levels associated with river regulation are thought to be part of the reason for their decline

We'd go with the old aunties and us girls'd sit on a log. You'd dangle your feet in the clear water and feel the shrimps biting you. You go down really slow and grab him. If he was a nice shrimp, you'd just break his head off, peel him and eat him raw. He's sweet - sort of a salty sweet. When you tell the kids this they go 'Yuck'. But that's how it used to be.

Mussels were also common in the river and used as bait as well as food. June remembers:

The old women would say, 'Go and find some bait now, you girls.' You'd go along on the edge of the water, feeling with your feet. You felt a mussel and your toes just rib around him, pull him up.

Roy explains how to cook them – as long they'd been caught when the river was clear, because when the river was muddy they'd have a muddy taste.

They used to cook them on firesticks. You'd get a firestick that was blazing then you'd open your mussels up and you'd put them all along on the firestick.

Subsidising rations

The river has always been an important source of food for Aboriginal people. It became even more important when food on the missions was rationed and agricultural development changed the landscape and the

river. People on the missions struggled to feed themselves properly. Roy says the river provided an alternative.

When the land was taken our people had nowhere to forage for food, they had to depend on government handouts. The introduced animals were much easier to come by than the native animals. We became much skilled at dressing the sheep up in the darkest of nights and be gone with it. So we had to subsidise, if you like, through other means of living besides our rations. The river was one of the main sources of food there at the time, with the fish in abundance, fresh water yabbies, big blue yabbies, shrimp, and things like that.

Some fish are better than others

Catfish was one of Roy's favourites and in the past there were plenty of them to catch.

We used to catch 15 - 20 pound catfish. When the water came down muddy, if there was a big rise in the system upstream, this would stir the catfish up. You'd only catch catfish and no other fish. But they were beautiful eating.

But catfish come with spines. Roy reckons the smaller ones were either more poisonous or the spines were sharper.

They've got three fins, one on the top of the fish's body and two on the side. If it stuck into you, it would ache all day. You'd cry with the pain. The bigger ones weren't too bad, but the smaller ones seemed to have smaller fins on them or smaller spikes. They were much sharper than a hypodermic needle and went further into you.

For Roy, any fish is good eating except bony bream - that was the one fish they wouldn't eat. Roy explains:

He was full of bones. You could eat him, if you were careful. You had to be very careful or you'd get blooming chocked with bones!

You don't see them anymore

Roy and June remember a river full of plants, insects and birds. Although some are still around, others are either rare or have disappeared completely. Roy remembers water weed, dragonflies, water spiders and some birds, like sand pipers, that they don't see anymore. Of the dragonflies Roy says:

You know, there must be a half a dozen species. We had a little red one, you've got a blue one, which is a bigger fellow. Then you've got another one in between who was a different colour. But that's how they used to breed, down in these weeds under the water, and they'd come up on top then, with the other weeds that were floating, and that's where they'd hatch out, those dragonflies. We don't see them anymore.

A complex system

Rory Treweeke, Narran floodplain landholder and fisher, explains the channels that form the Culgoa-Balonne system:

The Culgoa heads down and joins the Barwon Darling between Walgett and Brewarrina.

The Narran then takes of just south of Dirranbandi, and forms the eastern most stream, which terminates in the Narran Lakes, again, between Walgett and Brewarrina.

The Bokhara and the Birrie are the two middle streams. The Bokhara runs into the Barwon River, just downstream from Brewarrina, and the Birrie actually rejoins the Culgoa just before it enters the Barwon.

At the point at which the Culgoa enters the Barwon is actually where that river changes its name from the Barwon to the Darling.

Culgoa River at Brenda Station near Goodooga. The expansive floodplain of the Culgoa-Balonne and its rivers are all interconnected. Photo source: Pop Peterson.

Keith Codrington, George Thomas and Robert Worboys - *St George fishermen*

Bob with cod caught from the 'Garden Hole' in 1951.
Photo source: Bob Worboys.

St George fishermen Keith Codrington, George Thomas and Robert (Bob) Worboys have been fishing in the Culgoa-Balonne catchment for over 50 years. They have seen many changes in the river and have had a lot of great fishing experiences.

Catching cod

Like a lot of fishermen, cod are one of Keith, George and Bob's favourites. Keith and George remember a story of one particularly crafty cod:

> Keith: *George Ward used to go fishing and he kept getting his line broken. So he set a hook on the end of a clothes line. Rope. And it broke that. You could see the fish swimming along and dragging this cord behind it.*
>
> George: *I think eventually they did catch it. I don't know how much it weighed but it was breaking all their lines. Actually broke a clothes line, broke.*

Bob says back before nylon line was invented, you had to use all sorts of different materials.

> *In those days there was no such thing as nylon line. You bought what they called Irish Linen which was braided and had a two hundred pound breaking strain.*

And what you did with the fish when there was no refrigeration.

> *The biggest fish I caught was up at the junction. Took me about an hour get him and I had him tethered two days. He dressed over seventy pounds.*

Clear water

When he was young Keith remembers how the river would clear over spring and into summer. Clear water meant spinners could be used at a popular fishing spot called the 'Garden Hole' - a large hole in the river south of Beardmore Dam.

> *The water probably started clearing about September, then you could spin through until about January. You'd catch cod, anything, any size at all, catch 'em up to fifty pounds, sixty pounds.*

Spinners have long been a popular way of catching fish - the flashing of the blades attracting the fish. But, as Keith says, the fish have to be able to see the flash:

> *You gotta have clear water. Olden days you could see down 6 or 8 foot. You could see the cod laying down on the log sometimes if you were lucky enough.*

Bob also remembers having no trouble catching a feed or being able to see great sights underwater at times but laments these times may have passed.

> *Years ago you could go down to the river and if you had a tin of worms you'd have no trouble catching a bag of jewfish or black bream. When the river was clear, you'd go down and you'd see shoals of them. 300 fish, maybe more …. not no more.*

Rory Treweeke, another local fisherman and keen observer, has noted a certain order to the way the rivers cleared:

> *Certainly in my lifetime the Culgoa seemed to be the river that became clear enough for spinning first. On occasions some of the big waterholes in the Narran would be the same.*

Muddy water

While Keith, George and Bob remember the river as having clear water, over the years turbidity has become a problem. George thinks that is due to introduction of carp.

If we didn't have a lot of rain for 2 to 3 months, it'd get that clear you could see the bottom of the river. Now since the carp have come up this far I have never seen the water clear like that ever. And how long since that? About 1950s the carp came.

Bob also believes there is a link between the arrival of carp and the loss of water clarity.

Before the carp came I've seen this river run to 39 feet deep. Not once, but a few times. Once the flow settled down, then after a couple of months it'd clear. Never cleared since the carp've been here.

But for Keith, the problem is a bit more complicated. Other things contribute to the problem of silting and turbidity he says.

It could be the carp. They probably have a big bearing on it. The other thing is we've got the structures across the river length. Before building of the weirs, there used to be little flows that came through, like a little brook and it sort of cleared and was kept cleared. But with the structures, when it comes down and if the turbidity is still there, it doesn't really matter. You know I'm still at a loss to say whether its nutrients in the water, it's the carp, or the actual flow of the river itself.

Shifting sands

Changes in the river are sometimes evident over a long time frame – others happen quite quickly. One of the changes observed by George was associated with construction of the Jack Taylor Weir in about 1953 and its impact on water flows. George saw an immediate change in the river below their house:

In the middle of the river below our house was a sand island with two trees, probably eight or nine inches through. We could see the tops of the trees and used to gauge how high a flood was by the trees. I remember the first flood after the Jack Taylor Weir was built. We were waiting for the trees to show up and they didn't. The whole island and all the trees and everything were completely washed away. After that first flood that island vanished. It's never been there since.

Keith has seen some of waterholes completely filled with sand, which he thinks is also probably due to the Jack Taylor Weir.

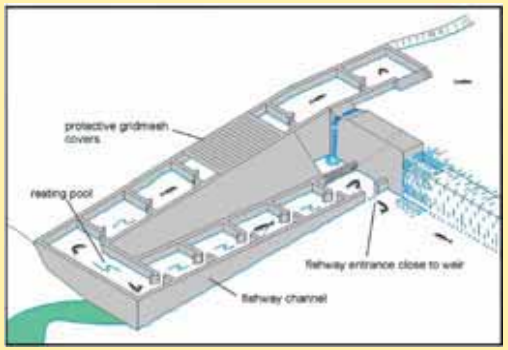
Mainly you'll find that in the lower reaches, at the bottom of the dam, especially at the Jack Taylor Weir, the sand has just shifted and it's only from the weight and current.

Dam impacts on fish

Beardmore Dam (pictured) and Jack Taylor Weir have both changed the Balonne. Photo: Hamish Sewell.

