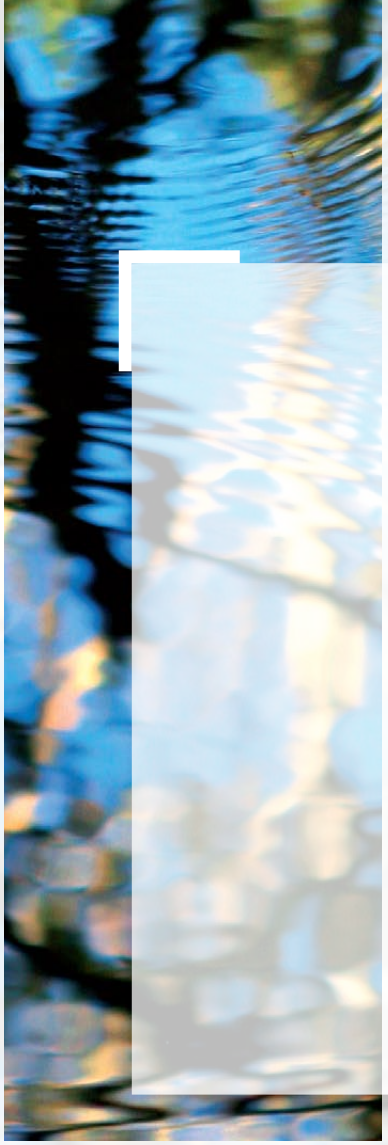
Something about Mary

Inspiring Community Connection to Mary River Stories

A project of the Mary River Catchment Coordinating Committee



Many people, too numerous to all mention here, have contributed to this project in various ways. We thank you for your time and commitment.

There are so many amazing stories to tell, and we invite you to contribute to this evolving creation and help us inspire community connections to Mary River stories. Please send your comments and thoughts to mrccctanzi@ozwide.net.au

Tanzi and Glenbo, November 2012

Photo by Bevly Hughes

Mary River Catchment Coordinating Committee

The MRCCC is a community based catchment management group based in Gympie. Since the MRCCC was formed in 1992 we have been partnering and learning together with landholders, schools, primary producers, conservation groups and all levels of government to create a sustainable and productive catchment.

To find out more contact us at the MRCCC...

Mary River Catchment Resource Centre:
Phone 07 54824766
Tozer Park Road, Gympie.

MARY RIVER CATCHMENT COORDINATING COMMITTEE

Be Natural and Landcare Australia

Be Natural Cereals and Snacks partnered with Landcare Australia to help local Landcare groups tackle environmental issues and to connect with the wider community.

The partnership between Be Natural and Landcare Australia is based around the premise of taking small steps towards making an ongoing difference, and the projects funded by the Be Natural Landcare Grants program aimed to support local groups tackle a range of local environmental issues.

For further information about Landcare Australia and the Landcare movement please visit
www.landcareonline.com.au

This book is dedicated to Peter Oliver, who was and will always be an inspiration to all who care for the Mary River.

Main photo on cover
Arkin Mackay

This project is proudly supported by:

Be Natural®

Landcare Australia

Donations to the MRCCC Public Fund are tax deductible

Photo © Craig and Gabrielle Latta

the Mary River...

Creating an inspiring learning experience for Our River Community

Photo © Todd Fauser

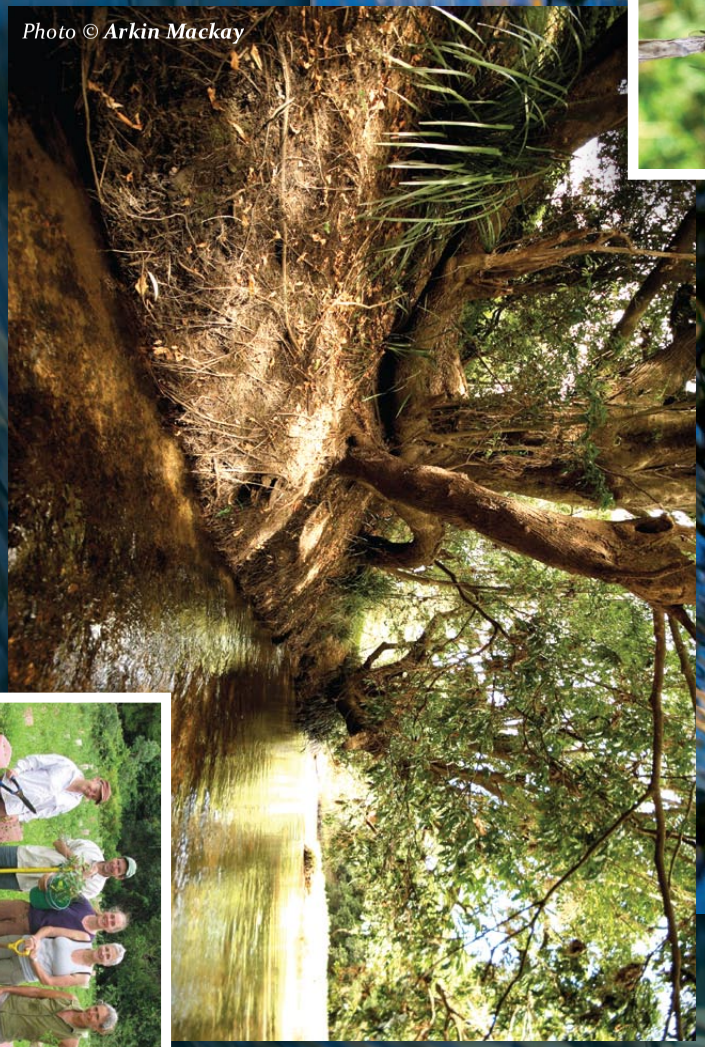
The Mary River is literally the life that flows through the wider community of humans, domestic animals and wild creatures that make their living along her banks and estuaries.

