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)

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Source: Garry Hera-Singh.

Source: Jodi Frawley.

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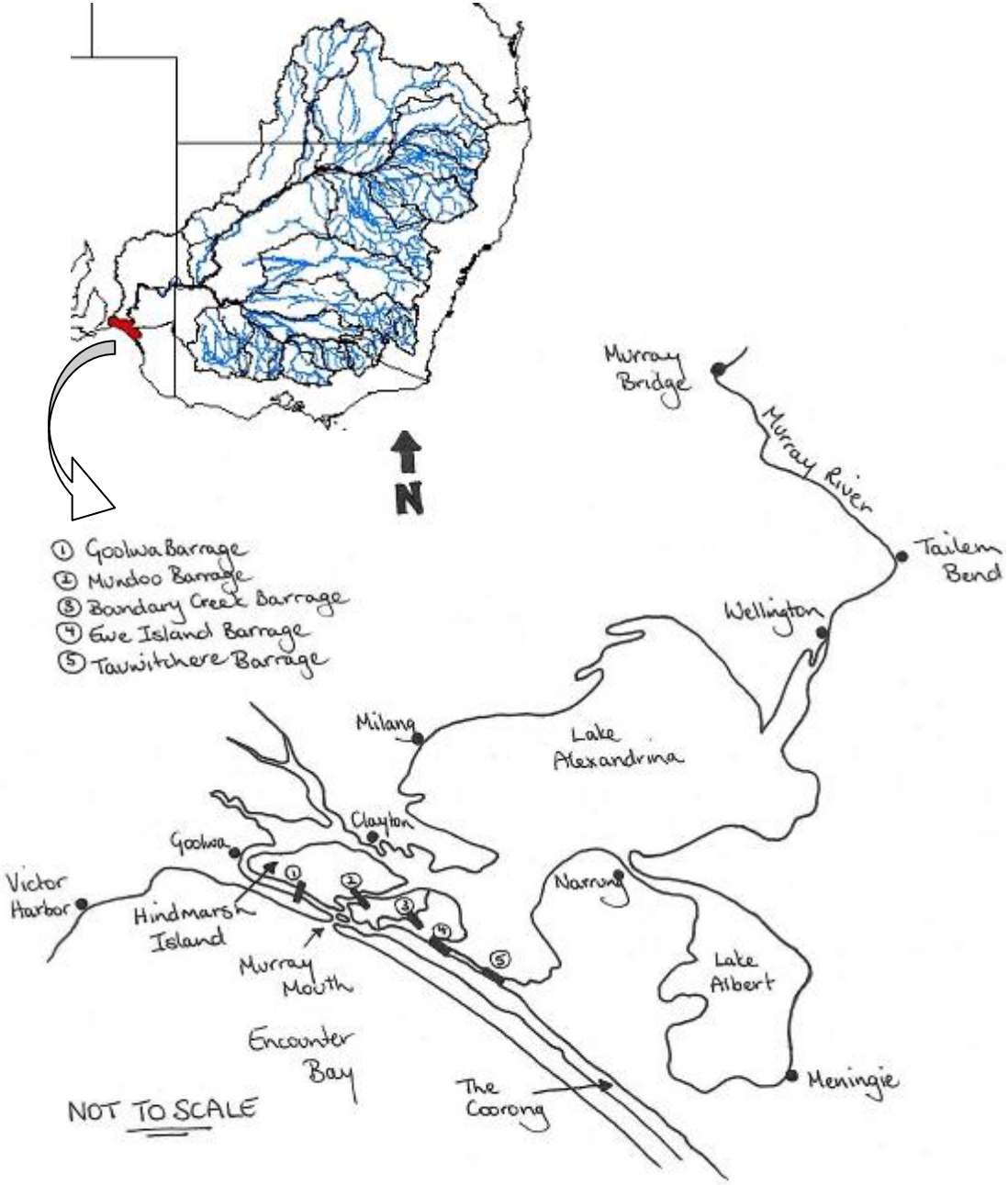
Source: Jodi Frawley.



Brian Schulz came to love the River Murray and its fishing from family holidays when he was a child. So, he moved to Murray Bridge! Photo source: Brian Schulz.

Terry Sim (left) and **John Yelland** (right) were born within three days of one another. As youngsters, they explored the banks of Lake Alexandrina and have continued this love of the wild as adults. Photo sources: Terry Sim and John Yelland.

Tracy Hill is an active member of the Southern Fishers Association. She is proud that the commercial fishery operating in the Coorong and Lower Lakes is recognized as a sustainable fishery. Photo: Jodi Frawley.

And my grandfather used to tell me about the ***weeds*** *growing in the river, and they'd watch that. And a* ***big fish*** *would come in there and of course you could see the movement. When he's feeding, the* ***Murray cod****'s tail would always come to the top. I've seen it myself – the tail,* ***the big tail****.*

Ngarrindjeri woman Annie Koolmatrie, born 1917, recorded in 1979 by Bonita Ely[1]

Introducing the river and its people

After gathering water from 23 river valleys, the Murray empties into Lakes Alexandrina and Albert before making its way to the Coorong and out the Murray Mouth to Encounter Bay in South Australia. The entire Murray-Darling Basin is upstream. Everything that happens there affects what goes on here.

Wind is almost a constant here. Nothing separates this unique piece of Australia from Antarctica and the full brunt of the Southern Ocean.

Yarluwar-Ruwe: Sea Country

The River, Lakes and Coorong are part of the traditional lands of the Ngarrindjeri people. These waters provided food and featured in their stories.

The *Ngarrindjeri Nation Yarluwar-Ruwe Plan* retells how the Lower Lakes and Coorong were created by Ngurunderi and Pondi, who came from the upper reaches of the Murray River.

The Murray Mouth – where the Murray-Darling Basin meets the sea. Photo: Jodi Frawley.

A long, long time ago Ngurunderi our Spiritual Ancestor chased Pondi, the giant Murray cod, from the junction where the Darling and Murrundi (River Murray) meet. Back then the River Murray was just a small stream and Pondi had nowhere to go. As Ngurunderi chased him in his bark canoe he went ploughing and crashing through the land and his huge body and tail created the mighty River Murray. When Ngurunderi and his brother-in-law Nepele caught Pondi at the place where the fresh and salt water meet they cut him up into many pieces, which became the fresh and salt-water fish for the Ngarrindjeri people. To the last piece Ngurunderi said 'you keep being Pondi' (Murray cod).[2]

The coming of the Europeans

As well as being uniquely affected by changes upstream, the Lower Lakes, Coorong and their fish have been shaped by the people who came to live here and of the industries that developed. Sheep and cattle grazing, commercial fishing and tourism have all brought new people into the area, with new needs and new ways to catch its fish.

The Lower Lakes and Coorong that Charles Sturt found when he completed his journey down the Murray River to the mouth in 1830 was a tidal place, one big estuary where both salt and fresh water fish could be found. The Lakes only became salty during droughts. The shores provided good watering points for the sheep and cattle that followed in the 1840s.

Ngarrindjeri people worked in these pastoral activities, sharing their intimate knowledge of the Lower Lakes and Coorong with the newcomers. Fishing in the salt, estuarine and fresh water yielded a range of different fish for all to enjoy.

In 1853 the *SS Mary Ann* and *SS Lady Augusta* kicked off steam and paddle boat travel on the Murray and Darling Rivers, making Goolwa a key inland rivers port.

Professional fishermen worked the Lower Lakes and Coorong, moving between campsites dotted around the shores and the satellite towns of Milang and Goolwa. Professional fishing numbers swelled when other work in the area dropped, especially during the depression years of the 1890s and 1930s.[3]

A commercial fisher on the Coorong. Photo source: Garry Hera-Singh (Photo notes *Courtesy of Tony Gardner*).

James Carruthers, with his grandson Des, netting congolli in Narrung Narrows in 1940. Photo source: Garry Hera-Singh (Photo notes *Courtesy of. D and J Ayres*).

Clayton

In 1910 the Surveyor General of South Australia laid out the township which was to be gazetted as Clayton. It was hoped that it would become another thriving foreshore community like Milang, 30kms around on Lake Alexandrina.

That didn't happen until professional fishers Henry and Gloria Jones arrived in the 1960s, joining the only other resident – a man living in a cave with 20 cats.

Henry and Gloria built a house and then a little shop where they sold fresh fish caught out on the Lakes. In 1974, they opened a restaurant and deli that they called 'Yabby City', selling their fishing hauls direct to the public.

The little town grew around them, becoming a drawcard for tourists. Henry remembers: It was a really busy little restaurant for 25 years.

We had coaches, boats and helicopters bringing people in: the whole works!

River regulation in Victoria and New South Wales meant that by the early twentieth century the Lower Lakes were saltier than they had been in the past. Five barrages were built at Goolwa, Mundoo, Boundary Creek, Ewe Island and Tauwitchere by 1940, changing the Lower Lakes again. The Lakes were now permanent fresh water.[4]

Now, the barrages separate the freshwater from the salt and the Lakes from the Coorong. Flows from upstream have declined so much that in recent years a dredge has been used to keep the Murray Mouth open to the sea.

Today the pulsing of the fresh and salt water has ended. Continued low flows from upstream have meant the southern end of the Coorong has become up to five times saltier than the sea and is at risk of ecological collapse. Once a place where both salt and fresh water fish moved with the different waters as they flowed backwards and forwards through the system, the fish are now struggling to cope.

Brian Schulz – *The original 'Fantastic Fisherama'*

Brian Schulz was born 74 years ago and grew up in the Barossa Valley. His family ventured across to the Swan Reach on the Murray River where they holidayed in a shack near Lang's Landing.

Fantastic fisherama

Brian so loved his fishing that he moved to Murray Bridge to be closer to all the best spots in the river. He was enthusiastic about getting people together and spreading the word about recreational fishing.

I used to run a fishing competition called Fantastic Fisherama and that was a very, very popular fishing competition. We had up to 790 contestants at Walker's Flat one year back in the '70s. We went up to Big Bend in later years, and that's a lovely place up there. Always good fishing.

All sorts of fish

Brian has caught all sorts of fish from the river over his life time: callop, silver perch, catfish and carp. But he has seen some fish disappear from the angler's repertoire – for better and for worse. Tench, another fish introduced from Europe, is one example.

We used to have tench years ago. Sometimes they would be up to three or four pound. We didn't eat them though, they were too bony. But they have died out since the carp came in and took over.

Cod story

Brian's all-time favourite fish is the Murray cod.

They're so beautiful, they're so docile, they're such a marvellous species of fish. I don't believe in slaughtering them or killing them. We had commercial fishing in South Australia until a few years ago. We had a big petition drawn up and collected something like 28 000 signatures and we took them to parliament through Mr Peter Lewis and eventually the commercial sector in the Murray River was closed. I think recreational fishers also need to stop catching cod. I'm against lure fishing for Murray cod. I feel, don't target 'em, leave 'em alone.

Recently the South Australian government has moved to a catch and release policy for Murray cod, where they must be returned to the water.

Murray cod

(*Maccullochella peeli* – Cod, Codfish, 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 migrate hundreds of kilometres upstream with water level rises
- Males guard the eggs which are laid on logs or rocks
- Listed as 'Vulnerable' in Victoria and by the Commonwealth, catch and release only in SA

Photo: Luke Pearce.

Across the Murray-Darling Basin, fishers talk of a story about the map of the cod's birthplace imprinted on their stomach lining. Brian heard this story from an Aboriginal man he knew, Mr Hunter.

Like most fishers, he was skeptical. So he set out to find some proof, one way or the other.

I caught a cod, gutted it and cut open the stomach. When I saw the lining of the stomach, I held it up to the light and there was the tree in front of me. There are hundreds of trees in the Murray but this particular tree has got a particular lean on it, so I recognised it. A lot of people today don't believe me. But that doesn't bother me. I know the truth, I've got it there in writing. You can't do any more than that.

Tall tales and true

They catch some big fish at the bottom of the Murray system, Brian explains.

I was fishing and I had this huge bite and I started to reel it in and another fish came along and took the fish that I was reeling in. And then I started to reel that other fish in and he's hangin' on to the first fish and another fish came along and took the back fish, so I had three fish on the one hook. And just got them all to the boat and the cord broke and I lost the lot!

The stomach lining of a Murray cod showing Brian where the fish he caught was born. Source: Brian Schulz.

Salt in the fresh

Brian lives approximately 60 kilometres from Lake Alexandrina and has witnessed the problems of the Lower Lakes and the Coorong since the mouth of the River first closed in 1981. While he acknowledges that there are problems with hypersalinity in the Coorong, he also thinks fishers need to know about the salt in the River itself and how it affects what is happening downstream.

There is a lot of salt on the cliffs in this part of the Murray. The river gets salty because of the irrigation that's coming from the cliffs. Over time the water seeps back down into the river. It becomes very saline downstream. They've opened up the Barrages at Goolwa at the moment and a lot of that salt's gone out of the mouth. It's good it's washed out.

John Yelland also worries about the accumulation of salt from upstream water use and farming practices.

Salt interception schemes

Rising salinity is an issue throughout the Basin.

One option being used to address increases in salinity is Salt Interception Schemes (SIS). SIS use bores to capture saline groundwater and pump it to disposal basins before it reaches the river channel. Disposal basins are a large distance from the river and minimise the potential for salts to re-enter the surface waters.

The first SIS was built at Curlwaa in NSW in 1973. Sites in SA include Waikerie, Woolpunda and Loxton, Bookpurnong, Pike River, Murtho, and Chowilla.

At Morgan, the level of salinity is now about 25% less than it would have been without the schemes.[12]

For more information on this and other options being used to control the Basin's salinity see www.mdba.gov.au.

One of the things you certainly can't argue against in the Guide to the Proposed Basin Plan is the estimated two million tonnes of salt per year washing into the river. Where is it going? It has to go out to sea otherwise it's just going to fill the river up. I think everybody understands we need to deal with the salt.

One of the paradoxes of the Lakes, says John, is that they are freshwater with saline swamps all around them, fed partly from the salt deposited by past flooding.

Big fish and lots of fish. Top: a catch that included a large mullaway. Photo source: Garry Hera-Singh (Photo notes *Courtesy of Tony Gardner)*.

Henry Jones is a professional fisher who lives at Clayton on Lake Alexandrina. He thinks that the lack of flows are related not just to the drought, but also to the lack of freshes that would have helped to clear the salt in the past.

The big floods rarely happen now. I think '92 was the last one around this way, but we never get those intermediate ones anymore. Those little floods. They're pumped into dams and used for irrigation or critical human needs. Unless we can get those medium flows to flush the salt out through the sea, then this area will continue to die. I mean we can see it dying.

The Murray Mouth in April 1981. It was completely silted up, effectively separating the immense Murray-Darling River system from the ocean. Image source: Garry Hera-Singh.

The barrages

European settlement of the Murray-Darling Basin has altered the Coorong and Lower Lakes. Before settlement the Lakes were predominantly fresh, but during periods of low flow they are believed to have become brackish for short periods as seawater intruded into the Lakes.

As settlement expanded locally and across the Basin, land use changed and extractions increased. The intrusion of seawater became a greater issue such that by the early 1900s the increasingly salinity made it more difficult for locals to utilise the lake water.

By 1940 five barrages were built: Goolwa, Mundoo, Boundary Creek, Ewe Island and Tauwitchere - forever changing the connectivity, hydrology and ecology of the area.

The construction of the barrages in the 1930s was welcome work for many men. Fishing was important both to supply food and to take back to Adelaide and sell on their work breaks. Photo source: Garry Hera-Singh (Photo notes *Courtesy of Leta Packman).*

Terry Sim & John Yelland – *Mates on the Lakes*

Terry Sim (left) and John Yelland (right) were born within three days of one another in 1952. They were destined to be mates, although Terry grew up in Milang and John on Point Sturt. John's family owned a mixed farm that included a small dairy, and Terry's father did the milk can run every morning from the local farms to the butter factory at Milang.