- Native fish have evolved to breed when there are 'freshes' (flows)
- Dams modify the pattern and seasonality of water flows and even out the flows, so fish don't get the signals to breed
- Fish, such as Murray cod and golden perch, migrate to breed - if they are able to, these fish can travel hundreds of kilometres
- Dams and weirs interrupt fish migration
- A dam wall and height difference created in water levels up and downstream mean dams are impassable barriers to our native fish
- Fish need a temperature signal to spawn
- Water released from large dams can lower the temperature of the river for hundreds of kilometres downstream. Known as 'cold water pollution' this also disrupts native fish breeding

Fishways (fish ladders)



Vertical slot fishway. Image: NSW DPI.

- Fishways allow upstream fish passage past low level weirs that are less than 6m high
- Fishways act to overcome the height difference in water levels up and downstream of a dam by providing a gentle gradient using a series of small rises and resting pools, allowing fish to "step" their way up and over the barrier
- There are various fishway designs, the most common in the Murray-Darling is the vertical slot Vertical slot fishways comprise of a series of concrete boxes – each slightly higher than the previous - that hold water to create pools
- A slot at either end of each box controls the amount of water passing through and water height difference between successive boxes
- Fish must swim fast as water falls through each slot, being able to rest after reaching the next pool
- Fishways can be designed to suit the swimming ability of particular fish species present

The sediment is just picked up and moved and it might almost envelop or fill in a hole that was once twenty or thirty foot deep. After the flood, it absolutely changed the whole face of that hole. There may not even be a hole there. And when I'm talking holes, they could be anything from fifty to a hundred yards long. But they've filled up with sand.

Bob notes that some of the damage downstream of Jack Taylor Weir may have been due to the way the water was managed in the early days:

Down below the weir, when they used to manipulate the water and dropped it from 100 thousand down to 40 thousand megalitres, that'd let everything just drop underneath: fall. The big trees would drop. And the next thing you knew the holes were getting clogged up with sand.

Carp

Although not willing to completely blame carp for the water quality issues, Keith thinks carp is the major culprit for the loss of the aquatic weeds.

Where there used to be weeds up the river – they're not there no more. The carp must've chewed them out. The problem with the carp is that they're bottom feeders. So if you've got a bank with a straight drop off, I've seen them there by the hundreds and they're just nosing at the bank and sucking at the bank.

Roy Barker also believes the river at Brewarrina has changed over the years, particularly due to the introduction of carp.

Whenever we go down there now to Brewarrina, the river looks dead to us. There's no life in it. And the weeds are all gone. We believe this is so through the introduction of the European carp. In my view, carp have done more damage than the rabbits. They've undermined the big gum trees, and once these trees fall in, they take a quarter of an acre of bank with them, which is clogging the system up.

Roy believes that carp not only impact the river by creating erosion but also by affecting the native fish.

They've cleaned all the native fish eggs up and the fingerlings of the small fish that used to exist there in the thousands. We'd see thousands of these native fingerlings in a school of fish coming up the river. But, I think, they no longer exist. The native fish must be very good fish to exist or to go through that dark period of time and still be around today. Perhaps not so many, but they had a resistance, especially the cod and our yellowbelly.

Like Roy, George Thomas thinks the effects of carp aren't limited to turbidity and recalls noticing an immediate change in the sandfly population just after carp were noticed in the area:

> *After a big flood when the river went down and left the banks all muddy we used to get plagues of sandflies. This particular year, just after the carp were known to be in the river, I can remember the river went down and we didn't have any sandflies. I went down in front of our place and in amongst the grass and all amongst the banks it used to be a sheet of mud. This time it was just completely taken up with little craters. I think it was the European carp burrowing down in the mud, sifting through it, and taking out the sandfly eggs because we didn't have any sandflies that year. That's the only reason I can see for it. The whole bank was just a mass of these little craters.*

Mick Collier with cod caught in 1939. Photo source: Bob Worboys.

Carp – FAQs

(*Cyprinus carpio* - European carp, koi carp)

In the 1960s the strain of carp, 'Boolarra', was introduced illegally to Victoria and spread rapidly to all waterways of the Basin.

Can carp survive in mud or salt water*?*
No, carp cannot live in mud. They can tolerate a wide range of extremes conditions, including very low dissolved oxygen levels and half seawater salinity.

Are carp eggs carried by bird's feet and able to survive to be fertilised at any time?
No. Carp eggs only survive out of water for a short time and are usually attached to plants. Unfertilised eggs soon die.

Do carp undermine river banks and cause trees to fall into rivers?
Carp feed by sucking sediment into mouth, removing food (eg, insect larvae, crustaceans and some plant material), and expelling sediment out through gills. There is no evidence that they undermine banks.

Do carp eat native fish and eggs?
Carp may eat small numbers of eggs or larvae but these are likely to be taken incidentally. Carp are thought to increase turbidity and to compete with native fish for space and food.[7]

History of Carp FAQ

Why were carp brought into Australia?

During the early days of settlement many different types of animals and plants were introduced into Australia in an attempt to imitate a European environment. Carp were seen as a good sport and food fish.

When did carp arrive in Australia?

The first records of carp in Australia were from Victoria in 1859 and NSW in 1865 where they were released into ponds. During the 1900s carp were released into the wild but did not become widespread.

Many early newspaper accounts in the Basin around the turn of the 20th Century refer to carp being widespread and abundant, however these reports are referring to 'golden carp' or goldfish (*Carassius auratus*).

Carp spread in the Basin after they were released into the Murray at Mildura in 1964. Their release and spread coincided with widespread flooding in the early 1970s, but their use as live bait probably also helped.

Is there just one type of carp?

There are many species of carp, and the fish is widely farmed overseas for food. In Australia there are at least three strains of the one species, *Cyprinus carpio*.

Genetic studies have shown there were two strains in Australia prior to their expansion in 1964: the 'Prospect' strain in Sydney and 'Yanco' strain in the Murrumbidgee Irrigation Area. However it is the 'Boolara' strain from a farm in Gippsland that was released at Mildura and is now the most wide spread[7].

Rory Treweeke – *river observer*

Rory was born in the early 1940s and from the mid-1940s has lived on the Narran floodplains just north of the Queensland – New South Wales border. He owns *Angledool*, a large property in the area. When Rory was young he loved the river and the fish. He completed part of his education through correspondence which meant he was able to go to the river and fish regularly.

> *When I was a kid living at home doing correspondence I used to do quite a bit of fishing. Nothing sophisticated in terms of equipment. Just a hand line, with a hook and a sinker and probably a worm as bait. Yellowbelly and catfish were the main two that we were after and they seemed to be readily available, from memory, at the time.*

Rory found excuses to go fishing in the intermittently flowing river or in one of the permanent water holes. He was rarely short of other willing fishers to go with.

> *I remember frequenting the river a lot when the shearing team was at home because the wool presser and a couple of other shearers thoroughly enjoyed fishing and I used to go with them.*

They only took what was needed for a meal. It was a mile walk from the house to the nearest waterhole, so they'd carry the fish home in a sugarbag – being careful to avoid catfish spines poking through!

The elusive ones

A probable reason yellowbelly and catfish were favoured was discovered after talking with other fishermen.

> *Cod have always been the elusive one to catch and from talking to fisherman who love going after cod, there are only certain years when they seem to be able to get them, generally in winter time, after a series of pretty hard frosts. Now what the connection is, I don't know, but that seems to be the case.*

Sweet water

Although the Narran can have a lot of sediment, it is, according to Rory, good to drink. Rory knows how to use 'kopai soil' - a local soil that has a particular chemical in it which settles out the suspended sediments. Rory recounts how Aboriginal people would also use ash to settle the sediment, clearing the water for drinking:

> *The Aboriginals used to sometimes burn gidgee down to ash, then use the ash to settle the water. They'd put it in a container and use the water for drinking.*

Rory thinks the water is drinkable as it is:

> *I'm quite happy to drink river water. No problem. River water has a very pleasant, very sweet flavour. We don't have salinity issues in this river system. As far as I'm aware, chemical residues are virtually non-existent. So it very sweet water to drink.*

A different system

One of Rory's interests is observing the way rivers flow and floodplains get inundated with water.

> *It's interesting that one of the productive and environmental strengths of this system is that once these rivers get out onto the flood plain, they tend to vary very much in the size of the main channel. The majority of rivers, as they go further towards the ocean, generally tend to get a bigger main bed of the river. These don't. These fluctuate. Sometimes they actually contract as they go further down the system, which means that the water spills out over onto the adjacent floodplain at much lower levels than they otherwise would.*

Cleansing

The years Rory has spent observing the floodplain and its rivers has given him an appreciation of the good times and the bad.

Droughts are a necessity in our environment. They actually can have a cleansing, cathartic impact on the environment. In a commercial sense it's very difficult to manage through them. But they are part of what we have to live with and the sooner people realise that drought is likely to dominate one's life in these areas; the easier you will find to manage the country.