Stories of their life cycles, histories and interconnections provide a powerful means of conveying river science and community aspirations in interesting, holistic and engaging ways.

so roll on Mary...

Reflection by Glenbo

*Photo © **Arkin Mackay***



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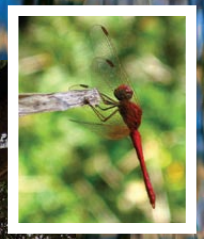

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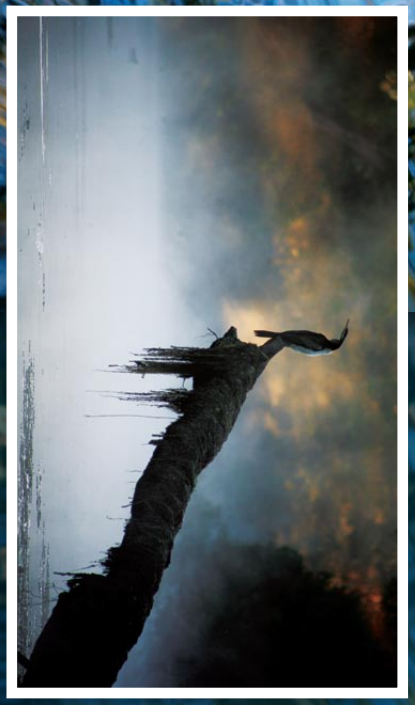

*Photo © **Arkin Mackay***

*Photo © **Arkin Mackay***

Why do we care about Mary?

The Mary River is literally the life that flows through the wider community of humans, domestic animals and wild creatures that make their living along her banks and estuaries.

Water from the Mary River nourishes cities, towns and fertile farmland from the Conondale Range north as far as Hervey Bay. Especially during the dry seasons characteristic in south-east Queensland, farms and human communities rely on the Mary River for their life-blood. During these dry spells, the Mary can stop flowing over one of the tidal barrages for several months of the year. In spite of this, the Mary nurtures forests, plains, and waterways that support valuable and endangered wildlife, right out to Hervey Bay and Fraser Island. When the Mary is in flood, her surging flood-plumes nourish valuable estuarine eco-systems, including mangroves and seagrasses. An astonishing number of valuable and endangered species depend on the Mary River for their lifeline. Because the Mary River cares for so much valuable life, we need to care for her in return.

The Mary is mostly a slender river, only broadening in her northern, lower reaches before her waters reach the sea in the International Ramsar-listed Great Sandy Strait, in the lee of World Heritage Fraser Island. Rare dolphins, vulnerable whales and dugongs, and six of the world's seven marine turtles (two of which are endangered) live in this valuable and endangered waterway. Many visitors come to enjoy the scenic treasures of the area, and to marvel at the spectacular wildlife. In her upper reaches, the Mary winds through her valley supporting a remarkable biodiversity of creatures. The other rivers across the south-east Queensland region have had their flows severely impacted by dams and barrages. The Mary is the last river in this area to reliably flow freshwater to the sea, supporting a sensitive and valuable estuarine and marine ecosystem.

Tragically, sometimes we humans don't know what we've got until it's gone. The communities of humans and wildlife who live along the Mary River nearly lost the life-giving flow of their river. But fortunately, we were given a second chance to appreciate and care for our life-giving river, when the proposed dam on the Mary River floodplain was stopped.

Now future generations of our children can still camp, fish and play along the banks of the Mary, just as indigenous families have done for many generations. Any of us might catch a lungfish or a turtle, wondering at these remarkable and unique creatures before letting them return to living their lives along the river.

As both a source and a symbol of life flowing through us, the Mary River connects us all between the mountains and the sea, giving us a sense of our place among the broader network of creatures that live along and in the river.

Photo © Eva Ford

"We care for the Mary because she cares for us

Photo © Eva Ford

Photo © Eva Ford

ARTICLE BY ADELE COOMBS

It's not the biggest, it's not the longest, but I reckon it's one of the most important rivers in Australia...