As youngsters, they both explored the banks of Lake Alexandrina, fishing, picnicking, and searching for wildlife along the wind swept shores. Nowadays they continue to explore the area as members of the community group, the Lakes Hub.

Although there was plenty of water, John explains fishing was a challenge when he was a young boy.

Our part of the lake, the corner down at Point Sturt is very shallow. When the water was out recently, it was nearly two kilometres out and it shows it is a lot of flats. So fishing there wasn't very good. Uncle Graham next door, he and his brother were keen fishermen. John particularly was keen. They had a decent sort of boat and outboard motor there for a while.

Yabbies and magic

Terry's family loved to yabby. And when they did, more than the family tucked in at the end of the day.

Everyone yabbied. If you wanted a feed of yabbies you went out and got your own. And you'd get enough yabbies to do a couple of copper-fulls. Coppers were used for boiling water that clothes were washed in. And at home we had a pergola that was covered in grape vine. The table would come out under the grapevine and the copper would start up for the yabbies. As a six or seven year old kid it was almost like magic because people just used to turn up. You didn't know how they got there but the gate would open and a couple of cousins and an aunt would come in. By the end of the day there'd be 15 or 20 people sitting around the table all eating yabbies.

Yabby fishery

(*Cherax destructor*)

Photo: Charlie Carruthers.

- A commercial yabby fishery operated in Lake Alexandrina from 1970-75
- In 1972 and 1973, in excess of 100 000kg per year of yabbies were removed – this equates to about 2 million yabbies per year
- The yabby population in the Lake has not returned to the high levels of the 1970s[10]

Today's good haul of yabbies does not come close to what was once available in the Lakes. Photo source: Brian Schulz.

Acid sulfate soils

Over the millenia, the sediments of the Lower Lakes have developed iron sulfide minerals from natural organic carbon and sulfate in an oxygen-free environment. With a decline in water levels, these materials are exposed to air, oxidise and form sulfates. When re-wetted, sulfuric acid is produced and toxic metals such as aluminium may be released.

In March 2009, when the water levels were very low (-1.4m AHD (mean sea level) or more than 2m below normal lake level) some 20 000ha of these sediments were exposed around the lakes. Potential acidification of the whole Lakes system was feared.

Most aquatic life needs a minimum pH of 6 to survive, but acidified water can be as low as pH 2, although it is often around pH 4. Fish and other creatures will try to avoid acid water, but if they can't, fish kills may occur. Acid water can have other negative effects to fish like damaging their skin, reducing their growth and reducing the ability of fish eggs to hatch. Acid water is also high in aluminium which is toxic to most fish, damaging their gills and leading to suffocation.[8]

Luckily, only small areas of shoreline showed serious acidification. Some aerial spreading of fine limestone was used to assist with neutralising these areas. Other areas were deliberately kept inundated with water following the construction of earth 'regulators' at Clayton and Narrung. As a result the waters remained greater than pH 7 and no fish kills were observed.

With much interest focused on the area, a Milang community initiative, the Lakes Hub, was formed to connect Government with enthusiastic and committed local groups. Community and agency monitoring and bio-remediation programs are ongoing.[13]

Acres of ducks

Terry knows that the wildlife in the Lakes was once measured differently than it is now.

I've talked to the grandson of one of the families who were professional duck shooters. And the ducks were on the lake in huge rafts. They didn't count the ducks in 200 or 300, they said, there's four or five acres of duck. That's how big the mobs were.

Terry and John explained how the abundance of birdlife also tells a story of Lakes thriving with the sort of feed that was also great for the fish.

Originally the Lakes were fresh, and in some places the ribbon weed, Triglochin, was two miles into the water. Then on the shore there were reeds, and then there were swamps and lignums behind them on the plains. And that water reed was where the invertebrates lived. The old fishermen and duck shooters say that there was a tiny little snail that lived in the water weed. I think they're more like a cockle or mussel than a snail. When the water weed was killed off by the sea water intrusions, that little snail died and then the ducks disappeared.

Little things lost

Henry Jones came to Clayton on Lake Alexandrina in the 1960s. He agrees with Terry and John that the devastation of the small animals in the system has effects for all the animals.

Little things like spiral snails. The swans used to live on them, and the musk ducks and the blue billed ducks, and the widgeon, the grebes. All those diving ducks. I used to throw an anchor in the water for ten minutes and pull it up and it was just covered in these snails. They're not there anymore.

Historically, about 18 species of snails lived in the River Murray in South Australia but natural populations of nearly all of these have declined.

Source NSW DPI.

Notopala sublineata hanleyi, was thought to be extinct in South Australia until it was discovered in irrigation pipelines in the Riverland region.

Notopala spp. produce 'miniature adult' babies and so require high protein, low carbon diets. River regulation is thought to have encouraged carbon rich algae in stable weir pools, meaning these snails don't get enough of the right food.[11]

Terry thinks that the changes to the Lakes reach back into the nineteenth century – when non-Aboriginal people first settled in South Australia.

There was an inspector of fisheries in the late 1800s who wrote a report to say that the Coorong was going saltier than it was before. He also detailed how black bream, which were a major fish in the past, had almost disappeared and the mullet were taking over. So, even as early as 50 years after settlement things had seemed to change down the Coorong. With the salt water coming into the Lakes more and more, the cod and the callop disappeared back up stream and the mullet and the mulloway came in from the sea.

Prior to their construction the barrages were seen as the solution to the problem of increasing salinity. A Letter to the Editor of *The Advertiser* (Adelaide, 31 May 1915) states:

What is the position to-day? The lakes have been lower throughout the year than at any period known to white men … . [T]he encroachment of the sea water has gradually increased. It culminated in the storm … [which] drove the water back, and allowed the inrush of sea water … . One of its effects was to destroy in Lake Albert one of the finest spawning grounds for cod in this State. … A barrage would have prevented this ….

Mulloway for isinglass

Mulloway, a saltwater fish, has always been a popular fish for both professional and recreational fishers. It is also a favourite of the Ngarrindjeri people. Terry points out that in the early days not all fish were caught because they were good to eat. The dried swim bladders of some fish were used as isinglass, a type of gelatine and clarifying agent used in beer and winemaking.

Originally the mulloway industry wasn't for flesh at all. It was for isinglass. They took what they needed and chucked the rest of the fish away. I've met many local people who say that there's no wonder there's no mulloway down there now because we used to see great heaps of them on the shore rotting because they just caught them and threw them away.

Fish piled up after a big catch. Photo source: Garry Hera-Singh.

Mulloway

(*Argyosomus hololepidotus*, jewel fish, jewie, butterfish)

Image: NSW DPI.

- Found in Africa, Madagascar and along the southern coastline of Australia from Shark Bay in WA to north of Brisbane in Qld
- Opportunistic predators, feeding on a variety of fish, molluscs and crustaceans
- Generally spawn in marine waters just outside of the surf zone. Egg and larval development occurs at sea
- Juveniles settle in estuarine nursery areas for three to four years
- Thought to live for a maximum of around 30 years
- Popular recreational species
- Some captured from freshwater of Lower Lakes
- Large mulloway fishery existed in the Lakes prior to barrage construction in 1940s
- Still the basis of a small commercial fishery in the Coorong Lagoon, but impacted by the presence of the barrages

Tracy Hill – *A low-tech, low-impact fishery*

Tracy was born in 1962, and initially worked in Meningie at the 'Bank of South Australia'. There she met Glenn, who had grown up in Melbourne. In the mid '80s he was working his way around Australia, doing whatever work he could pick up. He came to Meningie and befriended a professional fisherman. After going out one night as his deckhand he was hooked.

Instinct for fishing

Tracy and Glenn have since married and she is now his business partner.

> *He bought his licence in 1990. As far as older pro- fishermen are concerned, he's a new kid on the block.*

Glenn fishes at night, setting his fifty metre nets according to conditions at the time. He has learnt to understand the wind and waves, the weather, and how to find the right nook or cranny in the many places in watery areas around Meningie. He says.

> *You really need to think: cave man. You're really acting with nature, and there are no human rules if you're working with nature, and remember, this isn't like a farmer who's got a fence around a paddock, and he's cleared the land, and he's planted this and done that. We have absolutely nothing but nature to work with. And that process is a much more base instinct than anything else.*

Since starting, Tracy and Glenn have built the business up and now employ a fulltime deckhand for the boat and six people in their Coorong mullet processing rooms behind the house.

Glenn Hill running big mesh nets in the Coorong. Photo source: Garry Hera-Singh (Photo notes *Courtesy of Glenn and Tracy Hill*).

Boats for fish and fishing

The Lower Lakes, with their highly variable and unpredictable conditions, present a challenge for fishers using boats. The centre of Lake Alexandrina is classified as open-ocean, where howling winds from the Southern Ocean can whip up monster waves.

In the early 1900s Lakes fishers usually had one larger 18ft sail boat - one fourth or one-third decked forward. This boat carried them from home base in Milang or Goolwa, across the Lakes to mid-week camps. In 1907 one observer noted: *The men who go hooking are nearly all family men – good fearless boatmen*.[6]

Ngarrindjeri people often worked with the fishers at campsites. Smaller boats, dinghies or flatties were used to manoeuvre around the shores and swamps setting seine, gill and drum nets.

Boats made the run home on Saturday to meet the rail for market, and fishers spent Sundays with their families.

Sailing boats were eventually fitted with motors from the 1950s.[7]

Photo source: Garry Hera-Singh

Hard times for flounder

Tracy laments the changes in the southern lagoon of the Coorong, which is now hypersaline (up to five times saltier than the sea) and at risk of ecological collapse.

They used to get two hundred tonne of flounder out of the southern lagoon. And hundreds of tonnes of bream. Back in the seventies, early eighties, there's guys who've paid for their whole freezers and processing plants with the money from the flounder in the southern lagoon.

Garry Hera-Singh's maternal ancestors started whaling in Victor Harbour 1854-60, while his paternal forebears fished the Lower Lakes from 1900. Garry continues the family tradition as a commercial fisher but worries about the changes.

It's different for the species that are marine dominant, in other words, they live in the ocean, they grow and reproduce in the ocean and don't rely on the Coorong particularly. If the Coorong were to disappear tomorrow then those species will still continue. But the estuarine dependent species, the black bream and the green back flounder, the congolli, they're all doomed. They're in very, very low numbers.

Tracy explains how the changes in the flow from water use, sometimes thousands of kilometres away, show up in the numbers of fish at the end of the system.

Because of the lack of flows there's been no real breeding events, except in some isolated little areas where there is fresh water coming out of the sand hills. We'd get to a spot with our mullet net and we'd get all these little fifty cent size flounders. And you know they've bred, but trouble is, they're not reaching maturity. We also notice that when the water from the southern lagoon comes up into the northern lagoon you'll get dead flounder. They can't swim very fast so the hypersaline water can overtake them – if it's deoxygenated water, they'll just turn their toes up and die.

A sustainable professional fishery

Tracy has become an active member of the Southern Fishermen's Association. She is very proud that this Fishery has undergone restructuring. The Hills hold one of only 36 remaining licenses. They have also participated in an audit carried out under the rules of the Marine Stewardship Council. As a result they are internationally recognised as a sustainable fishery.

Barrages and fish

For fish the construction and historical operation of the barrages has created a series of problems:

- the change from fresh to saltwater is abrupt
- fish can't move around the system at will to find food, refuge, migrate or spawn
- water levels have been more highly regulated

The barrages prevent sea water entering the Lakes and River. During times of flow, the barrages are opened to pass inflows, allowing fish and freshwater to reach the Coorong and sea. Stable water levels have created conditions suitable for introduced species like carp and redfin.

Under drought conditions water regulation and extraction for human use upstream mean the barrages are kept closed, preventing the movement of fish, nutrients and food materials to the Coorong. This is thought to be one of the major factors that has degraded habitats and caused declines in fish populations of the region.

To overcome some negative impacts of the barrages Lake water levels are now operated with greater variability and allocations of environmental water are improving the Lakes Coorong connection. Fishways have also been installed in the Goolwa and Tauwitchere barrages and more are proposed.

Studies at Tauwitchere have indicated more than 30 fish species will use the fishways and millions of fish are likely to use them in a single year![5]

Marine Stewardship Council endorsement is the highest environmental standard for fisheries in the world, and we've got it. We were the third fishery in Australia after the Western Australia rock lobster and the Macquarie Island ice fishery, which operates down in the Antarctic. The MSC certification as a sustainable fishery is for our four main species: golden perch, mulloway, pippies and mullet.

Mullet, one of the fish that the Hills are certified for as a sustainable fishery. Photo: Jodi Frawley.

One of the first

One of Tracy's professional colleagues, Garry Hera-Singh, thinks this certification partly comes down to the practices that have been in place for generations of fishers in the Coorong and Lower Lakes.

In my grandfather's day, all those guys recognised that what we did was sustainable. This fishery was the first to put out an environmental management plan for a commercial fishery in the world. We completed that in 1998. And then the conservation groups got interested in what we we're doing and World Wide Fund for Nature, which has a sustainable fishery section in it, were interested in what we were doing and they co-sponsored us in to getting a certification process. So it was just another way of telling the rest of the world that hey, it's not over-fished and rundown because of the pro-fishers.

Another professional fisherman, Henry Jones, explains why it is so important to balance caring for the environment with best practices in business.

I realised many years ago that if we weren't sustainable then the public wouldn't put up with us. They'd get rid of us, so I think that is probably why we're the last commercial fishermen on the river, because we've done all this work.

Wind brings food for fish

'Wind seiching' is the movement of water by wind energy. Wind is a major driver of water movement in the Coorong and Lower Lakes. Water levels between Lock and Weir 1 near Blanchetown and Wellington vary by up to 50cm daily due to this effect.

Wind sieching is important for keeping the Coorong, Lower Lakes and Murray Mouth healthy. This effect is believed to increase oxygen levels in the water and distributes nutrients used by plants and animals, in particular fish, for food.

Wind seiching also plays a part in flood irrigating the foreshore of the Lower Lakes, encouraging plant growth through late summer.

The Lake foreshore, such as seen here near Milang, benefits from wind generated watering in hot weather. Photo: Jodi Frawley.

Making connections

Different communities - different connections

Ngarrindjeri man, Jack Koolmatrie was born in the 1910s on the Coorong. In 1980, he told Bonita Ely about the ways he had got about the Coorong:

> *We used to ramble all over the Coorong and down the Coorong on foot, right from the Murray mouth down to Kingston. And then I done it with the boat; then I travelled down on the push bike, and horse. And then I got a bit well off; I travelled down there from Kingston and back to Rabbit Island in a Ford T across the Coorong.*[1]

Being part of a fishing community is also important to Tracy Hill. She sits on the Southern Fisher's Association, and has worked with other fishing businesses and families to raise the profile of their fishery. She is also an advocate for the place of women in the fishing industry.

> *A group of women in the wild catch industry formed the Women's Industry Network. We were the ones that were under attack all the time from the public.*

> *There were people from over the west coast, people from down the south east, people in the north of Adelaide and the blue crab people. We had quite a few groups and we mobilised the women in this area to raise the profile of fishing.*

Women have been and still are important to the success of fishing activities in both Aboriginal and European traditions. Some travelled with their husbands, living in camps and caravans as they followed the fish. Ngarrindjeri women have a strong tradition of weaving fishing nets using local reeds.

Bethel Goldfinch, pictured here in the late 1940s, was one of the Coorong fishers who worked alongside her husband Reg, travelling in their caravan to wherever the fish were. Photo source: Gerry Hera-Singh (Photo notes Courtesy of D and J Ayres).

Reeds like these on the banks of the Murray further upstream, used to be a common sight on the edges of the Lower Lakes. Photo: Malcolm Wilksch.