… Rebirth

Although in many parts of the country flooding is considered to be potentially disastrous, regular flooding is considered necessary in this part of the country.

I know that in the southern part of the Murray-Darling Basin, it's highly regulated and people probably do not want floods on their country. We look forward to floods here. They are the regeneration, the rebirth of the countryside. They replenish the moisture stores in our grazing land and in the floodplain areas that we crop. Floods in the public's mind are very often associated with damage and mayhem. Not out here.

Rory notes the link between the rivers and floodplain:

Our rivers are intimately connected to the floodplain. They need the floodplain to draw nutrients from. The floodplain is a place where a lot of the fish and other creatures do their breeding. So if you deny flooding to the floodplain, you will impact negatively on the health of the river.

The Cross family at the Angledool Weir on the Narran River. Photo source: Pat Cross.

Changes in flow

Rory has observed some major changes in the flow behaviour of the Narran River over the years. Some of the changes are associated with the development of upstream irrigation, which means the extraction of water from flows that would otherwise have come through unimpeded.

That has had a drastic impact – particularly the small and medium floods that we used to get. 2004 was the starkest example of that. A flow came through St George that, prior to development, we would have expected probably 4 to 5000 acres of flooded country. On that particular occasion, the water was flat out half filling the main channel. So it didn't get anywhere near spilling out onto the floodplain.

A long river to travel

It's not only the flow that has changed while Rory has lived on the Narran. Rory has observed newcomers to the area and the impacts on the native fish.

It's interesting that the European carp came into our system in the 1974 flood. They made a gigantic leap from somewhere down the bottom end of the Darling, right up to Dirranbandi-St George area and then came back down our system. The immediate effect was what appeared to be the total demise of catfish. There was a period for 15 – 20 years when they virtually seemed to have disappeared. But, over the last decade, catfish have certainly made a recovery. It's interesting that – and I'm no expert on fish – it would appear that the native fish have made some adjustment to the presence of the European carp.

Weeds, weeds and weeds

Other newcomers Rory has observed arriving in the area include plants called knotweed, parkinsonia and lippia.

We've got one thing called knotweed at the moment. It's built up over the last 10 or 15 years. It grows along the banks but spreads out into the water, is vigorous growing, covers the surface and is a pain in the neck. We know that there have been outbreaks of lippia here. I haven't seen any since this last flood, so I'll be interested to see whether it comes again. We saw it back in the mid-2000s, but with the drought here since, it hasn't poked its head up. We keep an eye out for it. We do have some parkinsonia. They're a very prickly bush and look a little bit like prickly acacia. We're bringing that under control by repeated poisoning of any new outbreaks. Unfortunately, the seeds remain viable for decades, so it's going to be a constant watching job probably for the next 20 or 30 years.

The love of the river

Even with the changes he has seen, Rory still counts his blessings, although his appreciation of the river is different to when he was boy.

As a kid, I think you're interested in the results of your fishing. Like most kids, I was impatient to catch something. I suspect that the contemplative value probably come as you get older. There is nothing more pleasant than just lying down on the bank of a river and listening – even if the river's not running. Just listening to the wind through the trees, listening to the birds. Watching some of the cranes, the herons, and everything else going about their business of picking up whatever it is they're interested in at the time.

Here on Angledool *we're lucky: we have an ephemeral lake and it's a superb piece of country. It filled for the first time for 16 years in the floods earlier this year. We've had swans and pelicans nesting there, we've had waders, ducks, egrets, terns, even the odd seagulls. It's a lovely area to visit.*

A sea of slender knotweed in flower on the Murray floodplain. Photo: Murray-Darling Freshwater Research Centre.

Weeds, weeds and weeds

(*Parkinsonia aculeate* – parkinsonia, *Phyla canescens* – lippia and *Persicaria* spp. - knotweed)

Parkinsonia (left) and lippia (right). Photos: http://www.dpi.qld.gov.au/4790_7332.htm and Milly Hobson.

Parkinsonia is a Class 2 pest plant in Qld, a Weed of National Significance and one of northern Australia's worst weeds. It is a flowering thorny shrub or small tree (to 10m) that forms dense thickets along and in waterways. Can be confused with species like native prickly acacia. Prevention of its spread is difficult as seeds are dispersed by water. Sightings should be reported and control is required by landholders.[8]

Lippia is a flowering groundcover, well adapted to floodplains and is extremely difficult to control. Lippia prevents the growth of other species by outcompeting them and quickly forming dense mats.[9]

Knotweed is the collective name for a number of species in the genus *Persicaria* that are native to Australia and other countries around the world. Several species are found in the Murray-Darling Basin and grow in wetlands and along river channels where they can grow into the water, forming dense mats and causing issues for irrigation infrastructure.[10]

Making connections

Legends protecting the young

To Aboriginal people the river hasn't only been a source of food and water – it was a social gathering place. But, as Roy Barker explains, the river has always been used according to the customs.

Some of the mythical stories told by the old people kept the kids in order. One story goes that we've got a place, a deep waterhole there in the Barwon, they call it the Mirriguna. Now Mirri means dog, in the Ngemba, and guna means hole, the water hole, big waterhole. At the moment this Mirriooligun comes out of the Mirriguna, he's the size of a domestic cat. As he goes up the bank he grows in size to a shetland pony. He was known because there's a mythical time to go home, that existed there, with the Mirrioola, there, at the time. And the voice sung out, "Time to go home." Of course, we never, ever heard that voice. Just before the sun got to tree top level, or perhaps the tree top level, late in the afternoons, someone would get a premonition, and sing out, "Time to go home." And we'd be gone.

Roy believes there is a more practical reason behind the legend. It is to protect children from unnecessary danger.

Even though it was a mythical story, the idea was to keep the kids out of danger before nightfall. When the whites first come into those areas there were cases of non-Aboriginal children being lost and drowned in that river system. But in all the years that we lived there, there was never any kids lost in the bush country, or any kids drowned. Even though it was a mythical dreamtime story, it was a good one.

Making a bark canoe

Trees scarred from making bark canoes are all along the river, but not always where you'd expect as Roy explains:

But wherever you go in the bush country, even miles and miles from any river country, any river, you'll see these scarred trees, these canoe trees, that are cut. They must have got torrential rains at that period of time and the country became flooded, miles from any river, so they cut them down on the spur of the moment and crossed the flooded country this way to another sandhill where there was wildlife. I couldn't see them carrying their bark canoes 10 or 12 feet long, 20 to 30 miles to any river.

Roy is one of those who still know how to make the bark canoes.

Two years ago, my two boys and I cut two big bark canoes, one for the National Museum in Canberra, and one for the Australian Museum in Sydney. That's the first time a canoe had been cut on the river country for 70 years. Our people cut the canoes from the straight river gums. There's only a certain time of the year when the sap is running that you can get that bark off. The moment you cut around there and break what we call the seal, that's the seal right around, and put a few wedges in, you can lift the bark off real easy. In the hot summer months is virtually impossible to get the bark off without breaking the bark up.

The whole town is fishing

According to Rory Treweeke, fishing and the river has always been a very important part of the social wellbeing at *Angledool* and Goodooga – a way of teaching children about the river.

The shearers knew where the waterhole was. I remember talking to one of the shearers from Goodooga who was saying that the relaxation for the town when the shearers came back from wherever they'd been working, would be to go down onto the Culgoa and spend the weekend fishing.

The majority of those people were Aboriginal. That was their way of continuing their connection with the country. Fishing was not only a good food source for them, but a way of being able to impart their knowledge onto their kids and just also spend a very pleasant weekend on the riverbank, enjoying the fishing.

Margaret (Pop) and Peter Peterson, who managed *Brenda Station* at Goodooga on the Culgoa for 27 years saw that the river was also vital to wildlife as well.

We used to notice wallabies on the other bank from the house, in a drought, would pull the duckweed in. And when they had a pile they'd sit there and eat it then they'd pull another pile in. Because we were on the other side of the river we could see that this was happening. It was a little swamp wallaby that used to do it fairly regularly.

As irrigation development blossomed around them, they also noticed the changes in the river, especially during flood times. Pop explains:

You still get the water flood at the same time. But the duration of the flood being on the country was dramatically limited because the water upstream was being taken into storage all the time. The water had to reach a certain height before irrigators were allowed to take water, but once it got above a certain height it was just free for all. That's when you just didn't have that peak for very long any more which was a shame because it would be on the country and off again and it didn't really have much time to soak in. Especially on the extremities.

Rory Treweeke believes some of the floodplain vegetation is suffering as a result, whereas others are okay for now:

The vegetation, depending on where it is on the floodplain and what the return interval is, has adapted to that regime. Where the small floods have been denied because of water extraction upstream, there has been a lot of coolabah killed, simply because of the lack of water. In the intermediate areas, there are signs of it dying, but some are holding on. Out on the areas that only get a flood once every 10 or 15 years, the vegetation, including the coolabahs, is still quite healthy.