PROFESSOR
TIM FLANNERY
'TWO ON THE GREAT DIVIDE'
ABC TV

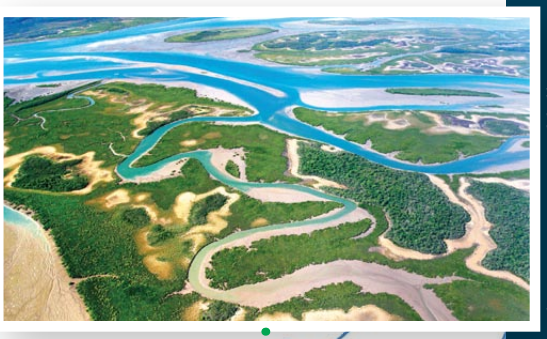

Photo © Stewart Riddell

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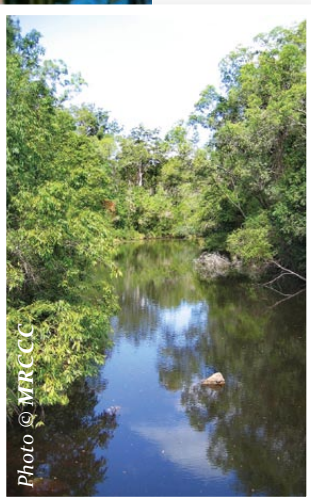

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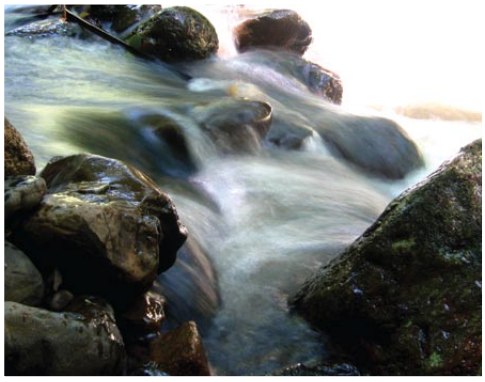

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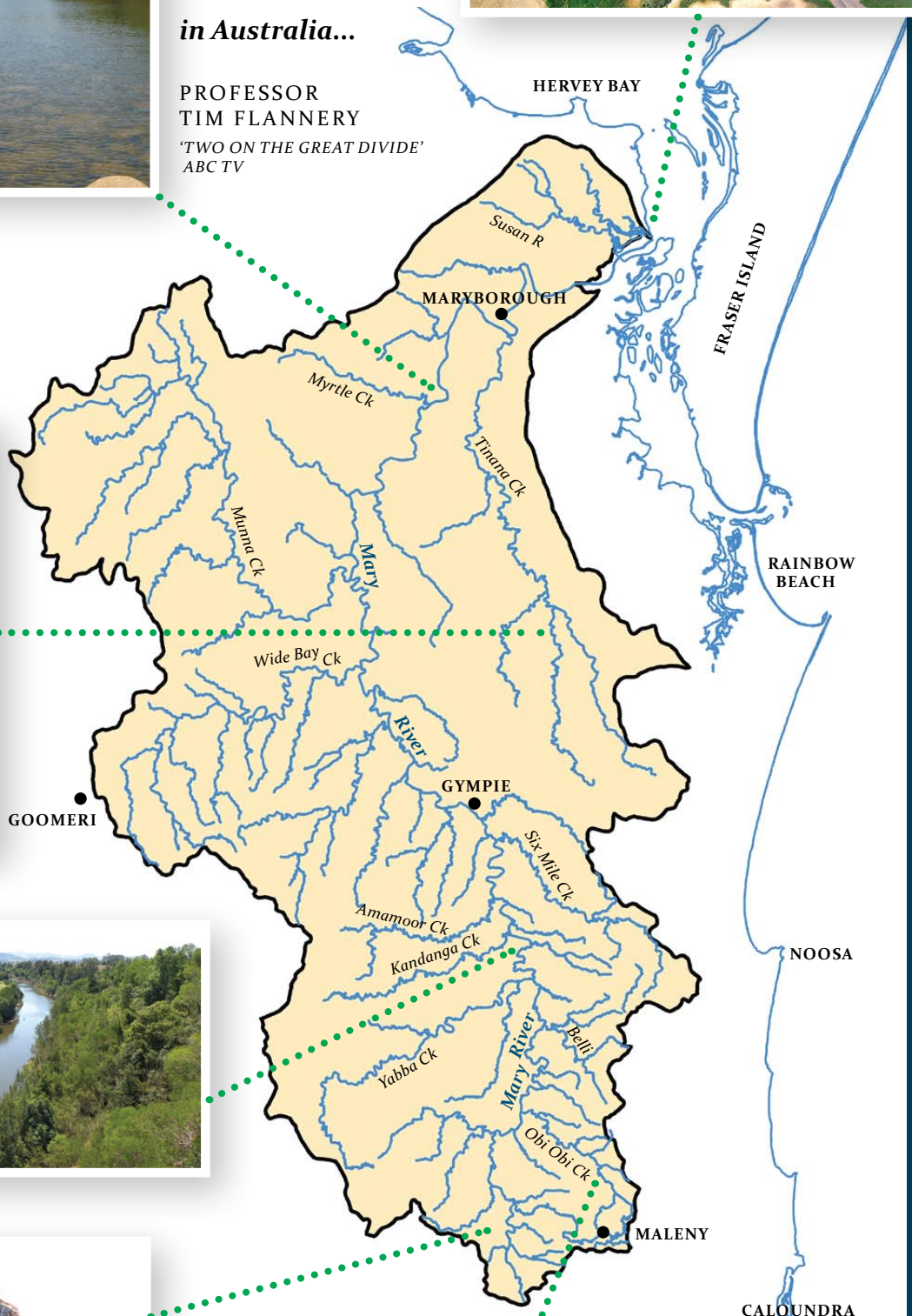
Photo © Bob Simpson



Why this book?