Ngarrindjeri reed weavers Ellen Trevorrow and Noreen Kartinyeri at Bonny Reserve on the Coorong 2008. Annie and Jack Koolmatrie recalled:[1]

> *They used to string their own nets with a type of rush. They used to get this long grass and they'd chew it to make it pliable, then they would lay it out in the sun to sort of cure it. Then they would make a net just the same as any nylon or cotton net.*

Photo source: National Library Australia PIC/12975/5 LOC Cold Store PIC CHAP.

Local reeds for Ngarrindjeri weaving

Ngarrindjeri women and children have always harvested the reeds from the edges of Lake Alexandrina and Lake Albert.

The historical records show the same techniques which Ngarrindjeri women use today: a range of different types of weaving to create baskets, string bags and nets for fishing.

These are made by weft-twining, knotting and coiled baskets methods. Reeds are stripped and then dried, and could be softened by chewing or woven green as a communal activity on the shores of the Lakes. Like fishing, weaving has always been an opportunity to gather for storytelling.

Once complete, woven items trapped fish, acted as keeper nets and were used to store fish as they were carried from the water to the campsite.

Baskets and other hand woven artefacts became items for sale to curious immigrants and tourists – providing important income streams from a traditional and time-honoured practice.

Ngarrindjeri women are internationally recognized for their creativity in design and weaving skills. Women share their skills at weaving workshops that are regularly held at Camp Coorong.

Another group of people that are making connections with the Coorong and Lower Lakes are those interested in the environment, especially from a scientific perspective. John Yelland and Terry Sim have been involved with the Strathalbyn Naturalists' Club, the River, Lakes and Coorong Action Group Inc. and the Lakes Hub. John explains the importance of the way the group works with scientists from the South Australian Museum and other agencies and universities.

The Strath naturalist group was really incredibly valuable for the area because it brought people together who were interested in the environment from around the whole region. My mum was one of the early members. It also brought in experts and suddenly, you have a crossover of specialist and local knowledge, which is fantastic.

A productive day fishing at Point Sturt on Lake Alexandrina in about 1958. Photo: Graham Yelland (Source: John Yelland).

Congolli

(*Pseudaphritis urvillii* – tupong, sandy)

Photo: Gunther Schmida.

- Small to medium sized fish, maximum 35cm, that lives 3-5 years in the Murray-Darling Basin
- Found with logs, rocks or overhanging banks. Its eye placement on top of its head allows it to be partially buried in leaf litter or sand
- Moves between freshwater and sea water as part of their life cycle
- Known to migrate up to 215km in lower Murray (but uncommon upstream of Wellington)
- Spawn in winter and early spring. Females reside in freshwater and males in the estuary. Both appear to move to marine environments to spawn
- Large upstream migrations of juveniles from ocean / estuary to freshwater in summer
- Eats small fish, aquatic insect larvae, small crustaceans, snails and worms
- Threats include barriers to movement and declining river flows

A composite photo showing the expanse of water at Lake Alexandrina – the Murray mouth is out there somewhere. Photos: Jodi Frawley.

Ngarrindjeri flag

The Ngarrindjeri flag was first flown on 21st November 1999 at Kumarangk (Hindmarsh Island).

The dots represent the eighteen Lakkinyeris of the Nation who are all called to Tendi by the scared boomerang. The traditional spears used for fishing take pride of place in the design with the waters of the Coorong, Lower Lakes and Southern Ocean all represented in blue. The sun, central to all life in Ngarrindjeri Country, is a central motif of the design.

The flag flies permanently at Camp Coorong near Meningie.

Belonging

Jack Koolmatrie saw many changes in the Coorong and the Lower Lakes over his lifetime. When he talked to Leigh Hobba in 1980, he remembered the way that his great grandfather would travel up the Darling River as far as Wilcannia looking for work and meeting up with other Aboriginal people along the way. But the Coorong was always a special place.

> *That was the tradition – they weren't lazy like some people think they were. My great grandfather, he got out early in the morning, and he'd rejoice and he would sing his language and dance – a great dancer he was – just to bring the new day for him. He was happy all day.*

He also remembered how his great grandfather, who was an excellent fisher, continued Ngarrindjeri traditions: [1]

> *My great grandfather used to get out early in the morning, and he had his two corroboree sticks and he'd corroboree with them, early in the morning. That was their tradition. He'd go out and run his nets in the early hours of the morning when we were living on the Coorong. He'd have a real good corroboree when he got out, you know. That was like saying he was satisfied and pleased with what he got for the day.*

Visions for the Coorong and Lower Lakes

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.

The little things ...

Henry Jones is a member of the Community Stakeholder Taskforce for the Murray-Darling Basin Native Fish Strategy. During the drought, Henry observed the way that scientists worked hard to ensure the protection of the smaller fish of the system.

I mean we had scientists going into little pools and taking out the Yarra pygmy perch and Murray hardyheads and putting them into aquariums and trying to keep them alive. When the water comes back they can put them back in and the species will not be lost forever. We've got a whole heap of species here that are unique to this area, and unless we can do things like that, or unless we can fix the Murray-Darling Basin and put some water back in the river and make it sustainable, then they will keep on dying unfortunately.

And the big picture

John Yelland and Terry Sim think that rather than everyone thinking about their own backyard, people should think about the Murray-Darling Basin as a whole. Terry says

We would like to see the river system looked after as a whole system and looked after from the mouth up rather than from upstream down. We can't understand why people upstream can't realise that what's happening here, if it's not fixed, it's a cancer that will move up through the system. There is a fair bit of pain, as far as humans go, especially for irrigation and orchards, but the environment's had the pain for the last 100 years. It's maintaining itself but it's nothing like it used to be. And we've got that little window of opportunity of repairing it. If you've got a healthy working river and it's flowing to the sea, everyone should be happy.

Yarra Pygmy Perch saved from Lake Alexandrina.
Photo: Michael Hammer.

Fish rescue!

During the recent drought, water levels below Lock and Weir 1 dropped to such an extent that wetland and refuge areas for a number of small native species dried up. Quick action by committed volunteers and government agencies ensured the last remaining populations of purple spotted gudgeon, southern pygmy perch, Yarra pygmy perch, Murray hardyhead and river blackfish didn't disappear for good.

Intensive sampling for these fish was carried out at locations where they had been known to occur. As many individuals as possible were collected and transported fish to aquaria where they would be safe.

Since being in captivity, some of these fish have done really well, not only surviving but breeding! Their genetics are being monitored carefully to make sure genetic diversity is maintained.

Now that water levels in the River Murray and Lower Lakes have improved, these fish are able to be released back into the wild.

Special congratulations and thanks should go to the volunteers including individuals, community groups and schools who have cared for these fish during their time in captivity.

For more information contact Native Fish Australia SA: www.nativefishsa.asn.au.

Tracy Hill is optimistic for the future – if we can get things right.

How about just fixing the environment up, and then it will be there for everybody. Mother Nature does all this stuff for nothing. It uses solar power and wind power and it does it for nothing. Our motto is 'look after the environment and the fish will look after themselves'. And it will respond before your eyes.

The Murray Mouth – the end of a very large river system which has diverse land uses, regulation and significant degradation.
Image source: http://www.thelivingmurray.mdbc.gov.au/__data/page/1482/WALKER_report1.pdf

Fish communities of the area

Fish monitoring at the barrages and island overflow channels in 2007-08 identified up to 33 freshwater, estuarine and marine species.[9]

Monitoring of island channel and lake edge habitats recorded 26 freshwater and estuarine fish species in 2005-07.[14]

The estuarine small-mouthed hardyhead dominated the catch for both these studies, but other fish captured in large numbers included: bony bream, Australian smelt, flathead gudgeon, introduced Eastern gambusia and redfin perch (freshwater) and Tamar river goby, sandy sprat and yellow-eyed mullet (estuarine).[14,9]

Species that move between fresh and saltwater to complete their life cycle (congolli and common galaxias) were also captured in large numbers.[9]

Over the last decade, the extensive drought has resulted in a significant reduction in freshwater flow to the Lower Lakes and Coorong.[15] In the estuary and Coorong, monitoring of black bream and greenback flounder has seen a significant decline in abundance and recruitment.[15]

The lack of inflow also has serious implications for the Endangered Southern pygmy perch, Yarra pygmy perch and Murray hardyhead that rely on the specific habitats found in the island overflow channels and which could be lost if inflows continue to decline[14] occur once again.

The Lower Lakes, Coorong and Murray Mouth are one of the *Icon Sites* of the Murray-Darling Basin. This designation recognises the unique cultural, social and environmental values of this place as well as the unique threats it is facing. The acknowledgement of and respect for cultural heritage values is an important aspect of the area's rehabilitation.
Photos: Jodi Frawley.

Katarapko

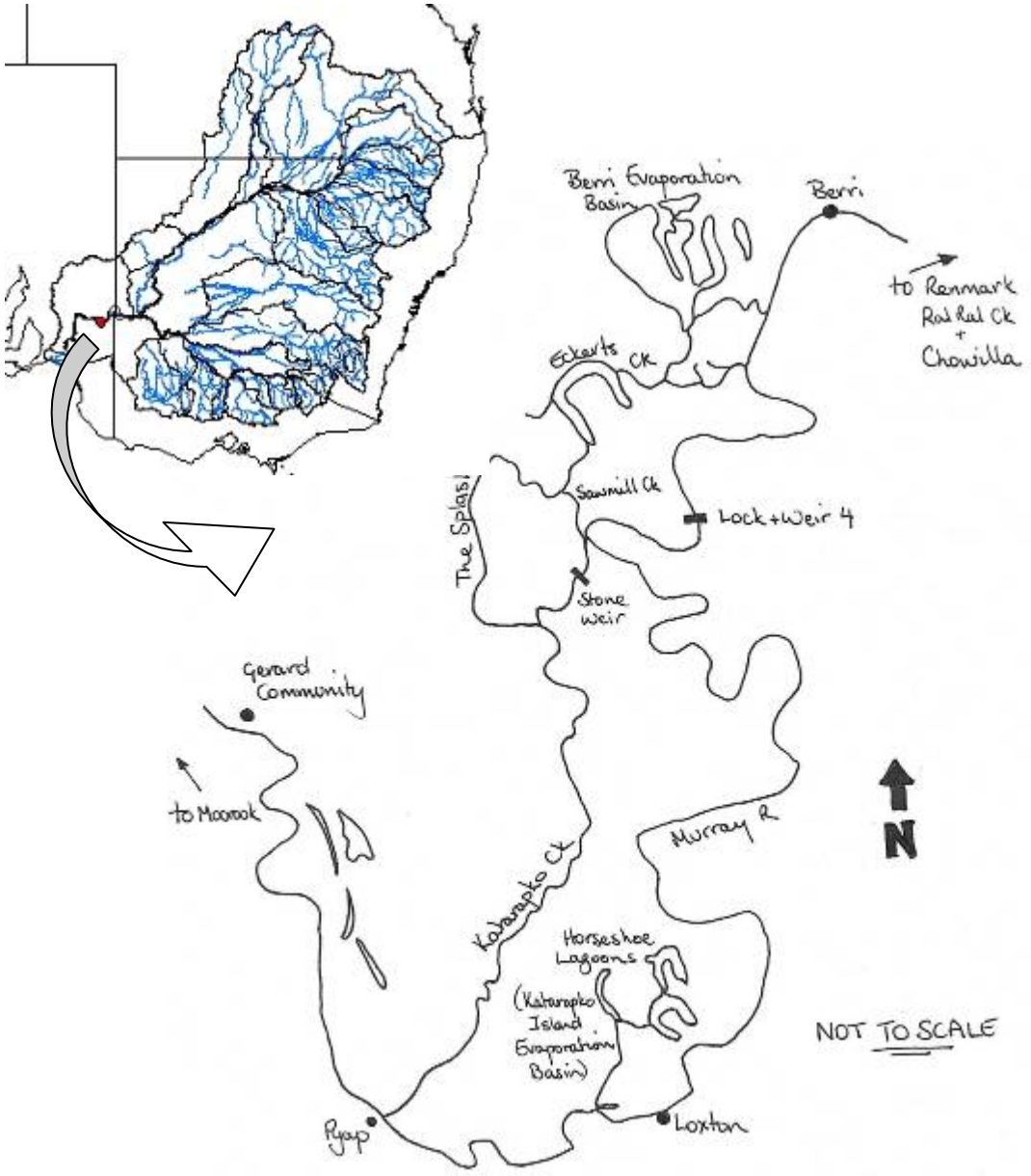
Source: Barry Porter.

Source: Scott Nichols.

Source: Tracy Bye.

Source: John Aston.

Source: Scott Nichols.



Howard Hendrick has lived most of his life close to Katarapko Creek. He grew up a 'Blocker' and gained his own block as part of the Returned Soldiers Scheme after World War Two. Photo: Jodi Frawley.

Barry Porter grew up in Berri. He worked on the river barges in the 1970s, travelling from the Murray Mouth to Mildura. It also meant Barry explored, and fished, a lot of the river. Photo source: Barry Porter.

Tracy Bye, pictured with her son, Jack, has fond memories of being taught to fish by her father and long summer holidays camping and fishing by the river. Photo: Jodi Frawley.

Kingsley Abdulla grew up on the Gerard community. He believes in continuing and building on the relationships his people have had with the river for millennia. Photo: Jodi Frawley.

… Murray cod … at Renmark and Loxton this fish was so abundant last season that people used it to feed fowl and pigs!

The Advertiser, Wednesday 11 September 1912

Introducing the river and its people

Once known as Crabb's Creek, Katarapko Creek is a small anabranch of the Murray River, located between the towns of Berri and Loxton in the Riverland region of South Australia. Its 9 000 hectare grey clay floodplain is covered with blackbox, saltbush and lignum. The creek's horseshoe lagoons, marshes and islands are the traditional lands of the Meru peoples.

Chasing Pondi

This is Meru country, where the Eriwarung, Moorundi, Barmerara, Maru and Narwij-jerook groups all lived along what is now known as the Riverland. Large groups lived in semi-permanent camps, hunting fish and birds and collecting mussels from the food-rich wetlands and waterways of the Murray and Katarapko.[1]

Today, the First Nations People (Riverland) are part of the Walkandi woni constellation that share creation stories with the Peramangk and Ngarrindjeri of the mid and lower Murray respectively.

Like other Murray groups along the River, the Old Peoples' stories tell of the chase for Pondi – the Murray cod ancestor – across the land. The thrashing of Pondi's tail created the wide channel of the Murray as well as the lagoons, billabongs and creeks like Katarapko.[1]

A wetland area near Renmark that still has reed beds and riparian vegetation. Photo: Scott Nichols.

In these places, Aboriginal people see more than a unique waterway – they see the essence, excitement and power of the ancestors.

The Arrival of the Europeans

Many people have come to the Riverland as migrants, and fishing has been a way to explore a new place and to put down roots in a different environment to the one they had grown up in.

Since Europeans arrived the health of the river and its fish has been shaped by the people who came to live there and the industries that developed. Grazing, dryland farming, steamboat trade and irrigation all needed different types of workers, bringing new people with new needs to the river and new ways to catch fish.

Fishing and hunting have been important ways of supplementing diets for a long time.
Photo source: Berri Barmera Local History Collection, Berri Library & Information Centre.

Commercial fishers were the first industry on the river, viable because of the abundance of native fish in the river.

Enormous grazing runs bordered lengths of the river and led to more permanent settlements.

The South Australian Government's Village Settlement Scheme in the 1890s saw up to 400 people arrive *en masse* and grow food crops.

Successive governments encouraged irrigation settlements by building locks, weirs, channels and pumping stations. Many people began by living along the river in tents made from tin and hessian bags. Fishing and hunting were important ways of supplementing their diets. Aboriginal people worked alongside the new immigrants, shifting from stock work to the seasonal fruit industry labour.

Labour intensive furrow irrigation in early Riverland orchards. Image source: Cobdogla Steam Museum.