Rory reflects that, for the Narran, it's lucky the river was not as desirable to the early boating industry.

It's never been a navigable river. So what snags were there, have stayed there. And, from that point of view, very good fish habitat, particularly in the large waterholes that are a natural refuge during the drought

Culgoa River at *Brenda Station*, Goodooga, during a dry spell. Photo source: Pop Peterson.

Culgoa River at *Brenda Station*, Goodooga, during flood. Photo source: Pop Peterson.

Visions for the Culgoa-Balonne

The people who contributed to this project have all talked about their hopes for the future of the river. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these people suggested ways to help the river and in turn help provide healthy habitats for fish.

Managing the flows

Like other landholders in the area Rory Treweeke is concerned about the amount of water being extracted for irrigation. Rory believes the finger of blame often gets pointed at particular industries like rice in the south or cotton in the north, but thinks there is a better way to look at water allocation:

Our water gets extracted by private irrigators who put it into large on-farm storages, which they irrigate from. Our main concern is that the Queensland Government has permitted far too much extraction on this system. I don't think it's a matter of a particular industry, it's a matter of understanding how much water can be extracted from a river system before you damage its ecological functioning.

Floodplain vegetation on the Balonne at Warroo Station. Photo: Greg Ringwood.

Rory also realises that better river management can also start at home.

What I would ultimately like to do would be to fence the river off from stock drinking on it, because stock don't have a good impact on the river banks and areas there. Cattle in particular tend to wander into the waterholes and defecate and urinate in it and puddle them up, which is not good. We have a pretty extensive frontage, so it's not a cheap exercise to do, but ultimately, I would like to fence off the river and provide water for stock so that the banks of the river and the riparian zone don't get impacted.

As part of a study on the economic and social impacts of reduced irrigation water in the Balonne Shire in 2010, one Aboriginal resident said it's important to find a balance:

We've got to look after it. It's our life, so we shouldn't be greedy about how much we take out. We need jobs but we need the river to be healthy, too.[6]

State of river: 'moderate'

The Sustainable Rivers Audit (SRA) is an ongoing and systematic assessment of river health for 23 major river valleys in the MDB. Environmental indicators include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.[11]

The Culgoa – Balonne was surveyed as part of the Condamine Valley survey in 2005.

In the 'Lowland Zone' of the Condamine Valley fish community and Ecosystem Health were considered to be in Moderate Condition. 50% of predicted native species were caught, alien fish were widespread and comprised just over half fish biomass (56%).

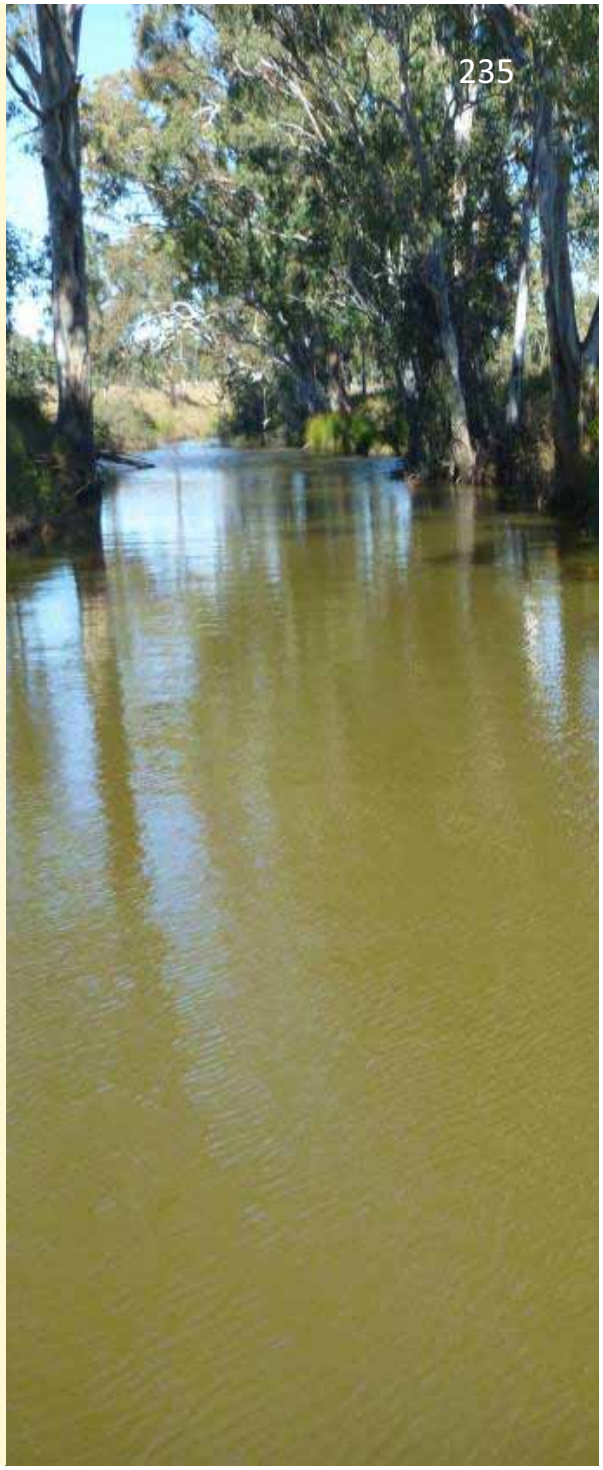
Bony herring, Australian smelt, golden perch, Murray-Darling rainbowfish were numerous. Carp gudgeon and spangled perch were also common. Three alien species, eastern gambusia, carp, and goldfish, were captured.

Upper Condamine

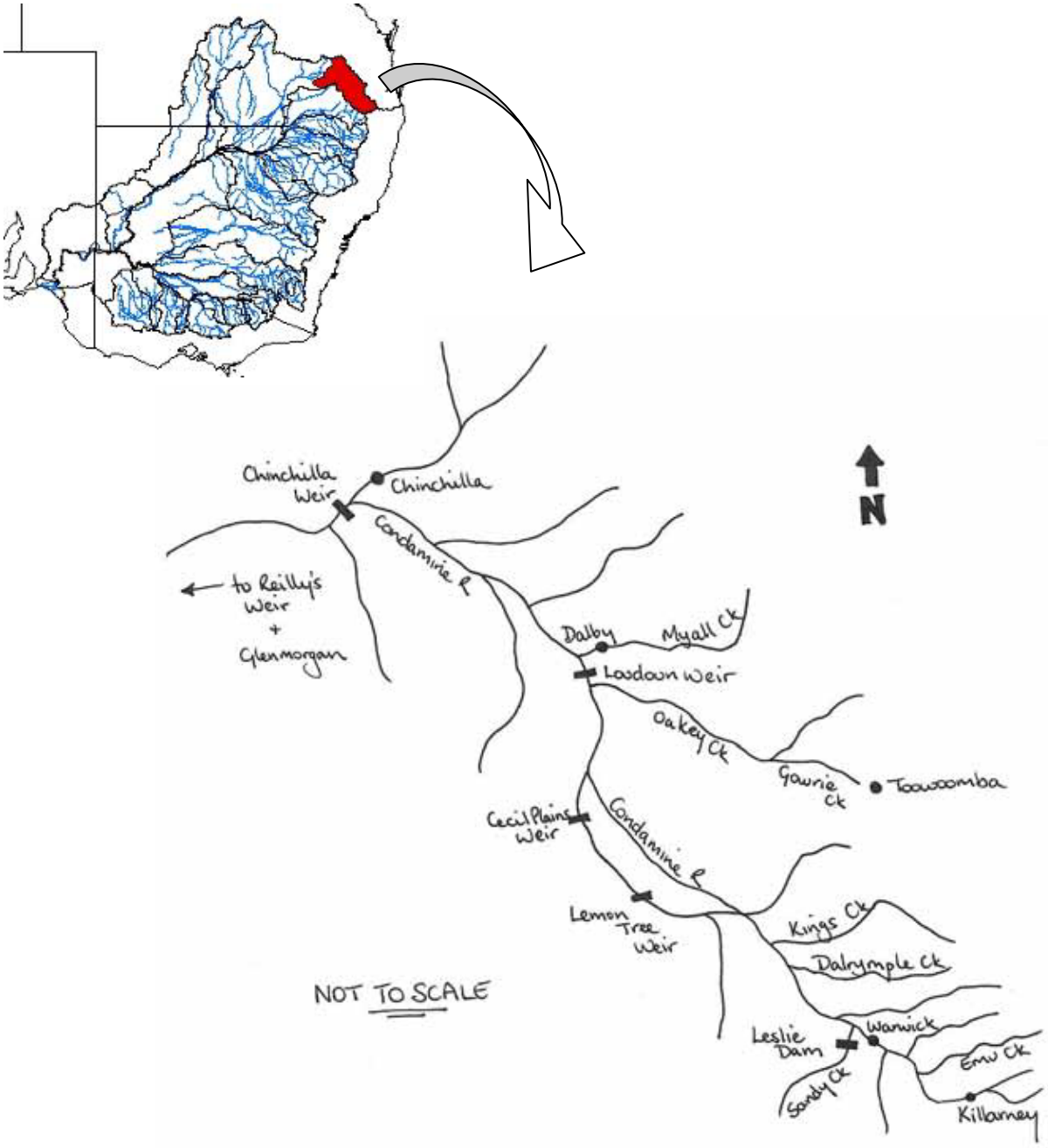
Source: Dessie Obst.