The Mary River is home to hundreds of different species that all rely on a healthy ecosystem in some way. Human members of the Mary River catchment also rely on a healthy river for recreation, water, environmental services, spiritual and cultural enjoyment.

This booklet introduces five species who, together, tell a story of what makes the Mary River so special. They show we can care for the Mary River.

By learning the story of these species, the habitat they need, the life cycles they experience and the things that are currently threatening their survival, we gain a glimpse of the complexity of the river.

We also learn about the patterns and cycles that govern the interconnectedness of the land, water, biodiversity and people.

Of these five species, three are endangered, one is considered vulnerable, and one is in decline. These five represent the dozens of other threatened species associated with the Mary River and also all of the species that we might consider common, but who still play an integral role in the ecosystem. As the stories of these species will illustrate, they each have a special affinity for an important and distinct part of the river ecosystem. They are among the species that continue to play a special role in the Mary River community, as they have done for millennia.

CONTENTS

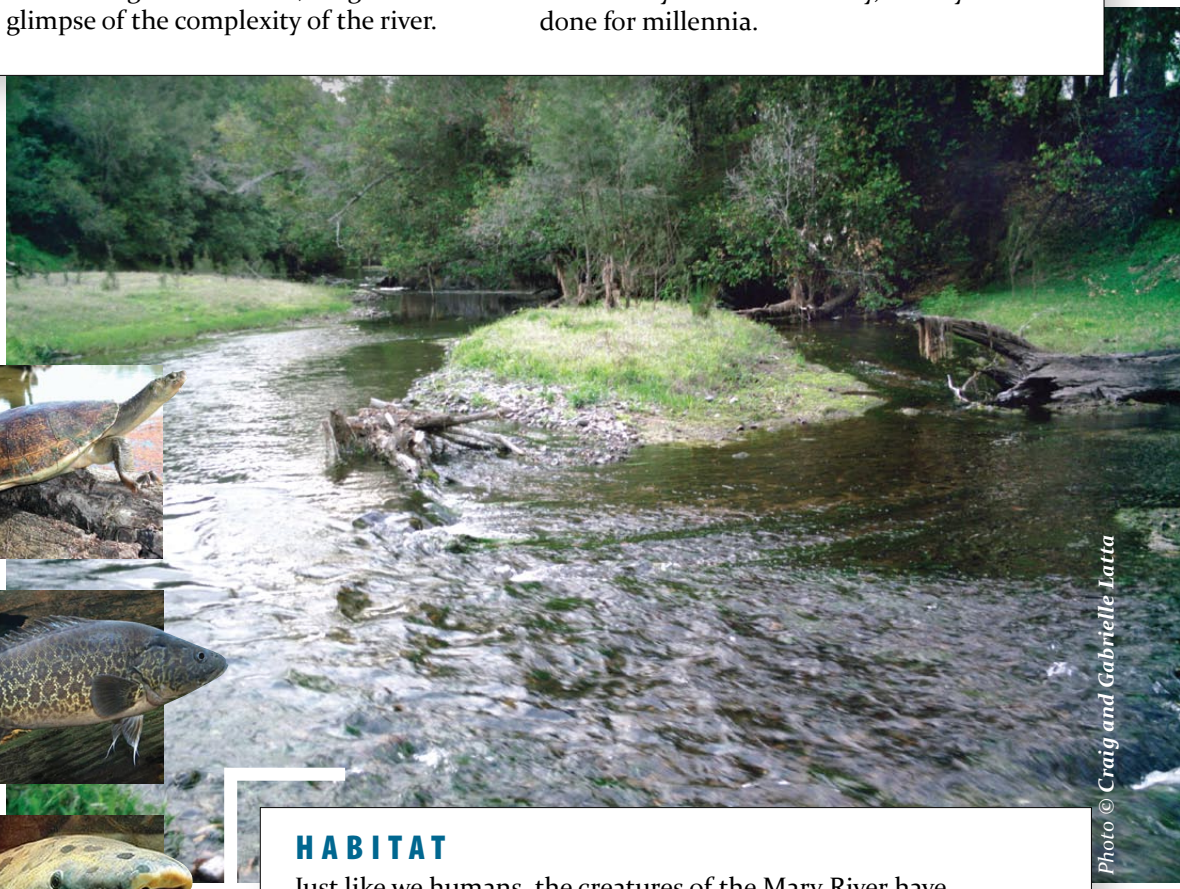
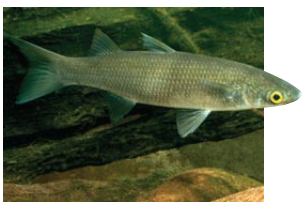