By the time the Returned Soldier Settlement schemes started after the first and second World Wars, water certainty allowed the 'Blockers' to grow fruit and grapes. They fished for food and fun, just as Aboriginal people were continuing to do.

Today, Katarapko's red gum and river coobah-lined waters leave the Murray near Lock and Weir 4, rejoining the river 16km later.

Dead box trees and abundant pigface are the result of altered water regimes and increased salt. Photo: Scott Nichols.

Katarapko has seen many changes as its waters were blocked, floodplains grazed, and surrounding irrigation districts flourished. Berri Evaporation Basin and Katarapko Island Disposal Basin have both taken a toll as they collected salty irrigation drainage water.

Fishing for market

Professional fishermen have featured in the history of the river around Katarapko Creek. The fishing industry predated the grazing runs in the 1860s. The depression of the 1890s increased the number of professional fishermen, who regularly fought over fishing rights. Combined with the drought, they saw fish numbers decline drastically. Fish went to market on steamboats and later by rail and road.

In 1923, the government declared licenses for 'reaches' which only gave a right to fish, but no claim on the water, riverbanks or the fish themselves. By 1936 there were 195 reach holders in the Murray River above Lake Alexandrina.

Fishing supplemented incomes when it was combined with working on irrigation blocks. Businesses were family affairs. Some members set nets and hauled catch, while others tarred nets and repaired knots in the mesh.

Professional river fishers today can catch only yabbies and non-native species, such as carp.[7]

Men like Gilli Stoneham, John Aston and Malcolm Wilksch have fished the river most of their lives. Their stories, too, are woven into the history presented here.

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Howard Hendrick – *Growing up as a Blocker*

Howard's parents came to Renmark after the First World War to settle an irrigation block at Renmark. He was born in 1923 and grew up near Ral Ral Creek.

A favourite stretch of the river

Howard now lives at Pyap, near the mouth of Katarapko Creek. In his youth, his family favoured one stretch of the river, near the house, for swimming, fishing and relaxation. Howard remembers:

> *Most of the blockers were fairly poor on the whole. We were fairly self-sufficient. We had our own eggs, we had our own milk, we made butter, and we had our own vegetables. That was another good reason that we went fishing, it was a good supplement for us. We went fishing often because we never had any fridges and you couldn't keep the fish very long.*

A welcome diversion

Howard's family mainly grew fruit for the dried fruit market – sultanas, raisins and currants.

Howard and his brother had to feed the chooks, pigs and cows before breakfast. And after school they would cut lucerne and collect vegetable scraps for the animals as well as chop wood for the stove. During harvest the boys would take three weeks off school to help out. Fishing and the river were a welcome diversion from life on the block.

> *And I look at the Ral Ral Creek it looks like a river, so vast and big. There were lots of logs in the river, lots of fallen gum trees over the years and it was a mecca for fish. In those days, cod was equally as plentiful as callop and bream. They were the three main fish. There was a sprinkling of catfish, but I don't remember seeing perch or carp in those early days.*

A lovely place to cool off

Howard's father was a very keen fisherman. Fishing, he says, enhanced their social life, because on Sundays they would join the other fruit blockers at the river. Sometimes at the widest stretch of the Ral Ral, dozens of families would gather for picnics and swimming on hot summer days.

Coming to the Riverland

In 1887, the Chaffey brothers came to Renmark hoping to transform the desert into an irrigation settlement.[3] The government also encouraged immigration with communal Village Settlements across the Riverland, including at New Residence, Pyap and Loxton's Hut. Although early irrigation schemes failed,[2] governments continued to believe in engineering solutions for securing water for agriculture and to support the irrigation industry.

Image source: Cobdogla Steam Museum.

Pumping stations initially stored water off-river and gravity fed it through hand-built channels to crops. Large gangs of men were recruited from the city to build the channels. Later, water was pumped directly from the river.

Returned Solider Settlement schemes were introduced after both World Wars, and the smaller blocks associated with these schemes brought more people to the area.[4] The schemes required land clearing, which increased the areas available for planting crops but also changed the water tables around Katarapko Creek. This contributed to developing salt problems.

As young children we'd go down to the river and it was lovely place to cool off. In fact the place had lovely shady trees, had nice green grass on the bank and it was a nice place to put a rug out and sit and have a picnic. Meantime I had three or four lines in. In those days, I don't remember anybody having a boat like today, everybody's got a tinny boat, including me. So you never went up and down the river. You just went to one place and there you stayed.

'Lock the river, unlock the land'

After the final year of the Federation drought in 1902, dreams of drought proofing the land saw calls to 'lock the rivers and unlock the land'. The River Murray Waters Agreement was approved in 1915, with an initial proposal for 26 weirs from Blanchetown to Echuca.

In 1929 Lock and Weir 4 was completed. It spanned the Murray between where Katarapko Creek left the river and where it rejoined. The new weir meant that water was continually pushed down the creek from the higher upstream pool. The weir also changed conditions for fish breeding, limiting migration. Stable water levels replaced small-medium rises that fish used as breeding cues.

As early as 1934, SA Fisheries blamed the locks for fish decline. Fish passage is being improved on locks and weirs in South Australia and upstream to Hume Dam as fishways are now being built – over 90 years after they were recommended.

The Depression years

The Depression years meant that the Hendricks became more reliant on the resources available in the river. A day on the river also meant catching and collecting baits from the local area.

So actually fishing was a very cheap way of entertaining for a family. Didn't cost us anything for bait, 'cos all the bait was available in the river. And what we'd do, first thing, my father would shoot a bird, and that would go in a shrimp tin – well really, dip tins. Dip tins were used on the block so we had a lot of them, it was like a more or less better than a net. So you tied the bird, cut it half and put it in the shrimp tin, so we got shrimps.

Amas Harvey (Jack) Heward watching his son Frank Heward fishing near Berri, 1950.
Photo source: Berri Barmera Local History Collection, Berri Library & Information Centre.

Perfect bait for cod

The smaller animals that lived in the river were so plentiful that there was always that perfect bait to catch cod.

We'd also dive in the river as boys, a little area we knew was safe and there was always mussels available in the bed in the river. So we'd get mussels for cod. We'd also catch little frogs and you'd get them in the bark of the gum trees, you'd pull off bark and there'd be a frog hibernating in there. Or we'd get little yabbies you'd also get in the shrimp tin. So that was the main bait for cod.

Using water for irrigation

During the years between WW1 and WW2, irrigation on Howard's family block was gravity fed. Water was pumped out of the river and held in storage, then released down miles and miles of man-made channels. Howard remembers:

In those days there was no sprinkler irrigation, no pumps, it was all gravity fed. So the water went down the vines and you had to direct it down with shovels and make furrows. And they had a bulkhead that held the water back 'cos it was a gravity channel, went for miles from the pumping station. And eventually ended up in Ral Ral Creek. The bulkheads held the water back so that many growers could water at one time.

By the 1950s sprinkler irrigation was being developed. By the 1970s many converted to 'under-tree' systems to avoid salt damage to foliage. Image source: Cobdogla Steam Museum.

Over the twentieth century, more blockers came to the Riverland, more irrigation was built and more water was pumped from the river. Howard and his brother both got blocks at Loxton as WW2 veterans.

Salt

Salinity became a new problem for the local communities to manage. One of the changes to Howard's block was the introduction of overhead sprinklers, but these where then changed again to the more efficient drip irrigation used today in the Riverland.

Also of course the salt content increases as the river goes down, and that may have a bit of effect on the native fish, because they're used to the fresher water from years ago. It went very salty, oh I don't know, 20 years ago. I remember we converted all our overhead sprinklers above trees to under-tree, because the salt in the water is so high it was burning the leaves on the tree. So all the irrigation practices on the Riverland changed, to watering under the trees and under the vines rather than over the top. I think because when the rivers were high it would flush all the backwaters out where the salt had accumulated in the river.

The Berri Evaporation Basin (pictured) drainage scheme started in 1942, although salt and drainage issues were noted at Berri Experimental Orchard as early as 1923. Photo: Scott Nichols.

The rise of salt

Native fish in the Murray-Darling evolved to tolerate salt levels that fluctuated with the natural cycles of drought and flood.

Due to underlying geology, the lower reaches of the Murray have always functioned a natural pathway for removal of salty groundwater. During floods or high rivers, these waters are diluted, but during times of low flow, water tables would be exposed and the salinity of the river would increase.

Native vegetation was the key to keeping a balance between the water tables and salinity. The system changed when there was widespread clearing for grazing and cropping. Early grazing runs and the Overland Stock Route hugged the river, as livestock needed access to water. However, the stock damaged the river banks by eating and trampling the vegetation. In 1917, 800 bullocks were pastured at Katarapko Creek.[5]

Cropping and an internment 'wood camp' at Katarapko during WW2, meant trees were removed to fuel pumping stations, produce fence posts, and make way for irrigated crops.[6] Loss of trees and addition of irrigation water raised the water table and brought salt closer to the surface as waters evaporated. Attempts were made to flush salts away by adding more water to crops.

The rising water table has been a serious problem from the 1940s, necessitating evaporation basins to dispose of saline drainage water. Today at many priority sites, 'salt interceptions schemes' act to collect some of the salty groundwater before it reaches the river and redirect it to evaporation basins away from the floodplain.

Barry Porter – *Spending time on the water*

Barry was born in 1949. As a youngster growing up in Berri he loved nothing more than to grab his pushbike with his brother and head off to the River with their cord-lines attached to bamboo rods.

Families out fishing

The professional fishers locked up the reaches around Berri, so the family would often travel out of town to throw a line in.

In the '50s we'd travel a couple of miles outside of Berri, because you knew you could catch fish. Dad and Mum's brother would go out in the old boat, rowing and fishing while Mum looked after the two kids on the riverbank. Plenty of other families did the same thing. We used to fish fairly regularly. Probably a couple of times a week in the summer. The family would be out probably at least once a fortnight because it was a cheap addition to the family food.

Floods mean yabbies

In Barry's family the floods meant yabbies. As the flood waters in the Murray or the Darling made their way downstream to the Riverland the Porters were preparing for floodplain adventure.

Yabbying, an historic institution. 1956 we had a huge flood here, 1957 we had the biggest yabby run I've ever seen. It was what you did after a flood. While the floods were up you get the yabby nets out.

Barry describes their yabby nets as two wire hoops, with the bottom one covered in bird mesh and the sides made from an old wheat bag. He remembers:

When they got wet they were very heavy.

Barry's father with a catch. Photo source: Barry Porter.

The regular flood water of the 1960s and 1970s filled the myriad of wetlands, lagoons and backwaters of the local Katarapko floodplains. As the waters peaked and started to recede, the signal was up for the boys to head out yabbying.

We preferred very shallow water, no more than about two feet of water, you actually had to row around in the flood plain before the flood's gone right down. Yabbies came out of the mud to breed.

Yabby

(Cherax destructor)

Photo: Charlie Carruthers.

- Seldom over 250g
- Widely distributed in SE Australia
- Found in ponds, billabongs and slow flowing streams
- More active in the warmer months, less active when water temperatures are below 14°C
- Breed from September to March
- Fast growing: can reach 50g in first year
- Grow for 6-7 years
- Reduction of backwaters, floodplains and billabongs biggest threat, overfishing leading to localised losses

On a barge on the river

As a young man Barry gained his crane driver's license and in the 1970s he secured a job on a pile-driving barge. His first job was to help install all the effluent disposal stations for the houseboats that were becoming so popular with tourists.

The barge travelled up and down 1 400 kilometres of river between the Murray mouth and Mildura. As well as driving piles, the crew maintained and rebuilt locks and helped out with odd jobs at the pumping stations along the way. They also helped to remove snags that were a navigation hazard from the main river channel.

Howard Hendrick recalls how there were more fish in the creeks, where they didn't remove the snags:

> *Years ago there was another very famous fishing spot, the Katarapko. The fish seemed to like creeks where all the logs had fallen over the years. Whereas in the main river they used to clear it for the paddle steamers, clear the logs out and make it a safe passage. Where no one worried about the creeks because there was no big ships, or boats rather, going up the creeks, so they were full of logs. And that was a marvellous breeding place for fish to feed and catch shrimps and all that sort of thing too.*

The S.S. Ellen at Berri. In the 1840s, locals dreamed of the river as a transport route to the goldfields. A decade later shallow-draft steamboats moved produce, including fish, to market. Barges removed snags with steam-driven winches to make clear passages for larger boats. The water then moved along the channel faster, scouring the riverbed as it went. By the time the locks and weirs were built rail and later road transport had replaced river trade.
Photo source: Berri Barmera Local History Collection, Berri Library & Information Centre.

I've seen islands grow

Working on the barge was a golden opportunity to explore the river by fishing and to see the changes to the river environment.

> *I've seen islands grow where they weren't before. Especially over the last 20 years when we were out in small boats a heck of a lot more. We've noticed through the '70s that the big floods shifted a huge amount of sand around. This formed the shape of the river that we've got at the moment – cut new passages through the flats in a few places.*

Upstream of Katarapko Creek, irrigation schemes have been developed for many industries. Barry says upstream irrigation means they don't see the small floods they used to. The loss of small flows and the fewer, smaller floods of the 1990s have changed the river in ways that people might not see. Barry explains:

> *We used to drive straight down the middle of the river, now we're weaving around looking for a spot through. People look at the river and, oh there's plenty of water there and it's 150 metres wide, but what they don't know is that most of it's less than a metre deep.*

Working on the salt problem

Since the 1980s Barry has worked for South Australian Water and the Department of Water, monitoring salinity and developing programs that measure and identify salt plumes in the river.

Fishing remains Barry's favourite recreational activity and he spends as much time on the water as he can. Fish are no longer as plentiful as they used to be. He doesn't see the periodic movement of the channel in the river as a problem for the fish. He says:

I don't think that that sort of change affects the fish as much as the changes in flow. It's just another symptom of the lack of flows, the gradual drying of the bottom half of Australia.

These river red gums are dying due to increased salinity and changed cycles of flood and dry. Photo: Scott Nichols.

Barry working on the salinity issues affecting the Murray River. Photo: Jodi Frawley.

Barry at play . Photo source: Barry Porter.

Snags, crays & cod

Until relatively recently there was large scale removal of snags in the River Murray to improve navigation as this story from Adelaide's *The Register News* shows:

> *'The S.S Industry has been between Lock 4 and Loxton for some time … About 50 large snags have been removed. Some were 50 feet long and yards round. Tackling broke like pieces of string when these huge logs were being lifted clear of the river. Cod and large crayfish dropped out of holes in the logs - which Captain Harry Brand considered had been on the river's bottom for half a century or more.'*
> (The Register News (Adelaide), 26 February 1930)

- Snags were also removed because it was thought they caused erosion of river banks, however it is now recognised that in many cases the presence of snags can actually reduce erosion by protecting the river banks
- There was also the misconception that snags increased flooding by reducing the amount of water that the river channel could hold. Under normal circumstances this is not the case
- The maintenance, protection and restoration of habitat including snags are objectives of the *SA River Murray Act 2003*

Tracy Bye - *For her father, a fisherman*

Tracy was born in 1964 and came to live in the Riverland in the mid 1970s. Her father, Colin Schultz, purchased the Shell depot in Loxton. With her brother and sister, Tracy learnt to fish from her Dad. Fishing was a way to explore and put down roots in their new home.

Tracy sees telling her story as a way of paying homage to her father's love of fishing and to talk about how important the river is in all their lives.

Dad loved Katarapko Creek

Dad was born down the south-east, so from all accounts he was probably more of a sea fisherman. But he just fell in love with the river. I mean it's such a beautiful stretch here. He loved going up Katarapko Creek, getting away from some of the speedboats and other people. He had his special secret spots that he'd come home with all of his fish and not tell us where he caught them. He was a bit tight lipped some times.

Colin Schultz out on the river. Photo source: Tracy Bye.