Source: Geoff Reilly.

Source: Greg Ringwood.



Source: Greg Ringwood.



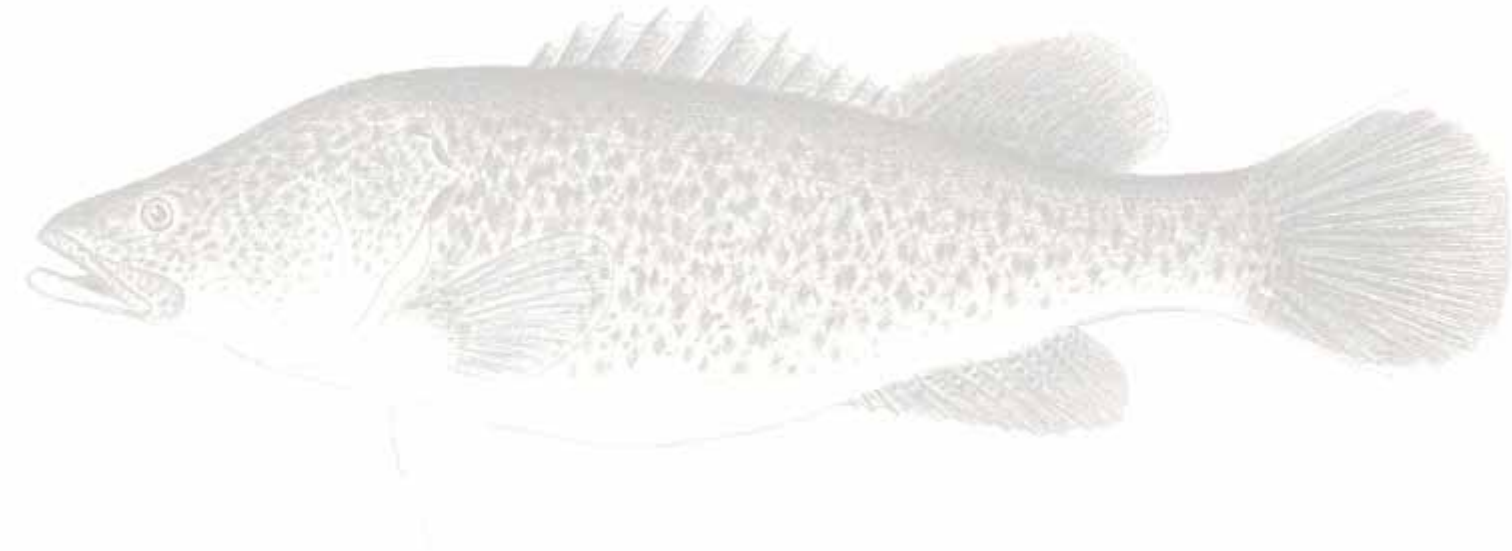
Brian Kuhn has been a resident, fisherman, fish stocking club member and Fishcare volunteer. More recently Brian has been involved in river restoration projects. Photo: Greg Ringwood.

Olive and Ray Shooter have lived on Dalrymple Creek for 48 and over 77 years respectively. In their younger years their lives revolved around the creek. Photo: Greg Ringwood.

Sam Bonner, Githabul Elder, is passionate about the Condamine. Sam is keen to pass on his traditional and environmental knowledge on to the children, to show them what the river means to him and his people. Photo: Greg Ringwood.

Noal Kuhl is a keen fisherman and fishing journalist. He is involved in the local fish stocking club and has undertaken local historical research to guide many river restoration projects in his area. Photo: Greg Ringwood.

The Condamine- a river system not just a channel, much of its water is underground you only see its power after a sudden downpour reinvigorates it.[3]



Introducing the river and its people

The Condamine River rises in the Border Ranges then makes its way along the eastern part of the Darling Downs region in Southern Queensland, becoming the Balonne River near Glenmorgan. The 13 000km^2 catchment is one of the major tributaries of the Darling River System.

Twenty thousand years ago, the Barunggam, Bigambul, Giabal, Kambuwal, Githabul and Jarowair people knew a very different Condamine River: a cooler climate, different plants and animals and, most importantly, a river that flowed year round. With much of the water in the Condamine River flowing underground, spring fed creeks and waterholes were permanent water sources utilised by fish and people alike.

Once upon a time

Prior to the European settlement there were at least eight Aboriginal clans in the Upper-Condamine catchment. These Aboriginal clans have a strong spiritual connection with the Condamine River. The Barunggam people believe that the Great Rainbow Serpent called *Gaiwar* carved out the rivers, creeks and lakes during its journey across the earth.

The Githabul people called the Rainbow Serpent *Mochel Mochel* and believe that it lived in the waterholes around Warwick. For the Githabul people swimming in the river was associated with strict rules. The genders were segregated and allocated separate times. Some water holes were also used for initiation ceremonies that were out of bound to the opposite sex[3].

The Upper Condamine was rich in fish, freshwater turtles, shellfish and waterfowl as well as a triennial bumper crop of bunya nuts. The clans would gather every three years in the Bunya Mountains, north of Dalby, from May to November, for the bunya nut harvest. [2] European records of multi-clan Aboriginal gathering go back to 1866 when 400 – 500 individuals from Barunggam, Bigambul, Dalla, Giabal, Jagara and the Jarowair people gathered along Lake Broadwater near Dalby.

Nardoo, a plant which grows in the shallow margins of billabongs along the Condamine, was ground to make a type of pancake. The bulbs of the native leek and water lilies were used as vegetables[3].

The banks of the Condamine River and its tributaries also provided the Aboriginal peoples with the fruits of ruby saltbush, native lime, winter apple and sandalwood. The richness of the Upper Condamine allowed local clans to trade with the clans from other catchments.

Although there have been some changes over the years, traditions associated with the river are as vivid now as they were before the arrival of the Europeans. As Sam Bonner, Githabul Elder, points out:

> *In past times aboriginals were required to remove rubbish from the river leaving it clean and tidy as they found it.*

A creek in the upper Condamine River catchment with intact riparian vegetation. Photo: Condamine Alliance.

The arrival of the Europeans

The first European explorer in the area, Alan Cunningham, travelled through the catchment in 1827, naming the Darling Downs after the governor of NSW, Sir Ralph Darling. During the 1840s, the early settlers established several grazing enterprises. More settlements were encouraged after Queensland became a state in 1859, and legislation was passed to subdivide large pastoral establishments into smaller blocks to increase population[2].

The area witnessed a significant increase in the regions agricultural economy as the cropping and dairy industries expanded.

The Leslie Dam, south west of Warwick, was constructed in 1964 with a water storage capacity of 47 000 ML. It was later modified to increase its water holding capacity to support the irrigation industry.

Nowadays the river waters one of the richest agricultural areas in Queensland. The average annual rainfall is in excess of 600mm, mainly falling during the summer months. Alluvial flats adjacent to and east of the Condamine are fertile and particularly suited to cropping.

Intensive land use and development has resulted in a very different river to that of years ago. Water extractions and weirs have resulted in reduced high flows, minor changes to seasonality and variability and a reduction in annual water volumes within the Condamine. Reduced flows and nutrient runoff have also increased the incidence of blue-green algal blooms in the system.

The extensive floodplains are easily eroded and with the arrival of hoofed stock the Condamine River changed and now the catchment is degraded significantly. Over 60% of the aquatic habitat is now considered in poor condition.

The River Improvement Trust

Photo: Greg Ringwood.

The River Improvement Trust is a statutory authority constituted under the *River Improvement Trust Act 1940* to protect and improve rivers, repair and prevent damage to rivers and prevent or mitigate flooding of land by riverine flood.

The primary role of the Trust is to plan, design, finance, undertake and maintain stream improvement works for the benefit of the community within its river improvement area.

The Trust has the powers to undertake these functions including the ability to raise funds, enter land, occupy land, enter into contracts and carry out works[4].

In the upper Condamine River the Trust removed habitat, vegetation and snags, forming a channel with increased water velocities, leading to elevated erosion issues and increased down stream flooding in many cases. This impacted heavily on native fish populations.

Brian Kuhn – *The passion of a farmer*

Brian Kuhn has been working as a farmer since he was 17 years old. He lives on a property that borders Kings Creek, a major tributary of the Condamine River.