Photo © Craig and Gabrielle Latta

HABITAT

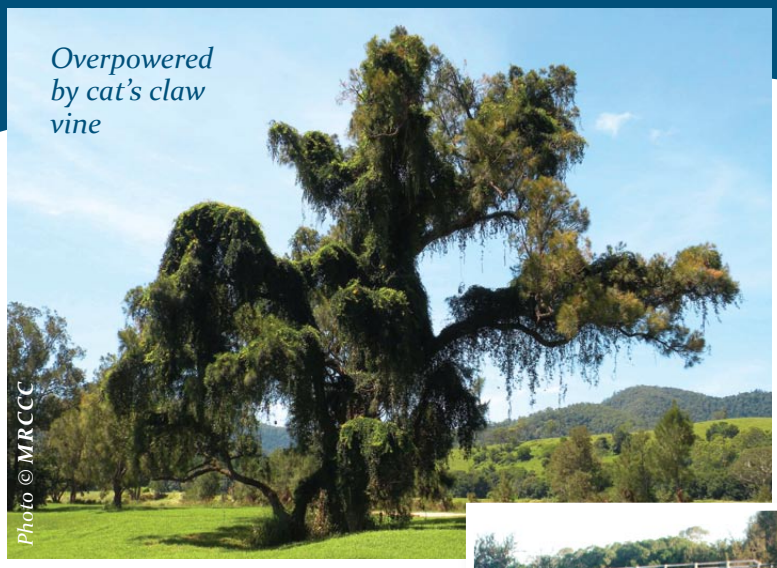
Just like we humans, the creatures of the Mary River have particular needs that must be met in order for them to survive and flourish. These needs are provided by their habitat. Over a day, through the seasons and over longer climatic cycles, the river changes. Human intervention has also changed the river greatly. The quality of the habitat will determine whether or not species can survive these changes and be able to adapt. As you will see, the habitats needed by our five species are complex and change over their life cycle. In many cases this complex world is hidden from the human eye.



Actions and issues

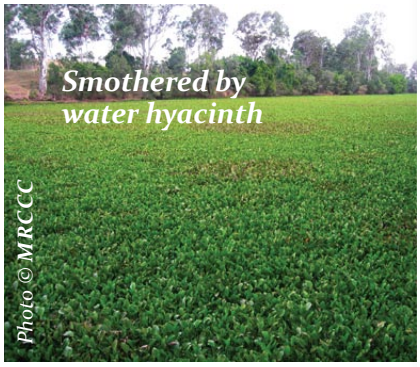
Rivers and estuaries are integral parts of our community. Despite their familiarity to us, freshwater ecosystems such as rivers and creeks are among the most threatened and also least understood parts of the planet. Management of river systems requires some different ways of thinking than we use when managing the land only. Rivers are highly complex systems with many interconnections between up and downstream, groundwater and surface water, the land and the freshwater, freshwater and saltwater. Plants and animals move through these connections. Identifying actions to ensure recovery of biodiversity in this kind of system requires a holistic approach that takes into account this connectivity as well as the complex social, cultural and economic roles that freshwater plays.

Actions that contribute to the recovery of the river, to its biodiversity and to supporting vibrant communities along the river's banks occur within this complex interconnected system. This complexity was embraced by the original human inhabitants of the area, and the guiding laws of Mimburi that governed their interconnection with the river, plants and animals. Impacts on the river are now possible at a much greater scale, and the river has been transformed through clearing, water extraction, damming, mining and the invasion of plant and animal pests. The community has joined together for decades to address these issues and continues to work toward improving the health of the river by fostering a more sustainable relationship between people and the river.



Overpowered by cat's claw vine

Photo © MRCCC



Smothered by water hyacinth

Photo © MRCCC

Photo by Glenbo

> *I've seen changes to the river over my lifetime. I can't sit back and do nothing.*
>
> LAWRIE WILSON - *TUAN*

Photo © DNR

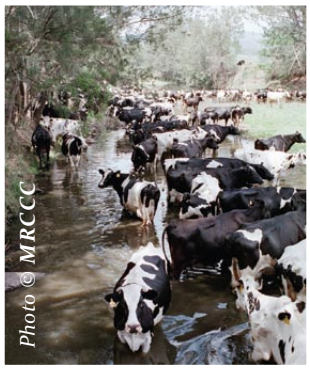
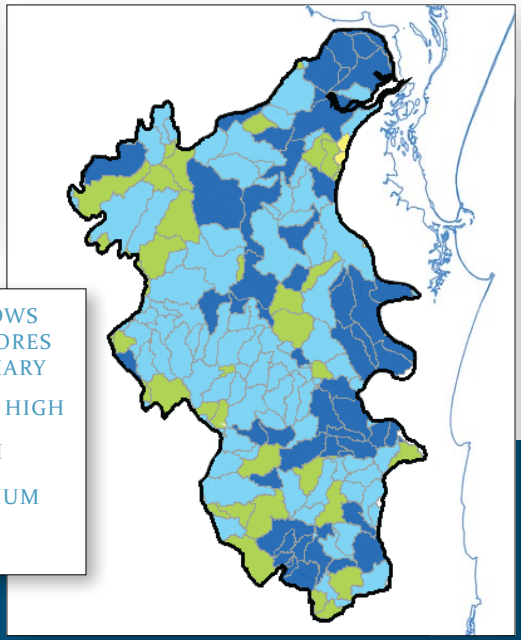


Photo © MRCCC

Mary's report card...