Colin patiently taught his children to bait their lines, where to cast and how to get a fish into the boat. Tracy even learnt how to fillet the fish. But being on the river was also an opportunity to take in the river.

> *He really enjoyed it and I think that's why we enjoy it down there so much as well, because we were brought up to really appreciate the colours and the water and the trees. I can remember sitting with him for ages. We'd be looking at the trees and discussing, you know, what was wrong with them or which one looked like it probably had a bird in the hollow and all that sort of stuff. It was really interesting. He just loved it.*

Always keep the callop

Unlike many fishers in the Riverland, Tracy and Colin didn't chase Murray cod as a favourite fish from the river. Tracy remembers that the three most common fish when she was growing up were catfish, redfin and callop.

> *I didn't like catfish when it was easy to catch them. They're just ugly things really. They were just slimy looking, horrible things. Dad used to keep them, of course, when we were able to, but in preference we'd always keep the callop. It's just such a beautiful meat.*

Barry Porter with a callop. Photo source: Barry Porter.

All the comforts of home

Over the Christmas holidays, the Schultz family would camp for six to eight weeks by the river. Tracy's mum wasn't quite the passionate fisher as the rest of the family. So Colin would take a generator to the river and hook up all the comforts of home.

> *He used to take the generator for her so she could use her hair curler. She would put her hair in curlers and put a cap on and sit there with the hot air blowing. We thought it was quite funny. He did whatever it took to make sure Mum was happy down there so she'd stay for that little bit longer.*

While the family stayed at the camp site, Colin would travel back and forward to work at Loxton. Often he'd give a feed of fish to people he knew would appreciate it:

> *People who perhaps weren't that well or had lost their husbands who had been fishermen.*

Clear water and white sand

Things have changed in the river since Tracy first came to the area. One of the things that she's noticed is a difference in the colour of the water:

> *I think the colour of it. Like I said, it was quite clear. When we used to go yabbying as kids in the river you would see a foot out before it became darker. Now it's quite murky. It just seems to be different. It almost has taken on quite a grey-green tinge. As a child I can remember it almost being blue.*

Over Tracy's lifetime there have also been dramatic changes to the vegetation, both in the river and on the banks.

> *There's a lot more weed growing in the river as well as from the bottom. I can't remember having to walk through weed as a kid, or having weed tickling your legs as you're coming in from the boat. Whereas that's quite common now.*

Occasionally you would see duck weed come through. We used to have fights with it, whereas now it's quite common to see large patches of it. There are now reeds growing in and on the side of the sandbars. Some sandbars we used to go to as kids were just pristine white sand right down to the water. Now they have reeds all over them growing right into the water.

Finding peace

In 2000 Colin was diagnosed with cancer, which had a devastating impact on the family. Fishing became a refuge from his illness. By Katarapko Creek Colin could find the peace and quiet to just do what he had always done. Tracy is sure that it helped him to cope.

> *And I think he found that it was quite nice just to get away a little bit on his own and deal with things in his own way. He also used to have a favourite fishing spot down around the bottom of Katarapko Creek, and when he was diagnosed the second time, with cancer, he jokingly used to say to his friend that he used to go fishing with, that's where my ashes are going. So when he did pass away that's where his ashes went, up to Katarapko Creek. And that's just where he should be.*

Tracy says: *This magnificent old river gum proudly marks the spot of Dad's ashes.* Photo source: Tracy Bye.

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Kingsley Abdulla - *Passing on what our grandparents taught us*

Kingsley was born in 1976 and grew up at the Gerard Aboriginal Community next to Murray River National Park. As a spokesperson for this community, he sits on the Katarapko Creek Demonstration Reach Steering Committee and he'd like to see more Aboriginal participation in the management of the National Park.

Learn to sit still and be quiet!

Whenever a big mob went fishing and camping, storytelling amongst the generations took on a different emphasis. One of the first lessons in fishing is to learn to sit still and be quiet – one that Kingsley says was not always easy to learn! But once kids get it, he says, listening brings much more than knowledge about baiting a hook.

That's when we'd take the time to educate all the younger ones about their history and how we used to do things. To pass on what our grandparents taught us.

Rainbow fish, a small, pretty native fish found in the Murray-Darling Basin. Photo: Gunther Schmida.

So if you get the young ones to do that then you can still be taught your traditional way and non-traditional way which is good. I've grown up with both so I can do a combination of both.

Callop, Pondi and Thukeri

When Aboriginal families go out fishing, Kingsley says they favour the big fish of the Murray to bring home for a feed:

You've got the yellowbelly. We call them callop up this way. You've got the Murray cod, which we call Pondi. And then you've got your silver bream, which we call Thukeri, that floats on the top of the water.

Murray hardyhead

(*Craterocephalus fluviatilis*)

Photo: Gunther Schmida.

- Small fish up to 7.6cm, commonly 4 - 6.5cm
- Only found in the southern part of the Basin
- Found in lake edges and wetlands, prefers open, shallow, slow flowing or still water with a sandy or silt bottom; sometimes found in deeper water with dense aquatic vegetation
- Can survive in highly saline environments
- Spawn from September to April
- Short lived, only some adults survive to a 2nd year
- Eats microcrustaceans, aquatic insects and algae
- Formerly abundant, now very restricted

and other small fish

Other small species found in the Murray-Darling Basin include gudgeons, Australian smelt and rainbowfish. These small fish occupy various habitats: some prefer wetlands and off channel habitats, others prefer fast flowing mainstem waterways or heavily vegetated sites. Most have small home ranges but will move upstream if they drift or get washed downstream.

Catfish are no longer present in the numbers that they were in Kingsley's youth.

You get the odd one or two but the majority have all disappeared somehow. I don't know why. It's probably because of what's been happening with the salt and everything else. They're driven away or they've stopped breeding, because there's no water in the back waters where they can breed. So they haven't bred up for 10 or 15 years, maybe longer.

Katarapko and Chowilla

The Old People's stories talk about the connections between Katarapko Creek and Chowilla wetland, a couple of hundred kilometres upstream. The connections are important to the Aboriginal people of the Riverland. Kingsley explains how the two systems differ:

They are two different systems, but they are related. They're both related but they're different cousins. Like first and second cousins. Up at Chowilla it's more open and it's got a dry land. More like an arid type of wetland up that way compared to down this way, which is more widgee river clay. Up there it's more sandy and stuff like that, which is two different ecosystems. Totally.

Flow in complex systems

In the summer of 1829-1830 Charles Sturt travelled by boat from the Murrumbidgee River to the Murray River mouth. Sturt described a variety of habitats, from wide, slow-flowing pools to 'rapids' and noted on their return journey: '*Shoals frequently impeded us as we proceeded up the river, and we passed some rapids that called for our whole strength to stem*'.

Today, the locks and weirs on the mainstem Murray River have made the river a series of connected weir pools, with uniform slow-flowing habitat at most flows except floods, and fast-flowing habitat mainly restricted to anabranch systems or tributaries.

These conditions have benefited some native species like bony bream (bony herring) and carp gudgeons, but also the introduced carp and redfin. Species like Murray cod and callop, that prefer fast flowing habitats, have been disadvantaged by the creation of weir pools.

In South Australia, the most complex anabranch system is Chowilla. It has streams with different hydrological characteristics, aquatic plants and woody debris and includes permanent creeks, ephemeral creeks and lakes that fill at different river levels. The Chowilla system therefore acts as a microcosm of what the lower Murray River once was. It supports a diverse, healthy native fish fauna including one of the most significant Murray cod populations in the lower Murray River.

Like Chowilla, Katarapko Creek and floodplain possess a variety of habitats and because the creek passes around Lock and Weir 4, its fast flowing habitats are preserved, benefiting species that prefer these conditions like Murray cod and callop.[8]

Bulyong Creek, Chowilla. Photo: Scott Nichols.

The back ponds

Fish benefit from regular water flowing into the wetlands around Katarapko Creek. Katarapko Creek is important for native fish to breed, says Kingsley:

It's good when the water comes up because it actually builds the back ponds up where they do all the breeding. As they grow they follow the water down and back into the main rivers. We used to do most of our fishing in the back creeks, where the water was a bit more stiller and it was a lot warmer than the river. The river's constantly moving and it just brings the cold water with it. And the back waters are nice and warm for the breeding and everything else.

But it is not just the fish that benefit. Kingsley points out that all the animals, trees and river vegetation need that water to survive.

Well if you don't get water into your back creeks, you don't build up what they call the nurseries, which is for all animals. If you haven't got those they can't go back into the main river system. And once they fill up the black swans and ducks will come back.

Wetlands

Prior to river regulation, all wetlands around Katarapko would have dried out periodically. Post regulation, several became permanent and were blocked to prevent water loss.

A wetland isn't necessarily always wet; however a wetland needs to be wet long enough to support the plants and animals that live in it for at least part of their life cycle, like most of the 46 fish species native to the Murray-Darling, which use them for feeding, spawning and nursery habitat.

Wetlands like Katarapko's Ngak Indau are now managed using flow control structures so that it can be watered or dried.

Photos: SA Department of Environment and Natural Resources.

Not enough water

The effects of the drought over the last fifteen years has taken its toll on the Murray-Darling Basin. This dry has been even more devastating on the Katarapko than earlier droughts because of the lower and lower flows coming down the river.

When there's not much water around, the vegetation decreases and then that opens up to the elements like the wind. And the wind is the biggest one. If you haven't got any windbreaks it will just score through anywhere. That's the biggest one we've got. And once you've got water and rain, if there isn't any ground cover, it destabilises everything, especially if the water had dropped back too far.

There go the windbreaks

Since the 1980s, cropping and agriculture has increased across the Riverland and the Riverina. The salinity in the area has increased.

The salt levels come up and the acidity in the sand and that just kills all your native trees around the edges. And then there goes the windbreaks.

Managing salt

The salt interception basins are important features of salt management in the area. People see these salt inception basins differently. Barry Porter, for example, argues that these schemes have seen an improvement in the water quality.

Because we've taken the salt interception schemes and tackled the big salt ascensions, we're actually removing probably half of that salt before it gets into the river now.

Kingsley, on the other hand, sees the salinity problems of the area as interconnected with other pressures that have been building over the last three decades.

I've seen it go from lovely and lush to grey and dreary, which a lot of the trees are just getting killed of by salt because there's not enough water coming through. Plus you got the expansion of towns and cities which is even worse. Plus people doing cropping. So just their techniques, some will do cropping, some will do spraying. And the sprayings will get into native bushes and that actually kills a fair bit of it. Which they don't intentionally do but it's just with their drift some chemicals just wipe to out all together.

Making connections

Belonging

Tracy Bye's family felt they had come to belong on the river after they moved from Adelaide and started fishing.

> *We didn't fish when we were in Adelaide, down at the beach. But as soon as we hit the Murray we were there all the time. It would have been when I was 11 or 12 that we first started fishing. I suppose it all boils back to Dad, and he had an absolute love of the river. I can remember going down with Dad in his boat. And he used to put up with so much from us kids but he always encouraged us to go down with him. He never got any fishing done himself, because he'd spend the whole time baiting us up, untangling us. He would just spend every waking moment down there if he could.*

Throughout Kingsley Abdulla's life, fishing has been an important part of Aboriginal community life.

> *We were always camping and fishing especially during the holidays, especially in the warm weather. Always on the river. We'd go as a family. The close family as well as an extended family, plus community members. Sometimes 40 or 50 of us would go out camping at the one time.*

Colin Schultz's love of fishing lives on. Tracy's son, Jack, and nephew, Will, are as keen to learn as Tracy and her siblings were. Photo: Tracy Bye.

A professional relationship

Gilli Stoneham and John Aston (senior) both fished the Murray around Renmark. A common problem was who could fish which parts of the river. Gilli and John squabbled with another pro-fisher over the boundaries of their reaches.

John's son, also called John, recalls how this was resolved and how a creek got named. John junior feels that his family's history is permanently part of the history of the river.

> *Dad went to the fisheries department to try and resolve this argument. And they said well, what is his area of it? Well, he said, Gilli Stoneham was working from this point to that point. So the fisheries officer said, I think that's a pretty fair argument. And he said to my dad, 'And what do you think we should call this creek? It has no name.' And he said, 'What about Squabbly Creek,' and that's what it was named.*

John Aston, a third generation professional fisher in the Murray River. Photo source: John Aston.

Knowing the fish

Malcolm Wilksch took up a professional fishing reach in 1957 and took the time to learn as much as he could about fish habits in his area.

> *We'd have to find the bait the fish were biting on that year, they never ate the same food all the time like you'd expect. Quite often we'd start off with mussels. And some years would be all yabbies. One year I found a spot where there was very large shrimp in the off season. I caught big cod on those as well.*

Before Dartmouth Dam was finished in 1979, water was pulsed down the river from Lake Victoria and through the locks and weirs for irrigators. Judging the reaction of the fish to these rises and falls in water level meant Malcolm could adjust his weekly timetable:

> *After a while I realised that I really only had to fish three days a week, cos only three days of the week the fish would actually bite.*

Big cod were also, naturally enough, a favourite for young boys. Norm Dixon was a young boy when he and his schoolteacher had this encounter in 1910:

> *I used to do a bit of fishing before school, and one morning I caught a big Murray cod that weighed 68 pounds when cleaned. The teacher asked me why I was late for school. I told her and she said to show her the cod. I rowed the teacher down-river to where the cod was tethered and told her she could pull it up out of the water. Well the fish really let her have it and almost drowned her![5]*

Gilli Stoneham's wife, Gladys, recalled an old wives tale for using mussel shells that shows that a healthy river can also provide for the health of the people who live around it:

> *We used to bake them, grind them up and any sores – we used them as a powder. A wonderful healing power.*

Part of life

A lifetime spent fishing in Katarapko Creek and around the Murray River near Loxton meant that the river has come to be an important place of renewal and contemplation for Tracy Bye.

> *I hadn't realised how often we radiate down towards the river for things that happen in our lives. My husband proposed to me down the river. When Dad passed away, without even realizing, we took the kids down the river to tell them. I tend to go down there if I need some time out. So it's just played such a vital role in different things that have happened over the years. I'd find it really hard not to live near the river.*

State of the river – '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.[6]

The Lower Murray was surveyed in 2005. Both the Lower Murray Valley fish community and Ecosystem Health were considered to be in 'Poor Condition'.

Only 35% of predicted native fish species were caught from the 'upper zone' (near Lock 3). The ecological community was dominated by alien fish (64%).

Abundant un-specked hardyhead, bony herring, Australian smelt, Murray-Darling rainbowfish and Murray-Darling carp gudgeon dominated the native fish. Carp dominated the alien species captured. Eastern gambusia and goldfish were also found.

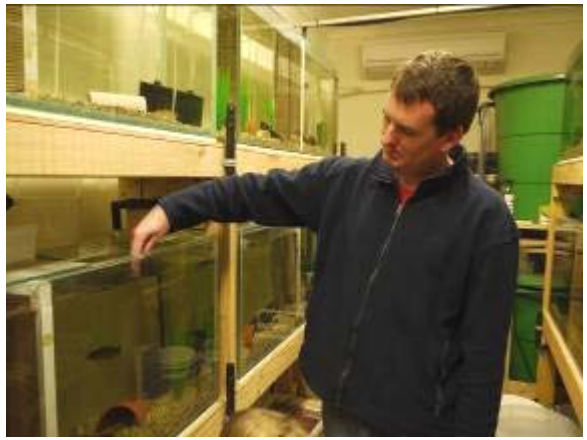
Lower River Murray Lobsters ready for market.
Photo source: State Library South Australia (SLSA: PRG1258/2/2495).

Visions for Katarapko

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.

This is all we've got

Todd Goodman is a recreational fisher on a mission. In 2007 Todd's family discovered a small population of 50 southern purple spotted gudgeons in a wetland adjacent his father's holiday shack.



Todd Goodman's aquariums where he is breeding southern purple spotted gudgeon. Photo: Jodi Frawley.