Brian has fished the Kings since he was old enough to fish.

Catfish and more

Fishing is a family past - time in this part of the world and the fishing skills have been passed down from generation to generation unchanged.

Brian learned how to fish from his father who had an easy way to teach the kids when they'd caught a fish.

He had a float on the end of his line and the line was suspended about probably 3 or 4 feet under the water and, you'd sit there in the afternoon and when the cork started to bob up and down you knew you had a bite. So it was an easy way to learn to fish anyway.

Brian remembers catching many fish, but mostly catfish.

Well the majority of fish we caught were what we called the old eel-tailed catfish. He was the most predominant fish we caught. We caught the odd yellowbelly or golden perch, even rarer, was the odd Murray cod. But since we have started stocking golden perch and Murray cod in these systems they have become more prevalent.

The silver lining

Everyone has a secret about fishing – Brian's father was no exception.

I remember back to when Dad taught me fishing in the creek years ago. We had a little fish called the bobby perch. Now they only ever grow to about 15cm. That's probably as big as they grow and once you got them on the bite there was a little feeding frenzy, Dad used to put a little piece of silver paper out of his tobacco pouch and they'd take that. So I mean if you run out of worms just put a bit of silver paper on the end and put it in the water and flick. Probably works like an early version of a lure.

Spangled perch

(*Leiopotherapon unicolour* - bobby, spangled grunter, nicky)

Photo: Gunther Schmida.

- Average length 15cm, maximum length 25cm
- Extremely hardy: recorded travelling up to 16km in 2 hours along wheel ruts during thunderstorms
- Upstream spawning migrations triggered by summer floods and temperatures exceeding 26ºC
- Highly predatory fish that will eat anything it can swallow
- Most widespread native freshwater fish in Australia
- River regulation, cold water pollution and reduced floods are threats to spangled perch
- Remains abundant across the northern Basin

When teaching her son to fish Olive Shooter loved the spangled perch.

Spangled perch are the most beautiful little fish you've ever seen. They're a dear little fish. For mothers introducing their sons to fishing, they were the best thing you could ever get, because as soon as the bait hits the water they grabbed it. You could catch them with a pin on a string. You could just throw it in, and whatever you had as bait, they would bite on it. I think they were the best fun for mothers and small boys.

Doing what young people do

To Brian, the river provided a lot more than just the fish.

Living on the creek, our house was less than 100 metres from the water. We'd just pop down in the afternoon and catch a fish. But as I grew older and started having friends we'd come out here, 15km out of Clifton, camp the night, have a fish and, you know, do what young people do.

The secret of preparing a fish

It seems regular fishing creates some practical ways of preparing and cooking fish, especially when the taste of the fish fillets is tainted with a somewhat muddy taste.

Gone are the old days of just throwing a fish on the BBQ, scales and all because you do get a very muddy taste out of the flesh. There are various recipes soaking them in milk or soaking them in salty water after you've filleted them. The best is to leave it overnight in the fridge and then next morning you will see all the fat areas on the flesh have solidified. All you do is cut that away and give that to the cat and the nice clear flesh it tastes fine. The Murray cod doesn't seem to have that problem as such.

Losing the banks

One of the major issues in relation to the habitat loss in the Upper-Condamine is the removal of snags from the river channel. Brian remembers:

In the 1960s, there was a scheme going. It was run by the Condamine River Trust and their job was funded by the Government to remove all the trees and snags out of the streams. It was to let the water get away faster, to allegedly stop flooding down the streams. Well, I think it made it worse, because I think it made the water flow a lot faster and there was a lot more damage and erosion done to the banks.

Righting the wrongs

Brian notes how attitudes have changed over the years. He has worked with local authorities to improve this section of the Condamine River.

In the last three years, money was allocated here so we could start putting snags back in the water. In this general area of 500 metres there 12 big, big trees were plonked back in the water.

Resnagging at Bowenville Reserve. Photo: Noal Kuhl.

Noal Kuhl releasing a Murray Cod caught amongst reintroduced snags. Photo source: Condamine Alliance.

Sam Bonner – *Traditional river connections*

Sam Bonner is a Githabul Elder who lives close to Emu Creek, one of tributaries of the Condamine River. He has a close connection with the river.

Sam points to a river red gum whose trunk still bears the deep scar from bark removed to construct a canoe over 160 years ago.

According to Sam, canoes were made by the local aboriginals not for their own use but to trade with other aboriginal tribes for locally unavailable products such as ochre for painting.

Here we are, in front of a scarred tree. See how they cut around that sappy part, and took all that out. They used to do that with wedges. They had special material to make wedges out of, you know, like special stone. And they cut them and mark them all the way around and then they wedge it. They wedge all that out. That is what they used to make the canoe out of.

An underground sea

The Githabul people maintained a close relationship with the river, using stories to convey the connectivity of waters above and below ground.

Sam Bonner and the canoe tree. Photo: Greg Ringwood.

Since way back – I was told about it, back in the 1950s, they said 70 years before the animal thing was sighted here. Mum and the other elders told me every 70 or 80 years those things come back and show themselves. They come up from underneath here, because it's deep, so deep it was bottomless, it goes into the big underground stream. It's like a big sea of water, all this country, underneath there. There are passage ways, and these things might come up down Tweed Heads or somewhere, or they might come up out at Cunnamulla. So this is a sacred water hole, this place. We're never allowed to swim here on account of they said there's some prehistoric animal or something that's in here. No one knows what it is, you know. But it has been sighted back in them days. Some describe it as like a big overgrown wombat.

An Upper Condamine River waterhole.
Photo: Greg Ringwood.

Only take what you need

Sam learned how to fish from his aunties. They often went fishing to bring home a feed for the family, always catching what they needed and only what they needed.

They would catch about five or six each, and then start packing up and put the fish in the bags, and I couldn't understand myself. I used to say 'Aunty, what are we going home for? We'll get some more.' And she would reply 'No, you're only allowed to catch so many.' That's what they taught me. You only catch what fed the family, see. You're not to get anymore.

Sam, his family and friends always kept the river clean and tidy. For others, such care for the river was not always undertaken, especially when it came to catching fish.

People these days they fill their fridge right up to the top with fish. That's stupid. That's greedy. They're still doing it. They take big eskies out there and they bring home as much as they can catch – unbelievable - what do they do with it all? They can't eat all that.

Timber mills and bobbing

Sam's father was a tree-cutter, so most family members worked in the local timber mill. They used some of their free time catching fish in Emu Creek.

We worked in sawmills and things. We never had that much spare time. Weekends were the only time we had, and then if we were lucky we'd get to town. If not we'd come fishing to these places. We've fished all along here. We used to catch a fair bit of fish back in them days, 18 or 19 jew and yellowbelly. You'd get a good feed every time.

Sam and his family used a variety of baits when they fished, attaching a cork to the line and using 'bobbing' techniques to attract the fish.

We used to use anything for bait. Maybe crayfish and frogs are number one, grasshoppers, crickets, and black crickets. We'd just lift up a log or cow manure to see and you'd see plenty of crickets. Use them, anything. Get the cork bobbing steady so it makes a big noise going 'pop' when it comes up. The bigger and wider the cork the better it makes that noise. The fish hear it and they come and they see the bait moving, and they just go and grab it.

Protecting the perch

Emu Creek flows straight into the Condamine River. Murray cod, yellowbelly and catfish all breed in the creek's waterholes. Occasionally you can get silver perch, but they are very small in the creek. Sam says:

A silver perch in Oakey Creek. Silver perch (*Bidyanus bidyanus*, also known as grunter, black bream, silver bream, bidyan) medium to large fish found in lowland turgid, slow flowing rivers. Potential threats include river regulation, barriers to migration, altered flow regimes and interactions with pest fish, like carp. Photo: Noal Kuhl.

Perch like a lot of protection, lots of trees, because they're fish that birds can get easily, especially Kingfishers and stuff like that, because perch are only small. You get silver perch here no more than about six, seven inches. Birds get anything that they can see. They can see out in the open, but around shade they can't see fish.

Along the Upper Condamine, the silver perch is considered to be the most vulnerable of all native fish. Although they are in abundance in stocked impoundments, they are not often found in the natural river system. Noal Kuhl puts this down to habitat loss from past human activities.

Much of silver perch's habitat has been destroyed and wild populations of them are very rare. There was a lot of discussion in our stocking group about releasing these fish. Fishermen told us 'its very difficult to catch legal sized fish for the esky'. Our stocking group committee's response was 'It's our group's responsibility to make sure this species is kept alive and healthy in our waterways'.

The importance of plants

Sam believes the river along Emu Creek has changed over the years. It is partly due to the clearing of vegetation in and around the river.

It's changed – there's not enough vegetation here now – timber and stuff. And you can see where it's gradually getting washed down and the banks on the creeks are getting narrower. That's because no vegetation is there to halt the erosion.