The Aquatic Conservation Assessment[1] has developed an 'Aquascore' for all subcatchments in the Mary River catchment. The aquascore is made up of eight different criteria. A very high aquascore suggests that that subcatchment has many threatened species and is still functioning reasonably well. A low score shows that this part of the catchment is highly modified from natural conditions. The figure (right) shows the Mary has a mixture of very high, high and medium aquascores.



1 *State of Queensland (2011).*

Get to know Mary...

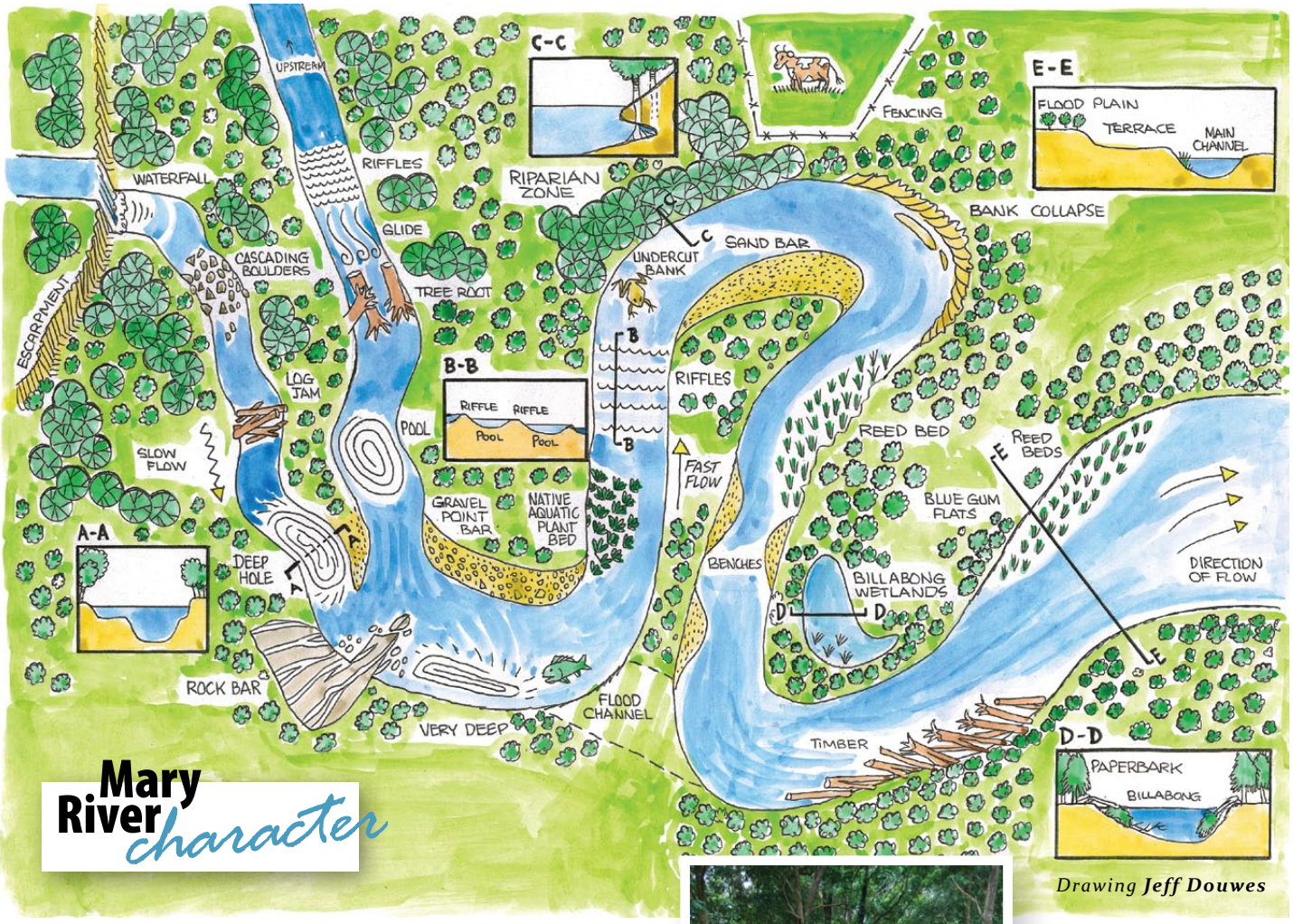



Photo © Arkin Mackay


Photo © Eva Ford


Photo © Lindsay Titmarsh

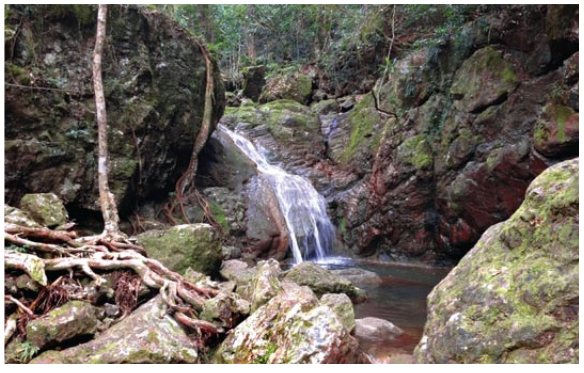

Photo © Eva Ford

...and her habitats


Photo © DNR

Arkin Mackay

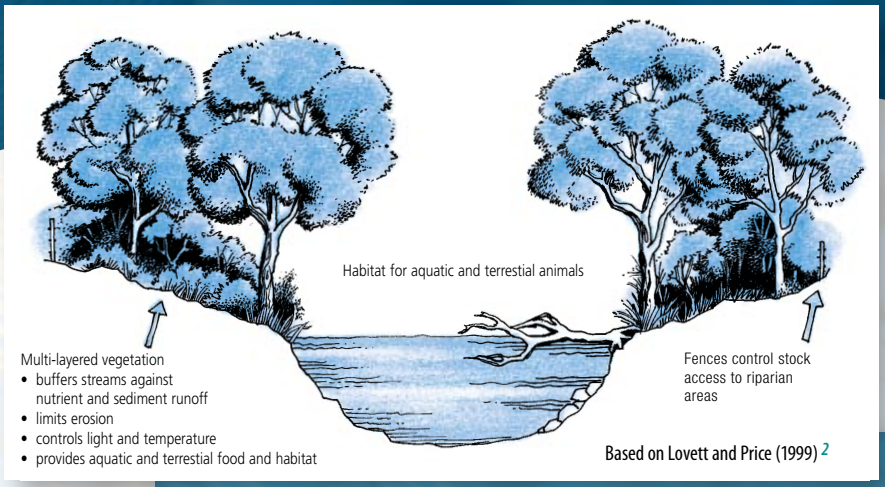
Go to **www.mrccc.org.au** and download your ***Mary River Character*** A3 poster.



A lot goes on...

Get to know the habitats

Many important habitat areas interact and influence each other. With the flows, the geology and the changes of the seasons, an overall river ecosystem is created.



Interaction of land and water in the riparian zone

A river is a place where boundaries between the land and the water are blurred and where the transition from one to the other creates a unique set of habitats that are different to those found anywhere else.

As the Mary River winds its way from the wet, steep foothills near Maleny to the drier meandering floodplains near Maryborough, the main river and her tributaries change from narrow, rocky and fast flowing streams to wide, sandy and slow flowing. During drought streams may dry to a trickle, with deep pools and ground water supply (where it exists) providing the last refuge for the Mary River creatures. During flood all streams are transformed into torrents and the usually docile lower river becomes a force capable of moving houses out to sea*. Through all of these cycles, the creatures of the Mary River, young and old, are there in the river seeking places to eat, hide and, if they are mature enough, breed.