Since then, he has been breeding the fish in aquariums in his garage. The species was declared extinct in South Australia in 2000 and now Todd works with other breeders in Adelaide and a number of local schools to ensure their survival.

Well basically this is it. This is all we've got. These guys used to be so common. They used to be used as cod bait, as live bait. They're part of the food chain. They're genetically distinct from the other populations around the place. Everyone you talk to used to catch them as kids. They used to be all through the irrigation channels. But they're just one of those species that for some reason has just disappeared. And I suppose being on our property we felt that it was our obligation. Originally it was only going to be for 12 months, now we're four years on. They've domesticated really easy. Why wouldn't you want to keep them? They are a great little fish.

Southern purple spotted gudgeons (*Mogurnda adspersa*). Photo: Gunther Schmida.

A week's catch of Murray crayfish in 1955.
Photo: John Aston.

Future health

Retired professional fisher John Aston voluntarily gave his license up in 1996. The long years of drought from 1992 until 2000 were a time when the fish did not breed as regularly. John believes that reducing the professional fishers at that point was beneficial to the future health of the river.

So in my opinion if the fishermen had been left there long enough, the number of cod would have gone down. From 1992 to now, 2010, we haven't had any water. In that period if the fishermen had continued to be in there it would have made a dramatic difference on our native fish.

Howard Hendrick would like to see more water allowed to flow to help the wetlands maintain themselves for longer periods between high river cycles. He says:

But the last 12 - 14 fourteen years we've had no floods, no breeding up and these fish have gone out and there's very few are being hatched out and coming down this way. So it's fallen off with the fishing a lot.

Kingsley Abdulla sees pest management as one way to help the fish. He sees the removal of carp as being important for a healthy river.

The carp can be classed as a weed and pest, you can have your land-based weeds and pests and your water-based.

He also sees a special role for the Gerard Aboriginal community in rejuvenating Katarapko Creek for native fish.

I'd like to see co-management with the Gerard community on the National Park as well as other reserves around. Co-management would mean that we would be looking after the land and water. We could develop teams to do certain projects ***like*** *weeds and pests and revegetation.*

Carpark Lagoon during a wet phase.
Photo: SA Department of Environment and Natural Resources.

These two photos illustrate the difference in wet-phase and dry-phase vegetation at Carpark Lagoon. Reinstating natural cycles of wetting and drying can be an important way to help manage populations of pest fish like carp, which like permanent still water.

Carpark Lagoon after it has been dried, showing dry phase wetland plants. Photo: SA Department of Environment and Natural Resources.

The 'Tree of Knowledge' indicates the heights of floods, the highest being 1956. Photo: Jodi Frawley.

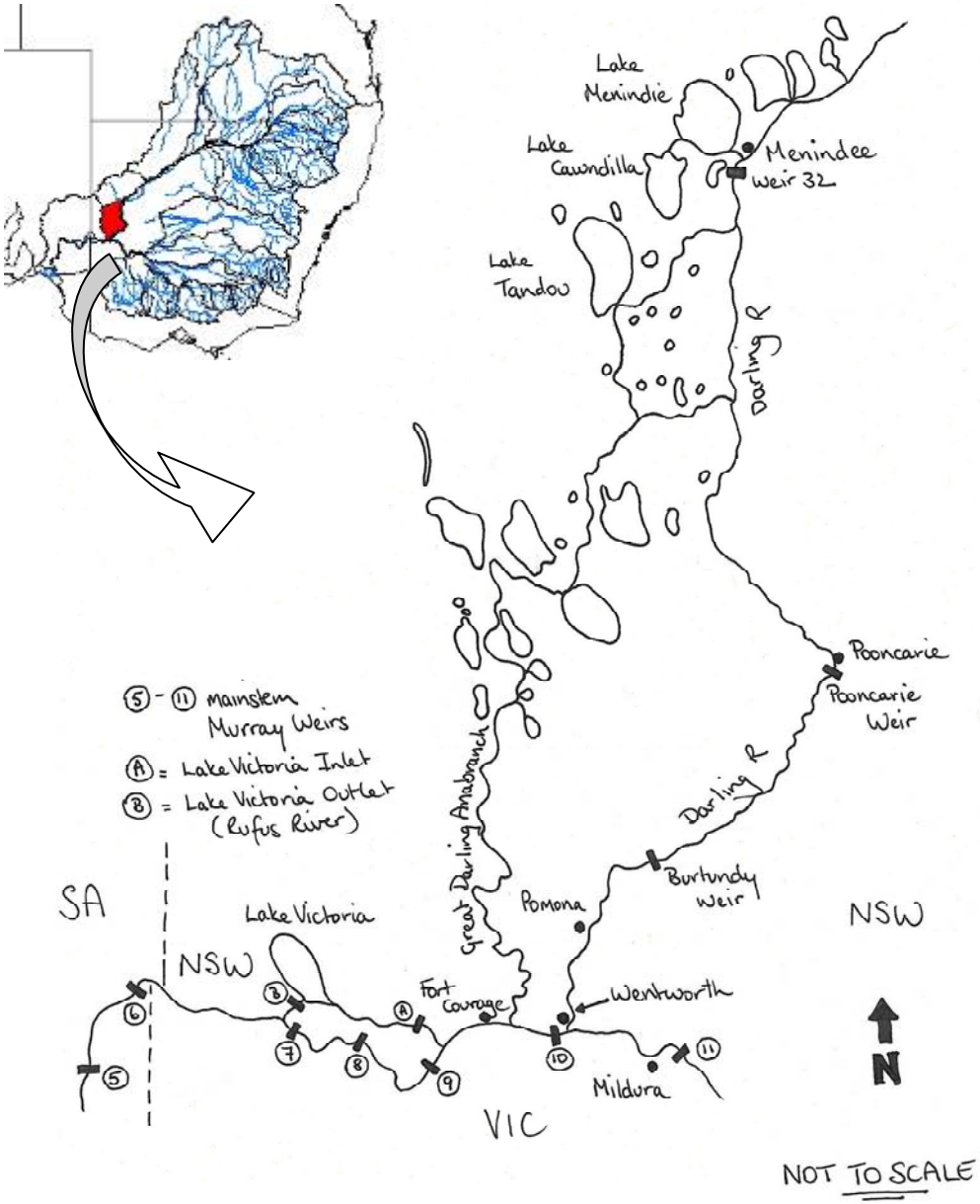
Lower Darling & the Great Anabranch

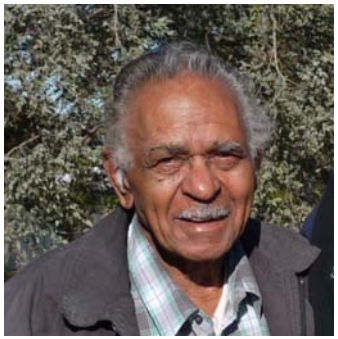
Source: William Riley.

Source: Scott Nichols.

Source: Wentworth Historical Society (at 'Kalcurrha', donor: Patsy Crozier; 2007-29-1-8).

Source: Jodi Frawley.





William Riley is a Paakintji man who was taught to fish by his Granny Quayle and his aunties. He fondly remembers the family fishing gatherings. Photo: Jodi Frawley.

Bill Lever lives at Wentworth and is a commercial fisher who has worked the Murray, Darling and Great Darling Anabranch since the 1960s. Photo: Jodi Frawley.

Rod Stone has been on the Wentworth Angling Club's committee for over twenty years and is currently serving as the president. Their home base is at Fort Courage where they have 100 acres right on the Murray River. They welcome travelling fishers to their camp and caravan park on the grounds. Photo source: Rod Stone.

Jenny Whyman is a Paakintji woman and representative on the Northern Basin Aboriginal Nations Committee (NBAN). Jenny believes the river needs to be looked after when its dry so that fish get the best chance to survive when there is plenty of water. Photo: Jodi Frawley.

We … passed the bank of a ***beautiful*** *piece of* ***water*** *…. This lake was* ***brimful****, a novel sight to us; the* ***shining waters*** *being spread into a horseshoe shape, and reflecting the images of enormous* ***gumtrees*** *on the* ***banks****. … . It seemed* ***full of fishes****, and it was probably of considerable depth, being free from weeds, and continuing so* ***full*** *and* ***clear*** *throughout summers which had drunk up all the minor streams.*

The Journal of Thomas Mitchell (1839)[1]

Introducing the river and its people

The Lower Darling River and Great Darling Anabranch are located in south-west New South Wales. Muddy waters meander over the grey soil floodplains past red dunes, spiky saltbush and gnarled red gums. 11 000 years ago, the Darling River changed its course just south of Menindee Lakes, leaving the Great Anabranch's 460km channel to dry and flow into the Murray only during big floods.

These are the traditional lands of the Paakintji people.

For 11 000 years, the Great Anabranch has been separated from Darling River, only flowing into the Murray River during big floods. Photo: William Riley.

The heritage of Paakintji fishing

Aboriginal heritage of the Great Anabranch and the Lower Darling dates back at least 36 000 years. Paakintji people have explained that the river system is important to them for its cultural and spiritual expression of their heritage, its many sacred sites and burial grounds and its continuing provision of medicines and foods.[2,3]

This long heritage is visible on the banks of Lake Tandou, where wind formed dunes ('lunettes') of fine red sand line the edge of inland lakes. Within these lunettes, Archaeologist Jane Balme uncovered a campfire in the 1980s.

In it she found the bones of 357 yellowbelly from a single meal. Radiocarbon dating found they were 25 000 years old.[4]

To Paakintji people, there is still nothing better than a fish feast from a campfire with family and friends.

The arrival of the Europeans

The Darling River provided a pathway for explorers, overlanders, graziers and bushrangers from the 1830s. In 1853, the first river-boats moved up the Darling and ports were established at Wentworth and Pooncarie. Produce, including fish, was sent to market along this river 'highway'.

River transport was critical for the survival of early settlements along the Darling. Photo source: Wentworth Historical Society.

Pastoral stations were vast and homesteads and outbuildings were located close to the river to ensure watering points for livestock.

The introduction of sheep, cattle and horses gradually changed the river environment, degrading banks, reducing native grasses and saltbushes and adding nutrients to both land and water. These stations employed both Aboriginal and non-Aboriginal people, who all enjoyed fishing for fun and food.

The introduction of livestock had a profound impact on the riverbanks. Photo source: Wentworth Historical Society.

Properties like Dunlop Station on the Darling River, pictured in 1886, employed a variety of people to work the land and in the homestead. Photo source: National Library of Australia (PIC/9228/16 LOC PIC Album 76).

In 1886, George and William Chaffey secured 250 000 acres from the Victorian Government and began the development of irrigation schemes along the Murray and Darling Rivers. In this area, Wentworth, Pomona, Comealla and Dareton all started irrigating from the early 20th Century.

The arrival of soldier settlers after each world war meant smaller blocks and more permanent people in the area.

Surveyors, possibly looking at divisions for Soldier Settlement Schemes – one of the significant land development activities that affected the rivers of the Murray-Darling. Photo source: Wentworth Historical Society.

Vine and stone fruits were grown for the dried fruit market, and wineries eventually joined fruit and vegetable gardening. Irrigation kicked off the annual rhythm of seasonal workers who often lived along the river while they picked fruit and worked in the factories.

The plaque commemorating the original Menindee punt. The text reads: *Before the construction of the Menindee rail and road bridge in 1927, the only means of crossing the Darling River was by punt. The original Menindee punt was installed in 1862 and was run on a commercial basis by a man named Turkey Creek Smith, who lived on the river bank adjacent to the punt. As sheep were regularly carried across the river on his punt, he kept a pet sheep to coax mobs of sheep onto the unfamiliar punt. In 1882, it was superseded by a new punt installed by the NSW Government adjacent to the Police Barracks in Nora Street. Passengers, goods and livestock were transported across the Darling River free of charge by the new government service. Fortunately the original punt remained, as several weeks after commencing, the government punt suddenly overturned and sank and could not be refloated until the river level subsided.* Photo: Scott Nichols.

William Riley - *I'm trying to get our people to rally now*

In 1934, William Riley, a Paakintji man, was born in White Cliffs, a tiny opal mining town in the far west of New South Wales. His father worked as a drover, pushing sheep from station to market along the rivers.

The River!

William didn't see the river in the first few years of his life, but boy when he did!

> *Well, I was amazed when I saw the Darling River. I was about 6 year old when I first crossed the Darling River bridge in Wilcannia. My niece was a bit younger than me and she was frightened to cross the bridge – because the old bridge across the Darling had cracks in the boards - and she could have fallen through.*

Darling River channel in flow. Photo: William Riley.

Fishing with Granny

When William was in his early teens, his father first sent him to an Afghan family in Broken Hill. From there he went to live with his Granny Quayle at Wilcannia. On the Darling River he learnt to fish with Granny and a couple of aunties.

> *I'd be running bait for them, keep an eye on the shrimp bucket, digging for worms. I was about eight years old before they let me touch a fishing line. They taught me to fish on a hand line. A lot of kids didn't know how to twirl a line and would get it hooked in their ear or in the back of their neck. Danger for a small kid, really.*

In the right conditions, big groups would go down to the river in the evening for special night fishing.

> *When the river was really running low, it was clear as crystal and they used to get down there with hurricane lights. Sometimes we'd make fat lamps – 'slash lamp' we used to call them. We'd get hessian, roll it up and pour mutton fat around – melt it and fill it up with sand while the fat was still hot and you'd light the hessian and it would throw a good light. The light used to attract the fish, and that's how they'd catch them.*

The ancient Darling

The main channel of the ancient Darling River once ran down the course of what we now call the Great Anabranch. The threaded nature of this whole web of channels has always consisted of lakes, channels, anabranches and a river channel that interlace across the dry arid landscape. Sometimes it dries down to a series of pools and other times water flows across the plains, linking all the waterways together.

Fish evolved in this pulse and response environment – sedentary when it is dry, moving and breeding when it is wet. It is thought the main channel moved from the Great Anabranch to its current position around 11 000 years ago.

At the time of European contact, when the Darling was in full flow, the Paakintji used cooperative fishing techniques such as nets to feed the large groups of people who had gathered to take advantage of this time of plenty. As the waters receded, weirs were constructed across channels and wetland inlets to contain and capture fish. As the waters slowly subsided the Paakintji would disperse, and smaller groups would work the smaller pools with spears and poison.[8]

The Darling is a dynamic river system that has always moved across the broader floodplain – and its people, the Paakintji and those of European descent, continue to learn how to respond to these changes.

The women fishers in his family were able to take fish home for people who didn't make it down to the river.

Yellowbelly, bream, there was never any carp in the river in those days. They'd feed their own families. And they shared them with the other families. It's a great sport and it kept everyone out of trouble. There wasn't any drugs around in those days and not much alcohol.

Trish Johnson, Paakintji woman, with two cod she caught from the Darling River near her home at Pooncarie. Photo source: Trish Johnson.

Lake fish

As William got older he would camp at Kinchega National Park with his family and friends. They would enjoy the Menindee Lakes, as time out from their day-to-day lives. They caught all sorts of fish in the lakes.

What they call the black bream has got a very small scale and more scales than the perch. And of course, they're harder to fillet too. They're very bony. A lot of thin bones.

The bony bream (*Nematolosa erebi*), also known as bony herring, pyberry, hairback herring, melon fish and thukari, is a hardy fish widespread throughout lowland rivers in the Basin. It's an important source of food for other fish and for birds. Photo: Gunther Schmida.

A young man's mistake

As a young man, William took on all sorts of work for the station owners in the western district. He worked with cattle, horses and sheep. As farming became mechanised, he got a license and tackled the modern equipment.

Planting crops on farms and big properties, erecting windmills, making corrugated iron tanks and troughs, setting up all watering points and things like that. My dad was pretty proud of me taking on heavy machinery, until I woke up to myself.

William's attitudes to the farming that was going on along the river were changed one lonely nightshift out on the plains.