The water holes are getting smaller and shallower all the time because they haven't been allowed to revegetate themselves, now we've got to help them to revegetate. This is all part of the main catchment of the Condamine and definitely has to be looked after.

Riparian vegetation provides shade and is a source of snags, both of which are important aspects of healthy fish habitat. Photo: Condamine Alliance.

The revegetation of Myall Creek, a tributary of the Condamine River, was severely affected by the 2010 – 2011 floods. Photo: Condamine Alliance.

River vegetation

Water plants are important because they provide habitat, food, refuge, spawning and nursery sites for fish and invertebrates. They also stabilise and filter sediments and influence water quality.

Ribbon weed growing next to a snag. Photo: Scott Nichols.

The plants on the river bank ('riparian vegetation') are a key source of organic matter for the aquatic system. Many aquatic invertebrates feed on decaying material and these, in turn, provide a food source for other invertebrates and fish. Woody material which falls into rivers and streams provide fish with shelter and a substrate for food, such as algae, and breeding sites. Riparian vegetation provides shade, which reduces daily and seasonal extremes in water temperature, stabilises riverbanks, slows surface runoff and can act as a filter to pollutants and nutrients. It also leads to more diverse fish habitats through providing snags, undercut banks and variation in the channel bed.

Olive and Ray Shooter – *A lifetime on the creek*

Olive and Ray Shooter have been married since 1963. Ray has lived along Dalrymple Creek for over 77 years. Olive grew up a few kilometres from where they live today, moving to their current home 48 years ago.

When he was a boy Ray could not keep away from the creek.

> *Oh, it was very carefree and we used to swim and play in the creek. There were willows in the creek at that time, and they were lovely shady tree. It was good.*

Ray and his family also often had picnics along the river.

> *We used to – even when we were young, have a few picnics on the bank. We used to take the afternoon tea. It was lovely, it had the Condamine couch under the trees. It was a fairly nice little area. Mainly just us and other nephews and nieces that might come and stay. We'd just play around and maybe paddle a little bit, because you could get down into the creek very easily.*

Fishing is a family pastime

Ray did not fish much when he was young, but his father and brother were keen fishers. They caught yellowbelly, jewfish (catfish) and cod.

> *They used to fish in Dalrymple and the Condamine. In my boyhood days the cod weren't here, but I heard stories from my father, when he was a boy, that there plenty of cod in the creek. They disappeared for some reason or other, and they come back in 30 years ago, I suppose. And they – well they lasted up until the dry, I think, that that would have finished them off. But our son has caught a small cod recently; we had to throw him back of course, so they are still about.*

Although Ray does not engage in fishing, Olive is a keen fisher. She sees fishing as a relaxing activity.

> *I just love fishing. It's like looking for mushrooms, really. You never know when you're going to get one, do you? I used to always say, 'It doesn't matter whether you sit at the bank all day and you catch nothing, it's lovely.' The dragonflies, and everything that flits around the creek are there. Little wrens and kingfishers and all the other little bird life flittering around. It's beautiful.*

Mayflies are important parts of the aquatic ecosystem – and particularly loved by fish as food.
Photo: Luke Pearce.

Learning to fish

Olive's father was a fisherman, and taught Olive and her sisters how to fish. They used several different methods of fishing between them.

Dad used to set us a line with a cork on it and we'd sit with that when we'd go fishing. Mum never fished. She would always take the New Idea and have a day out at the river. It was a good family day. When we were kids and we'd go down to Kings Creek, my eldest sister had an idea that if you bobbed you'd catch more. She caught 48 spangled perch one day by just bobbing the cork all the time. We couldn't ever repeat that.

I never even use a cork now, and I don't like rods either. You can't feel what the fish is doing with a rod. If you just hold onto the line, you know what the fish is doing.

Driven to distraction

When the fish are on the bite, not even a fear of the bait would stop Olive from catching a fish.

One time when I couldn't find any worms, my son said he'd get some willow grubs, something I don't like to handle. Anyway, I took the toilet paper with me, and I used to get a piece of toilet paper, and pick up the willow grub with that, and put it on the hook and bait up. I was going all right until they started biting, and then all of a sudden I didn't care if I picked up a willow grub or not. I picked up a willow grub and I put it on the hook, no trouble. I didn't need toilet paper after that.

Olive with one of her catches. Photo: Ray Shooter.

Olive is now teaching her grandson Harry to fish the same way as she did her son.

Harry is 11 and a real fisherman. He can talk of nothing else but fishing when he's fishing. He comes up to me wanting to go fishing because he's not allowed to go to the creek on his own. He takes a lounge chair for me to sit on while he fishes.

A drier creek

Both Olive and Ray have noticed changes in the creek over the years. In the 1950s and '60s, Olive noticed that the local water hole dried out more regularly.

Just down here, where I always fished, the big hole. Well it's been dry on quite a few occasions lately and it never was dry in past years. We always had water in the creek. But those times are gone.

Some of the aquatic creatures have ways of coping with these changes, as Olive explains:

There's yabbies in the little hole down here. They're amazing really, 'cause the water hole goes completely dry and there's nothing there at all. Then as soon as it gets water in it there's yabbies and the little perch, spangled perch, in it.

Ray also says the river dries out more regularly than it has in the past.

I've lived on the creek all my life. I've noticed a big change in the creek. When I was a kid, we used to swim and play in the creek and it very rarely stopped running in those days. It's changed dramatically now. Partly I'd say because of the 16, 18 year drought that we've had, and the over-allocation of the irrigation water.

A changed creek

Removal of vegetation along the river has affected the flow and creek banks. Ray recalls:

In their wisdom, the River [Improvement] Trust decided to get rid of the willow trees, they were slowing down the stream too much. And they took them out, and as a result then, the stream ran much faster, and it scoured the banks and it made it into a different creek altogether. Instead of the nice sloped grassy banks, we finished up with a great scoured out steep bank. It used to take 24 hours for the water to come from the top down to here, and after that it came for 12 hours. Before the flow would get to the Condamine, it deposited all the silt.

In an attempt to address some of these problems, the River Trust carried out work on erosion effected areas, some more successful than others, as Ray explains:

They tried three different things to aid erosion control that I can remember. They battered the banks down and planted grass on them. That was moderately successful. They put a wall of tyres down the bank there; to hold the creek from washing back to the road. The tyres were successful. And then they put posts in and tied logs and brown saplings to them and they backfilled that then, but that wasn't a success because the saplings that they put in very soon rotted away and it washed away.

Denuded and eroding banks on the Condamine. Photo: Brian Kuhn.

State of river: 'moderate'

The Sustainable Rivers Audit (SRA) is an ongoing and systematic assessment of river health for 23 major river valleys in the MDB. Environmental indicators include hydrology, fish and macroinvertebrates, which are monitored and will highlight trends over time.

The Condamine Valley was surveyed in 2005. The Condamine Valley fish community and Ecosystem Health were considered to be in Moderate Condition. 56% of predicted native species were caught from the "Slopes Zone". Alien fish were widespread, and comprised just over half fish biomass (55%).

Bony herring were numerous and carp gudgeons, Australian smelt, golden perch, Murray-Darling rainbowfish and spangled perch also were common. Three alien species, Eastern gambusia, goldfish and carp, were captured frequently[1].

Oakey Creek – habitat for carp. Photo: Noal Kuhl.

Noal Kuhl – *Angler, historian and fish habitat restorer*

Noal Kuhl has lived in Oakey area all his life. Restoring the local waterways to their former natural glory has always been an ambition.

All you saw was sewage

As a youngster growing up Noal saw how poorly the river was treated.

When I grew up in the 1970s, all you could see was sewage flowing down the creek and it was foamy, brown, and that certainly wasn't eye-pleasing. It certainly wasn't appealing as kids to come down to the local creeks for a fish. So it became a challenge to change all of that. With the Environmental Protection Agency in place, the local council were forced to clean up the creeks. The improvement in treated water flowing downstream became noticeable. The creek landowners tell us they noticed better quality water in the creeks around 1997 as it got a lot cleaner and a lot clearer.

Noal became interested in the health of the waterways so future generations could respect and know that waterways are important ecosystems to have in the community and not a water source to be abused. In 1994 he joined the Oakey Freshwater Fish Stocking Association.

Through his involvement with the fishing association Noal began interviewing the long term residents for historical records and started piecing together some of the changes that had occurred to the waterholes and headwaters of the Condamine River, including Gowrie, Westbrook and Oakey Creek.

The first settlers only needed the water for their domestic use, where they'd be washing clothes, or feeding livestock. There was no large scale irrigation like we have now. So now during dry times, you will probably see the creek run dry. Back in the 1960s Toowoomba City was expanding and housing estates started covering over the surrounding natural springs, so there's less water seeping out and filtering into the creeks now. Not a lot of people noticed because sewerage treatment water was replacing the good spring water, so the water level basically stayed the same but the water quality was reduced. Now the sewerage water is no longer being released into the creek, all the fish have to rely on is the rainwater that falls in the catchment zone. The creek is not as permanent as what it used to be.