Riparian (riverbank) trees, shrubs and grasses are an obvious part of the Mary River habitat.

They send their roots down and may interact and intertwine with the water. They shed their leaves and branches which may wash into the river and provide necessary nutrients and carbon for the aquatic food web. In some cases fruit from overhanging trees is a direct food source for the river creatures.

Every subcatchment of the Mary River, whether it be Munna Creek to the west, Tinana Creek to the east or Obi Obi Creek to the south, has particular characteristics that are determined by the local climate (particularly rainfall), local geology and soil types. At the extremes, this makes some tributaries become narrow cuts into steep sided banks while others become very dynamic streams that move considerable distances across a particular channel between one year and the next.

The vegetation that grows around and in these streams is altered by this dynamic process.

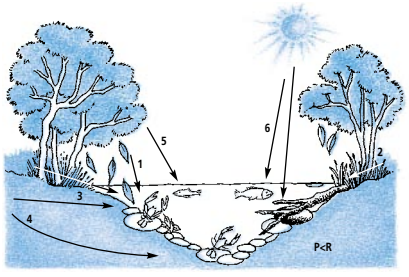
While there is diversity across the catchment, there are particular patterns that can be seen over and over again once you reach the floodplain (from about Conondale north on the main trunk of the river). If you've ever paddled down the main trunk of the Mary River, you will have noticed how the river changes over only a couple of kilometers between slow flowing deep pools and narrower fast flowing riffles. Depending on where you are, there will be a sandy or gravelly bed at fairly regular intervals. This pattern of deep pool, riffle, and sand/gravel bar is a key habitat feature of the Mary River on which all five species depend.

Shallow riffles provide popular feeding grounds for water birds. The variation in depth between these and the deep pools nearby provides gradients in depth, light and temperature that create a diversity of habitats.

The sand banks at the water's edge provide crucial nesting habitat for the Mary River turtle.

Clearing of river banks is one of the major habitat changes that has occurred in the catchment. Clearing changes the way that nutrients and carbon flow between the land and the river.

More trees...