This Chinaman gave me a big area to myself to plant, to sow my crop and it had been worked before, and I didn't know. There was a nearby creek going past. I was on night shift, I thought the dust was changing colour; but then I realized, it was a burial site! And just on daybreak, I've unhooked the tractor off the combine, raced off the corner to prepare the machine for the next shift, and I came across a disturbed grave, where I'd been ploughing over these burials. I prepared the tractor, left a note and jumped in the ute, got outta there – I felt haunted, you know. The guilt I carry, and the damage that's been done to all of our rivers and our Country in general, that's why I'm trying to get our people to rally now.

Burials were once common along the river corridors, because of the softer soils. These same spots were favoured for ploughing and irrigation by the non-Aboriginal settlers.

I feel sorry for the old cod

Whether out camping, or travelling along the Darling for work, William and his family would see commercial and recreational fishers taking advantage of the wide open spaces – which also meant hardly any fishing inspectors.

I feel sorry for the old cod – everybody goes for the cod, and they're just about extinct. I was against the Victorians coming up to Menindee and they'd have camps set up all over the place. They were licensed fishermen, of course, but instead of Fisheries putting a quota on what they were allowed to take, they just let them go and they just hogged everything. Just too greedy. They used to come right up as far as Tilpa. Up the Darling. Set up big camps. Boats. Spinners and all their fancy lures. And some of them even carried gillnets with them, which are illegal. And they just got too greedy. And, even now, they still get away with a lot.

High river levels, such as seen here at Menindee, provide temporary habitat for native fish. They take advantage of the additional snags and the food that falls from overhanging trees. Photo source: Scott Nichols.

Inundated lakes and wetlands, such as Lake Menindee, provide critical habitat for many small native fish, yabbies and other invertebrates – important food for the larger fish. Photo source: Scott Nichols.

Cod & snags

- Snags are important habitat for both Murray cod (*Maccullochella peeli*), also known as Cod, Guduu, Pondee, Pondi, and trout cod (*Maccullochella macquariensis*), also known as blue nosed cod or blue cod.
- It's estimated that 80 per cent of Murray cod are found within 1 metre of a snag
- Trout cod move less than 500m from their home snag, with occasional explorations of 20-60km before returning home

Photo: Luke Pearce.

Bill Lever – *Fishing for a living*

Bill was born in 1926 in Albury where his Dad worked on the Hume Dam and his grandparents were the weir caretakers. During the depression, lack of local work forced his parents into the drift to Melbourne. He served a plumber's apprenticeship but quit the day he finished because, as he said, he wanted to go back to the bush again.

Fishing for a living

He got a commercial fishing licence in 1953, just after he was married to Judy.

When I got my licence and we were living at Numurkah I used to fish the Murray around Cobram. I'd go up the Edwards around Denny and the Billabong Creek and used to drive over to Euston, Lake Benanee. Fished it all from Numurkah. I put in about five days and go home and pack the fish and send it down to Melbourne. Echuca can be pretty good for reddies. I'd sell them at Echuca on the way home. Shepparton was always good sale for cod. They didn't want reddies or yellowbelly, just cod.

In the 1960s Bill came to live at Wentworth and started heading north up the Anabranch and the Lower Darling to the Menindee lakes for his catch. Bill almost always fished on his own, working from his 18ft boat, setting nets to catch native fish for market.

But you know, the drum netting was the best living though, I liked drum netting. Plenty of exercise up and down the boat. It kept me pretty fit. If you've got 20 drum nets in - I'd shut the motor off, walk up the nose of the boat with the net, and jump back and set the net again. Get half way back pulling the oars, all depends on the current. I'd be walking over a mile a day just up and down the boat.

Drum nets like this one being set in Victoria were used throughout the Murray-Darling Basin.
Photo source: State Library Victoria (H84.488/135).

While mostly Bill fished on his own, sometimes he would meet up with other commercial fishers along the river.

I'd meet up with my mate Roy Wilson when the river was running. He'd be fishing upstream and I'd be fishing downstream. We'd camp nearby or together. Just sit there of a night-time, knitting up drum nets. We'd have our ice-boxes with us. There used to be a bloke who'd bring ice up for us from Wentworth once a week. And we'd have a tonne and a half of fish for him every week.

A seasonal catch

The bounty from commercial fishing in the Darling was seasonal – entirely dependent on the flow of water from upstream.

We'd be sweating on rain. Sometimes we used to get February rains then you'd get a bit of a flush for Easter. Then we used to start getting a good river, from the rains in March and April. She'd be rising around July. Every day from then on, the fish were getting up steam all the time. More and more every day. The last day in August that was always our best lift. That was also the day when you had to pull out.

The NSW regulations closed fishing in September to allow the fish to breed and for numbers to rebuild for the following season. But the water kept moving downstream, crossing over the state border, where the regulations were different.

Used to cry then, used to cry because bloody South Australian blokes, they could catch golden perch all the year around. We'd knock off and they're catching perch left, right and centre.

Rules and regulations

Fishing regulations currently vary between all Murray-Darling Basin states, something which has been a bone of contention for some time.

As early as 1928, during a visit to the River Murray in South Australia, the NSW Inland Fisheries Officer, Mr. H. K. Anderson, recommended a number of actions to the SA Minister for Agriculture, Hon J. Cowan, which would improve conditions for the Basin fishery.

Amongst these were a *schedule of lawful lengths* that would apply to both recreational and professional fishermen, and be in line with those in place in New South Wales and Victoria.

In addition, Mr Anderson recommended regular opening of Lake Victoria's gates to allow fish to move to the river, and fishways on Murray weirs[9] – something that is only now being implemented.

Golden perch was the best

Cross-border fishing regulations regarding golden perch became more of an issue for Bill in the mid 1990s. In part, this was because one of the favoured fish for Indian, Chinese, Vietnamese and other Asian communities was golden perch. At this time, cooking fish using Asian methods started to become more popular among the broader community too. Bill says:

It really kicked on in the last 15 years when the Asians started getting used to our fish and they reckoned our golden perch was the best thing they'd ever had. They were our best buyers.

The coming of carp

Recreational fisher Rod Stone worries about the biggest change that he has seen to the rivers and to the fishing in the area: the carp.

When they first came here, probably late '70s, '80s, I reckon for the first four years after they hit here you could hardly ever catch a native fish. They just decimated the native fish population in my opinion. Then, after that, native fish started to pick up a bit. We used to catch native fish with carp inside them. You'd go down there and you'd catch 20 fish and 19 of them would be carp, and you might catch one little perch or something, that's about all.

Lagoons and backwaters are traps for the carp, who don't always move into the main channel as the water levels drop. Rod has seen this for himself:

We were driving through Boxer's Island trying to find whether there was any water in the billabong to get a tin of yabbies. We drove up and all you could hear was these fish. We walked back down over the bank and just saw these massive carp. I mean they were three and four foot long. Some of the biggest carp I've ever seen in my life. And they were just packed in this water hole. I reckon there must have been a million carp in there, at least.

Carp are often the last fish left in a drying wetland if it was possible for fish to escape. Photo: Scott Nichols.

Carp FAQs

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

Photo: Milly Hobson.

How many eggs do carp lay?
Carp can lay millions of eggs per year. Carp spawn on vegetation in warm, shallow waters such as found in wetlands and undergo population explosions following flood or high river events.

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.[10]

Bill has also seen changes since the carp arrived:

> *Because carp were feeding on the bottom, they ate all the catfish eggs. They just go along sucking everything up. Catfish used to lay eggs in stony nests and you could see a hollow in the bottom of the creek when it went dry. Plus all the little water snails. In the summertime when we were drumming, they'd be just encrusted with snails, we had to run our hands down and knock them off otherwise you'd ruin the boat. I haven't seen a snail since the carp. They tell me there's a few down South Australia, in some of the pipes there. And that was the main food of the catties, plus all the mussel beds, they wiped them out too.*

Natural populations of *Notopala* spp. are now thought to be extinct in the Murray-Darling Basin, however small populations are surviving in irrigation pipelines. Source: NSW DPI.

Little things lost?

Historically, the Murray-Darling Basin supported about 18 species of snails, but natural populations of nearly all of these have declined.

Some of these, like *Notopala* spp., were thought to be extinct until rediscovered in the mid 1990s in irrigation pipelines, where numbers are still limited.

Notopala spp. produce 'miniature adult' babies and so require high protein, low carbon diets. River regulation is thought to have encouraged carbon rich algae in stable weir pools, meaning these snails don't get enough of the right food.[11]

Len Hippisley observed changes in the Darling River over a 42 year period. He noted the loss of a small aquatic insect.

> *A change I noticed* [around 1953] *concerns what I describe as a tiny microscopic water flea, they were always evident in the water especially when furrow irrigating. Water soaking into the earth would be laden with these tiny insects, hardly noticeable except by their absolute mass of numbers enabling them to congregate on the water in billions forming a level line up to an inch thick. They are not seen like this anymore. I believe that they must have been food for small, newly hatched fish and crustaceans, similar to tiny sea plankton of the oceans. I have not been able to identify this insect, and capture exercises carried out by various different bodies have been unsuccessful.*[12]

Len accounted the decline in native fish catches at that time to the disappearance of the water flea.

Rod Stone – *Drought rivers and flood rivers*

Rod was born in 1955 in Mildura but for a number of years lived at no fixed address with his family. His dad was a rabbit trapper, so they travelled up and down the Darling and the Great Anabranch making a living on the fringes of the pastoral industry. They lived in a shanty on the river, and Rod's childhood was rich with the experience of the great outdoors.

Oh, I was probably fishing by the time I was about three years old. We used to have a place on the river– they'd call it a shanty now I suppose, but it was probably a fairly good house back then. We used to have all kinds of animals; rabbits, goats, kangaroos as pets. We had a dog, but no cat. We just lived there up 'til I was about five and a half and then we moved into Pomona so that we could go to school.

Fishing – part of life

Fish were part of the staple diet of an early life lived on the riverbanks. And after they moved to town, Rod and his family continued going to the river as much as they could, joining their Dad on weekends and during the school holidays.

It used to be mainly perch, the odd cod and catfish. We used to get silver perch in the Murray. There used to be a lot of other native fish that you used to see swimming around. At odd times, you'd get a little gudgeon type. Tiny little fish. We used to call them 'minnows'. We wouldn't know what they were. But the odd times, you'd get them.

Gudgeons

(*Hypseleotris* spp., *Philypnodon* spp.)

Western carp gudgeon. Photo: Gunther Schmida.

- Group of small native fish, usually 8cm or less
- Bottom or mid water dwellers that prefer wetlands, or slower waters with aquatic plants
- Food includes microcrustacea, aquatic insects
- Males guard and fan eggs while they develop

Over the long summer holidays it was hot and dry. Christmas Day was always a traditional day at home trimmed with a hot roast lunch. But on Boxing Day, the Stone family celebrated a different tradition.

Oh, they were fun days. Christmas night after tea, we'd start getting everything organised, have it all packed up, ready to go next morning. We'd leave at day break. We used to take all the cold meat and things left over from Christmas Day. And we'd go up the rivers fishing and swimming, play cricket and go out in the bush walking and just having fun. There was a couple of other families used to go with us. Just a fun day out, it happened every Boxing Day, it was just a ritual.

The notice board at Fort Courage, Wentworth Angling Club's home base, is covered in photos of successful fishing trips and get-togethers. Photo: Scott Nichols.

Dry, very dry and drought ...

The western district of New South Wales has a highly variable climate. You get dry, very dry and drought. Rod has seen the Darling River and Anabranch in all these stages – each one with its own special fishing conditions.

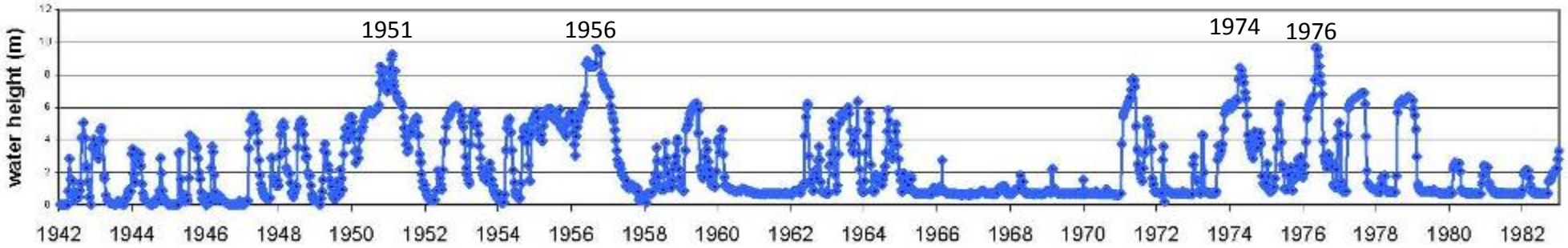
I've been up the Darling when it's only been holes; a little trickle between each hole. We used to use lures called 'floppies' back in those days. You'd cast your lure out and let it sink, and you'd actually see five or six feet down into the water 'cause they were all clear, pools. You could actually see the fish come up and strike the lure. That's a fantastic feeling when you see a big fish come up and grab the lure.

... then flood

But Rod has also seen plenty of the other extreme that people of the west experience – the floods that can take months to travel down from all the upstream tributaries. The dry beds and creeks of the Great Anabranch and its floodplain changed dramatically once the water arrived.

Some of the creeks were like channels and were probably about eight or ten feet deep, so they weren't shallow. There were five or six of them together in this little spot on the Anabranch. One of the main ones that used to run off the main channel and it would nearly do a loop, and then it went back into the delta. It used to roar down that one. You couldn't stand in it when it was running real hard. It used to knock you over. We used to get a few fish but it was good for yabbying!

The Darling River in 2007 during the recent drought (above), then in flow in 2010 (below). Photos: William Riley.



Len Hippisley meticulously measured and recorded water heights at Burtundy Weir on the Darling three times a month from 1942-1982. The graph shows just how variable the river height can be and reveals that the 1951 flood peak was almost as high as the memorable 1956 and 1976 floods and was higher than the flood of 1974. Data source: Len Hippisley.

1956 at the confluence

After WW2 the irrigation areas around Mildura were cut into smaller blocks for soldier settlers. Each pair of blocks was supplied with a Bedford truck and a TE20 Ferguson tractor.

In 1956, flood waters threatened Wentworth from both the Murray and the Darling systems. The 'little grey Fergies' were brought in to build levee banks while the water was still far away. A fleet of these light little tractors, with earth scoops on the front and trailers at the rear, successfully sandbagged Wentworth, which sits at the confluence of the two rivers.

Locals knew that the light red sand that filled the bags would not be enough. So they fortified levees with a layer of red river clay that baked solid in the sun. Levee banks protected the hospital, pump houses, power station and most of the main town.[5] Mildura, just over the Murray River, was not so lucky, experiencing some of the most devastating flooding in 1956.

Fergies at work in the 1956 flood, Wentworth.
Photo source: Wentworth Historical Society.

Clayton Sharpe is a fish ecologist who works for the Murray-Darling Freshwater Research Centre in Mildura. He grew up in Mildura angling and yabbying in the irrigation channels, rivers, backwaters and the Great Anabranch. He too remembers arrival of flood water from rain events upstream and its effects on fishing:

> *They were slow in that it seemed slow, but really, in two days the river would change. It would go from a slow river to a really happening, fast flowing system and then the full front would hit, sometimes it seemed, in less than a week. It was slow in terms of how far it was inundating but it was just roaring. Even on the flood plain there were current lines and it was just beautiful to see.*

The 1956 flood – well and truly covering the floodplain. Photo source: Wentworth Historical Society.

Floods, droughts...and fish

Flow in the Murray was, and still is, much less variable than in the Darling which is dependent on the less reliable rainfall brought by tropical monsoonal winds in summer and autumn.