Noal with one of the water quality samples from Oakey Creek, downstream from Gowrie Creek. The water in Oakey Creek contains treated waste water from the Wetella treatment plant in Toowoomba City as well as stormwater comes from the city streets and surrounding farmland. Photo: www.nma.gov.au.

Carp country

It's not only the water flows that have changed in this part of the Condamine – many parts of the river and its creeks have had their vegetation cleared to the creek edge and removed from the creek channel. This has led to areas so disturbed that they

can no longer support a diverse range of aquatic life including the native fish that once thrived here. Despite carp only arriving in the Upper Condamine in the late 1990s, Noal describes these areas as 'carp country':

Basically, this is European carp country: if you fish here you will catch a lot of carp. There is basically no habitat here for native fish to live. There are no trees for native fish live under. It's just a 'glorified gully'. There's hardly any structure in the water, no logs in the water, or anything to hold native fish. It's also shallow, about four to six foot deep right through and that's what carp like.

A wriggly problem

There are many different types of bait used to catch fish in the Upper Condamine but, as Noal recounts, bloodworms are considered the best, especially the species that live in the black soil country of the Darling Downs.

The local fishermen come to the waterways collecting bloodworms for bait. The Darling Downs produces the best fishing bait on the Eastern Seaboard for catching native fish and this is because of the blood worms.

Because of the popularity of bloodworms, many fishermen regularly visit to dig for them. This is having a great impact on the riparian vegetation where the bloodworms are easily located.

Some friendly rules have been developed to lessen the impact on the riparian zones.

Local fishermen have their own little beds made up and they continually dig them over for worms and look after them. That's what is needed: to limit the diggings and reduce the need to go into new areas and stuff up the riparian zones.

Ground worked over for bloodworms. Photo: Noal Kuhl.

Ringtanks and catfish

Despite the numerous negative impacts that human activities have placed on the waterways, Noal believes sometimes man-made structures have had a positive effect by providing habitat to some native fish. One example is the role ring tanks (farm dams) play in the survival of eel-tailed or *Tandanus* catfish.

Back in 1991, there were only three ring tanks on Oakey Creek. What happened is that fish get pumped through with the water. When the dams are nearing empty you can see all the round hollows at the bottom of the dams indicating eel-tailed catfish nests. Eel-tails collect little pebble rocks and place them in the middle which help the eggs to stick. The eel-tailed catfish are a hardy native species that thrive in farm dams, as do silver perch. Other predatory fish are less adaptable to ring tanks so without the competition, catfish thrive.

Noal and his mates used to have great success fishing in the ring tanks.

All you'd catch was eel-tailed catfish. But they were the plumpest, healthiest, fattest looking eel-tails you're ever likely to see. Some were over 900mm long and you'd catch 14 or 15 in a session and take some home. Sometimes you'd put them in a hessian bag (especially if you knew they were female with a lot of eggs) and take them back down to the creek and let them go. Ring tanks are prolific sites for eel-tailed catfish breeding on the Downs. Oakey Creek has a large population in comparison to the rest of the Murray-Darling Basin where they are pretty scarce. I'd say the ring tanks are one area to nurture eel-tailed catfish to return them in big numbers elsewhere.

Pumping water, not fish

Irrigation pumps and drains are a problem for fish. These fish are removed from the natural system with little chance to return to the river, effectively being 'lost' from the main river channel. This situation has a major impact on the health of native fish communities in the Murray-Darling Basin.[4]

Photo: NSW DPI.

Some of the more resilient native fish species, such as spangled perch, are able to live in storages, but their ability to return to the rivers and contribute to their natural community is lost. Research is now being done into the designing effective screens and figuring out how they can best be used to benefit both irrigators and fish.

Research is ongoing to find out what sort of screens can be fitted to irrigation systems to minimise the damage to native fish populations. Photo: NSW DPI.

Ring tanks close to Oakey Creek. Photo: Noal Kuhl.

Making connections

Being involved with native fish

During the early settlement, fishing was a necessity as it provided a vital food source. Those interested in fishing only had the time to catch a feed of fish. These days fishing has became a passion for many who not only spend time fishing but also observe the health of the river and the native fish populations. Brian Kuhn explains:

We started the fishing club at Nobby in 1988. It was a family orientated fishing club focused on putting fish back into the river. It became evident there was a need for an educational program to aid native fish in this area. The fishcare volunteer program, which was orientated towards sustainable fishing, was kicked off by the Qld Department of Primary Industries (Qld DPI). They provided us with brochures and general material to educate the fishing public on the correct way of caring for native fish. The program was proactive - not just saying they could not take a fish. Further extension was provided by the Qld DPI in Brisbane, training us about fish and fish habitat. Now, from time to time I come out here and just check the river in general and make sure that everything looks reasonably healthy. That is part of being involved with native fish.

Moving toward zero till

Tilling of the fields around Dalrymple Creek has contributed to the turbidity of the creek water as soil was eroded off paddocks and into the creek. Recently farmers have made changes to land management practices and zero till is gradually becoming more prevalent. Ray Shooter observed that this has led to clearing of the creek waters:

I think that a lot of the farmers now have gone to zero till. Well that certainly has cut down the silt entering the creek. When we used to plough, the water that ran off the paddock after a storm was quite dirty. Since we knocked off cultivating, the water runs off mostly clear. I suppose it would be 80% zero till in this area now.

Escape the rat race

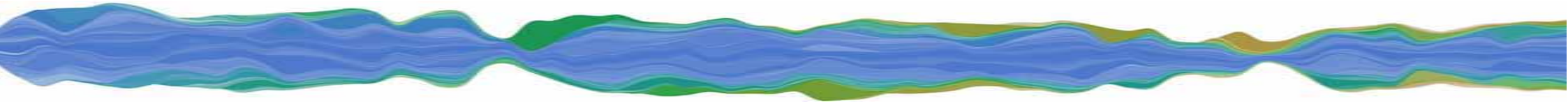
The river is enjoyed by many people for activities including fishing and as a place to spend quality time with friends and family. Brian Kuhn recalls it is mostly a place to relax:

At busy times, typically at Easter time you come out here and there are lots of families that camp here for the Easter weekend. People come from all over to get away from it all. They set up their camp, their little dog and a fire, it's marvellous to be out here away from the rat race. Just the river and nature to enjoy.

You have to take the time

Sam Bonner believes it's important to teach his young relatives to respect the river and their history. Sam explains:

They used to come here to swim. It took me two or three seasons to stop them. Because this is my area where I was brought up, I know all about it. I had to do my job, do my duty. You've got to keep them legends alive, see. In our days, we had to listen. These days it's different - they're brought up different culture now. You've got to get through – you've got to take the time to get through them now.



Visions for the Condamine

The fishing people who contributed to this project have all talked about their hopes for the future of the Condamine. Many felt they had seen some improvements but most don't feel the river is as healthy yet as they would like to see it. Each of these fishers suggested ways to help the river and in turn help provide healthy habitats for fish.

Helping fish in tough times

Fishing clubs including Nobby and District Fishing Club and Oakey Freshwater Fish Stocking Association are very active - giving native fish a hand when needed. Between 2001 and 2009 the Upper Condamine was gripped by one of the worst droughts in history, resulting in a significant number of water holes drying out. The native fish required human intervention to survive, as Brian Kuhn recalls:

For the past 20 years the Condamine River has been in a pretty sad state with only occasional flow. More often than not it has been dry holes. Eighteen months ago, we walked some of the river, rescuing Murray cod and put them into more permanent waterholes. We've got a few very dedicated people who love fish.

With the help the Condamine Alliance and Fisheries Queensland, these two fishing groups approach the issue of sustaining fish populations in the Upper Condamine more systematically than just stocking fingerlings into the water. Both clubs have also been closely involved in habitat restoration works on the Upper Condamine. As Noal Kuhl explains:

We asked the question: when we put fingerlings in the waterways, is it worth the effort? To answer this question we needed to understand what the creeks were like before and what we see today. Once the changes were identified we looked at if we could rectify the bad aspects. We found that a lot of the vegetation had gone. Most importantly ploughing the banks had reduced the riparian zone. That required fixing so the native fish would want to return. Once we started putting fingerlings into the creek in the '80s, we noticed an increase of native animals as well. The farmers started telling us that koalas, goannas and birds, were appearing on the creek quite noticeably. Once revegetation began, there's been major improvements from 1995 and what you see here today.

Members of the fishing and stocking groups are involved in revegetating numerous creeks along with the local councils in the Condamine (above) as well as fish monitoring (below). Photos: Noal Kuhl.

One of the interpretive signs explaining the work that is being done to improve the health of the creeks and rivers of the Condamine catchment. Photo: Greg Ringwood.