The largest flood in the upper Murray was in 1870 and the largest in the Darling was 1864. The largest in the lower Murray was in 1956 when smaller floods in the Murray and Darling Rivers combined.[13]

Prior to river regulation, droughts have at times reduced both rivers to a series of saline pools. In the Darling this still occurs, and was observed in the recent drought.

Native fish have adapted to these extremes in flow and use water levels and water temperature rises as breeding cues for 'the good times ahead'.

The recent floods in the Darling and the Great Anabranch have allowed fish to breed and access floodplain habitats that were unavailable at low flow. Monitoring of the Great Anabranch in late 2010 recorded 16 433 fish from 11 species. Golden perch and carp gudgeons, and introduced carp and Eastern gambusia, were the most common.

'Young of the year' golden perch (fish born that year) were caught prior to the Darling flowing into the Anabranch, indicating these fish probably took advantage of the filled Lake Cawndilla and bred there. Similarly, the majority of the baby carp collected was also thought to have come from this lake. Baby bony bream were thought to have originated from both Lake Cawndilla and the lower Darling River.[14]

Jenny Whyman – *Wiimpatja women fishing*

Jenny was born in 1956 and first lived in a river camp on the Darling at Menindee. Her family lived with a mob of other Paakintji families on one side of the river and regularly visited the other side. There her aunty lived with Vince Etrich, a Yugoslav man, and they could visit Uncle Jack Kelly, a Mutthi Mutthi man, and Aunty Lou Reeks, a Parappa Parappa woman.

Family, river, fish

Jenny explains why they were all in Menindee:

> *They worked at all the stations along the rivers. That's how we all got together there. And my mum and dad worked in Menindee, picking fruit, like watermelon, rockmelon, topping onions, picking tomatoes and all that sort of work, and when the work ran out, my mum and dad decided to move to Dareton.*

Jenny remembers how everyone would congregate on the riverbank in the afternoons and weekends:

> *There was a few families and we all got together every afternoon, after school, and particularly on the weekend, we all loved the river, and we'd all go down and catch some fish, some yabby, and some look under the leaves in the river, in the bark, we'd get the yabbies out of there. Some make their own little line out of cotton, and meat; tie the meat on the cotton and get the yabbies. We didn't sit on the river bank, we'd sit on the logs. On the broken branches that sat out in the river. When we got in the water, we'd all just dive underneath and we could catch the fish that way as well.*

With the Menindee Lakes nearby, and the river on their doorsteps, Jenny's families were never short of fish to eat.

> *When we were kids growing up, my main fish was catfish. Oh, I could eat catfish all day. But we can't get the catfish now. We also used to eat yellowbelly, perch and black bream. That's the main three fish. I didn't eat cod. But I ate all the other sort of fish if I couldn't catch catfish.*

They lived together, played together, worked together and learnt about the river and surrounding countryside together.

> *We were all one big family and we all shared. When we went out and got the wild food, we all had a bit of that. We were all really close. There was other members of the family on the other side of the river. My mum's sister and her husband, they owned a big block – we just swam across the river to get our veggies and fruit.*

Jenny was also lucky enough to enjoy a special fish recipe that her Uncle Vince brought with him from Yugoslavia.

> *He used to catch the carp and we used to catch the carp for him. And people say 'Oh, how do you eat carp?' and I'd say 'Well…like this'. Before he cooked the carp for us, he used to soak it in big jars with vinegar with some other ingredients. He'd cut the head off, then he'd cut it up in all little pieces and then he'd put it in this big jar, and then, I think he left the fish in there for a week, and when it's all ready, then he'd get it out and cook it for us. It was really lovely.*

All the fish were dead

In the drought years from 1985 onwards, the upper Darling declined in flow severely until, in 1991, most of the river from Mungindi to Menindee turned bright green. This was an extended blue-green algae bloom that ran for one thousand miles.

Jenny remembers:

> *No fish. In the river at Pooncarie, all the fish were dead. I don't know what happened there. They found the fish floating. In Menindee the water was so green, no one could get in it.*

Algal bloom on the Great Anabranch in August 2000.
Photo: Bill and Elaine Grace.

Blue-green algae

During the 1990s, blue-green algae bloomed all along the Darling River and tributaries. There was widespread popular belief that the bloom was caused by toxic chemicals running off from intensive agriculture upstream as far as Queensland.

The scientific assessment, after careful study found that two things caused the bloom. Firstly, excessive pumping from rivers with low flows. This was made worse by long periods of sunny days. Combined, these factors created a still and warm water column perfect for blooms of algae.

Secondly, high nutrient levels in the water caused by fertilizer, not toxic chemicals, running off from a range of agricultural enterprises. Animal manure from pastoral properties and human solid waste from ineffectively sewered towns along the river also contributed to high nutrient levels required for algal blooms.[6] However, it remained easier, and certainly more popular, to blame the cotton industry!

Blue-green algae in the Great Anabranch in 2003.
Photo: Bill and Elaine Grace.

Our river is dry

Bill Lever worries about the lack of flow in the river. While this area always feels the effects of Australian droughts, Bill believes it is the water extraction that has increasingly caused problems for fishers over his lifetime:

> *There was no irrigation going on back in the '50s really. There was no irrigation water coming back in – it was good natural water. Sometimes there might have been a little bit of rice growing, but not to the extent that they do now. And when those cotton blokes came, they took all the water. Back in the '50s there was none of that, just natural river all the way, practically nothing growing on the side, there was no spraying. Just good water. Once they got a bit of fresh water coming in, especially the Murray, if it went over Hume Weir, off they go. That's the same if you could get good water out of the Bulloo River and country around Tibooburra. The fish just went boom– population explosion then. Fish everywhere.*

In the last two years Jenny has joined other Aboriginal representatives from the Murray-Darling region on the Northern Basin Aboriginal Nations Committee. She has travelled to other parts of the Basin and started to see new things about the river.

When I went away for the first NBAN meeting in Moree, I saw the big irrigation channels. I saw the cotton growing, and I was really upset. I was thinking 'our river is dry'. We'd had green algae in Menindee, and we couldn't swim in there. But when I went up there and saw that, it really hurt me. And then I went to another NBAN meeting up in Roma in Queensland; I saw all the cotton in St George, and it hit me again. To see that river dry like that, I was really hurt because those people are holding that water up there. That water should be allowed to flow a natural flow. It has stopped us from getting our fish, our turtles. I still eat turtle, still eat fish, witchetty grubs; all my wild food. Without that, I wouldn't live here. Fish, to me, out of the river, is our main thing.

Great Anabranch pipeline

For the last 10 000 years the Great Anabranch was wet or dry depending on seasonal rainfall. Mostly it was dry.

Over the years Anabranch landholders built a series of blockbanks, retaining water when present but hampering fish passage. Initially, the water was good for cattle, sheep and fish that lived in the semi-permanent pools.

The Anabranch was also used for recreational fishing, swimming and picnicking. Over time the water became salty.

For twenty years, fish scientists and water managers negotiated with graziers for a return of the Anabranch to a more ephemeral state.

By 2006 a pipeline was built from Lake Cawndilla to supply water to these stations, and by 2009 all the built structures were removed. During the recent drought water security for livestock and people who live there was guaranteed.

In 2010, water once again flowed down the Anabranch and met the Murray, allowing native fish to use the Anabranch and move for breeding.

Irrigation offtake Tandou Creek. Photo: Scott Nichols.

Pipeline being laid to Bill and Elaine Grace's property on the Great Anabranch. Photo: Bill and Elaine Grace.

Making connections

Getting their hands dirty

When the drought struck the Darling hard in the last decade, Jenny Whyman and her aunties made a special effort to keep going to the river. Jenny reflects that the river was never that dry during her childhood – but as an adult, the dry was a time when they could do their bit for the river:

> *And when the river was dry, my auntie and I used to go and walk in the river bed. Because what else could we do? Couldn't go fishing. And my auntie used to say to me; 'Look, what are all those sticks in the river? All those broken bottles. They should be all pulled out when the river's dry you know, 'cause when the water's in there, people can get cut, and stick into people when they dive in and swim around.'*

Carmel Chapman works at the Wentworth Information Centre. Born in 1941 and raised in Merbein, she has lived in the area all of her life. She thinks that we should listen to a range of knowledgeable people about the rivers:

> *Aren't we dumb? We don't even listen to what Aboriginal people say and it's in their soul. The Anabranch is the original course of the Darling River. The scientists say that 10 000 years ago the Darling forced this new course down to Wentworth. But still to me, the Anabranch is highly important. And I don't think you interfere with an original source of a river. Especially the Darling. Patience is what we require. Patience. And a bit of thought about what we are actually doing with this water.*

The dry river below Wilcannia, in August 2007. Photo source: William Riley.

William Riley has been out talking to everyone who will listen about the state of the rivers, at local forums, like the Northern Basin Aboriginal Nations meetings and at global forums.

> *November 2005, I was chosen to go over to Uganda for a world convention on protection of rivers and wetlands. I talked from the heart. I threw the sheet of paper aside, and let it go from the heart and I got a good reception from the audience. I'm trying to tell people. They've got to get off their bottoms. Get off their butts to help the rivers.*

Anger and joy came with the rain

Rod Stone is gravely concerned about the management of water and the blackwater events that came with the rains in 2010. In October of that year there were widely publicised fish kills at the Wakool River. Rod says that it was the third in eighteen months:

> *The angling club sent a letter to the New South Wales government condemning what they've done, through our local MP, John Williams. They've actually been filling wetlands and forest areas like the Barmah Forest for a fortnight, and then leaving them, and then draining the black water back into the Murray and that's what's caused the death of so many fish. In my opinion, there's been enough flow. They should have just let it run through naturally, and as it runs*

through naturally, it would have cleared itself. There would have been more fresh water and it wouldn't have depleted all the oxygen, it wouldn't have become as black as it did.

In 2010, heavy rains in the northern catchments flowed down the river, filling the lagoons, lakes and creeks along the way. For the first time in a decade the Great Anabranch of the Darling River flowed down to meet the Murray. Jenny Whyman describes the euphoria that came with the water:

We were going to Broken Hill for a meeting. And I said to my husband 'I hope there's water in this Anabranch'. We went over the bridge, and all of a sudden, I was going mad, and I said 'C'mon, stop, stop, stop!' So we made our own track down to the water and I just took my jumper off, took my shoes off, rolled my trouser legs up and I was in there. Ohhhh, I was in there. And it was really lucky. It had just started coming down. Must have been the second or third day. And I went in and I was getting all the leaves, I was chucking them all out, to see if I could see any yabbies or shrimps. Yeah, I went mad when I saw it 'cause it was dry for a long, long time.

Blackwater

- Blackwater events occur naturally
- They occur when there has been a build up of leaf litter and woody debris on the floodplain, followed by enough rain to submerge this material and high enough temperatures that it begins to rot. The water becomes discoloured and usually oxygen levels drop significantly
- Blackwater events can harm aquatic animals such as fish. Some animals, such as crayfish, have been seen escaping the water during such events
- There can be long-term benefits. Carbon from the decomposing organic matter enters the food chain, increasing the population of aquatic invertebrates which then provide food for fish
- The impact of an event can sometimes be reduced by water releases to dilute flow. However, this is not always possible and can actually cause the blackwater to spread downstream with the pulse of deoxygenated water

The flows down the Great Anabranch in 2010 saw blackwater produced as leaf litter and other plant matter began to rot. Not every blackwater event causes a fish kill and in 2010 no major fish kill was recorded in the Anabranch. Photo: Scott Nichols.

A dry Lake Menindee in 2007. Photo: William Riley.

A wet Lake Menindee in 2010. Photo: Scott Nichols.

Visions for the Darling and the Great Anabranch

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.

As the president of the local fishing club at Fort Courage, Rod Stone is keen to support ways to bring back the fish. A Lower Murray Darling CMA led initiative to remove willows from the waterways in his area has caught his attention.

Apparently, they're supposed to be coming to do that over the next five years so there'll be no willow trees left in the river here. It will take away some fishing habitat but willows can be very invasive. I've seen pictures of them in streams further east of here where they look like they've actually clogged the whole river up. They just about touched on either side. Actually, Wentworth used to be a bit like that. Fish will still be around snags elsewhere but they won't be around the willow trees.

Commercial fisher Bill Lever thinks that the future of the river revolves around water quality. He remembers what it was like in the past – especially for yabbying – and would like to be hopeful about a new era of clean water:

Queen's Birthday weekend South Australians used to come up in the thousands, craying. This is going back in the '50s when there was good water. Now, the water's changed and we haven't got the quality of water that we had back in the '50s. So that effect's evident in the numbers of fish and crays. If we could get good water they will breed up again. But I don't think that we'll ever get good water again now. That's the finish of it I think. Then again if they send more water down, buy three-parts of the water back off the irrigators, we might do some good.

Clayton Sharpe is aware that there have been many changes in the river over his father's lifetime and over his. He recognises that what one generation sees as normal might not be the way it always was. Helping the river by caring for fish habitat and river environments might be a change that will bring more fish for future fishers.

My father and grandfather used to fish a lot in Lake Victoria and they would catch a lot of introduced redfin. By my generation, they were gone. Before my time there were heaps of catfish, apparently. My uncles and my father talk about them being in pest proportions. They used to get annoyed with how many they would catch. I can't actually ever remember angling one. It's hard to believe that in one generation it can change.

Clayton Sharpe (pictured with his son, Tully) hopes that by caring for the river and its habitats, native fish will still be around for his kids to see.
Photo source: Clayton Sharpe.

Jenny Whyman hopes that it will come back to the basics for the future of the Darling River.

That's how I grew up in Menindee on the river. And, today, I still go back to that same spot over the river. We can't live without that river and the Nguku in the river. And 'Nguku' means water in the Paakintji language.

State of river: 'moderate'

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.[7]

The Darling Valley was surveyed in 2005. The Darling Valley fish community and Ecosystem Health in the 'Lower Zone' were considered to be in poor condition. A little fewer than half the native species predicted for this zone were collected during surveying (47%) and introduced fish comprised a little over half the biomass (53%).

Bony herring, Australian smelt, golden perch, Murray-Darling rainbowfish were numerous, with carp gudgeon and spangled perch also common. Of the introduced species, Eastern gambusia, and carp were most common. Goldfish were also captured.

Menindee Lakes scheme

The Menindee Lakes Storage Scheme includes Lakes Wetherell, Pamamaroo, Menindee and Cawndilla.

Early newspaper reports indicate the Darling River only flowed 9 out of every 12 months, and the Great Anabranch was '*dry in the middle for eight years out of ten*'.[a,b]

Despite this, it was hopeful that the Anabranch and Lower Darling could provide water for Broken Hill and large scale local irrigation development. By 1914 the Great Anabranch was lowered at its upstream junction with the Darling for a second time to facilitate earlier flows and improve conditions for settlers.[15,c]

Variable flows in the Darling and the need to find a secure water supply for Broken Hill saw periodic calls for a 'water scheme' to be developed so that the Darling River could be turned into a 'veritable Nile'.[b,d] The Menindee Lakes were looked to for water storage, although the risks associated with high evaporative losses and erratic Darling inflows caused concern.[d,b]

Debate continued for over 40 years until works finally began in 1949, with an estimated construction time of 6-7 years and cost of £2 300 000.[e]

Although project construction took 11 years, with Menindee Main Weir commissioned in 1960, these works provide water security for Broken Hill and at times of high flow can deliver water down the Great Anabranch and onto the lower Murray.

Newspapers.

a. Barrier Miner (Broken Hill) Monday 11 April 1910, p6
b. The Sydney Morning Herald (NSW), Thursday 16 February 1933, p8
c. The Argus (Melbourne), Thursday 20 August 1914, p5
d. Barrier Miner (Broken Hill), Friday 24 February 1928, p2
e. The Sydney Morning Herald (NSW), Saturday 2 December 1950, p11

Emu tracks in the grey clays surrounding Lake Menindee. Photo: Scott Nichols.