1. Inputs of leaf litter (CPOM) from riparian vegetation
2. Inputs of logs and branches (important habitat role)
3. Leaves and fine particles of organic matter (FPOM) washed in from surrounding catchment
4. Dissolved organic matter (DOM) in sub-surface flow and groundwater
5. Terrestrial invertebrates falling from riparian vegetation
6. Microalgae (for example, diatoms) and other aquatic plants (for example, emergent and submerged macrophytes, filamentous algae) stimulated by sunlight. Primary production is low compared with respiration (P<R).

Less trees...

1. Reduced inputs of leaf litter (CPOM) and terrestrial invertebrates
2. Changes in the quantity and quality of FPOM and DOM from surrounding catchment
3. Reduced inputs of logs and branches
4. Prolific growth of filamentous algae and aquatic macrophytes stimulated by high sunlight and nutrient run-off. These sources are not readily consumed by aquatic invertebrates and cause major changes in habitat.
5. High respiration from plant growth and decomposing organic matter leads to reduced oxygen and lowered water quality. This together with loss of habitat results in loss of biodiversity and major impacts to ecosystem function.

Based on S Bunn (1998) in Lovett and Price (1999) 2

*In the 1955 flood houses from Maryborough ended up on Fraser Island

...and under the water as well...

What makes a happy home in the Mary River?

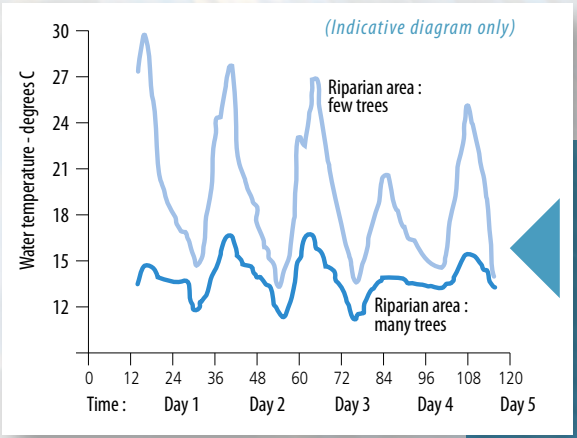
In a nutshell a happy home is a place where our cod, turtle, lungfish, frog and mullet can safely move between feeding, breeding and hiding areas. With the exception of the needs of the turtle and frog who use the riverbanks as well, all of this important habitat is under the water, hidden from our eye.

Feeding

Healthy feeding areas are created by a healthy river with a diversity of depths, flow speeds and a healthy riparian zone. Riffles provide oxygenation which generates growth of lots of macroinvetebrates (e.g. insect larvae, water insects), crustaceans (e.g. freshwater shrimp) and molluscs (e.g. freshwater mussel). Aquatic plants of all sizes from microscopic to larger plants provide food and attract small fish and animals that are an important part of the food chain. Underwater surfaces such as logs and rocks provide places for biofilm to grow - a favourite food of mullet. Deep pools help moderate the water temperature and provide refuge for all sorts of creatures that are part of the food web. Within the river there is predation, competition and cooperation between species which creates a complex web of interactions that is intimately related to flows, the physical structures of the river and water quality.

Breeding

Good breeding areas have the right conditions for laying of eggs and for the survival of the eggs. In fish, the laying of eggs is referred to as spawning. As explained in the following pages water depth, flow conditions, sandy banks, undercut banks, hollow logs, caves and river connectivity all form part of the breeding habitat of our five species. Sediment levels also have a major impact on cod and lungfish egg survival.



Source : adapted from Quinn et al (1992) in Lovett and Price (1999) [2]

Water quality has a direct impact on breeding and the likelihood of eggs surviving.

Water temperature, which is particularly crucial for the cod, reaches greater extremes (much hotter) in more open riparian areas.

Threats to habitat

- Removal of wood from the river
- Clearing of banks
- Slumping and erosion of banks
- Sand and gravel extraction
- Introduced fish species *(e.g. tilapia which compete and destroy habitat)*
- Aquatic and terrestrial weeds *(e.g. cabomba, cat's claw)*
- Water extraction • Water pollution
- Barriers • Streambed erosion
- Damage by stock and people to river banks *(especially turtle nests)*

Finding mates can be a challenge especially when species are endangered and therefore their numbers are low. Our five species may need to be able to move long distances to find mates.

Hiding

Undercut banks, overhanging branches, rock ledges, caves, submerged trees and tree roots provide excellent hiding places. These hiding places are especially important for young cod, turtle, lungfish and mullet. However, there may be a Mary River cod lying in wait to ambush unsuspecting visitors. Cod spend 90% of their time within one metre of submerged trees and tree roots - commonly called Large Woody Debris or Beneficial Large Wood.

Giant barred frogs hide in leaf litter and tangles of roots within the floor of the riparian rainforest.

Hiding places include refuges from harsh environmental conditions. These include deep holes to retreat to when the river is low during a drought and healthy tributaries for waiting out floods.

The ability of the Mary River creatures to move between these areas is affected by barriers. These can be physical barriers and water quality barriers.

For example if a stretch of river has been polluted or covered in thick aquatic weeds, the creatures may not move through to get to the other side.

Mary River turtle [THE ELUSIVE]

(Elusor macrurus)

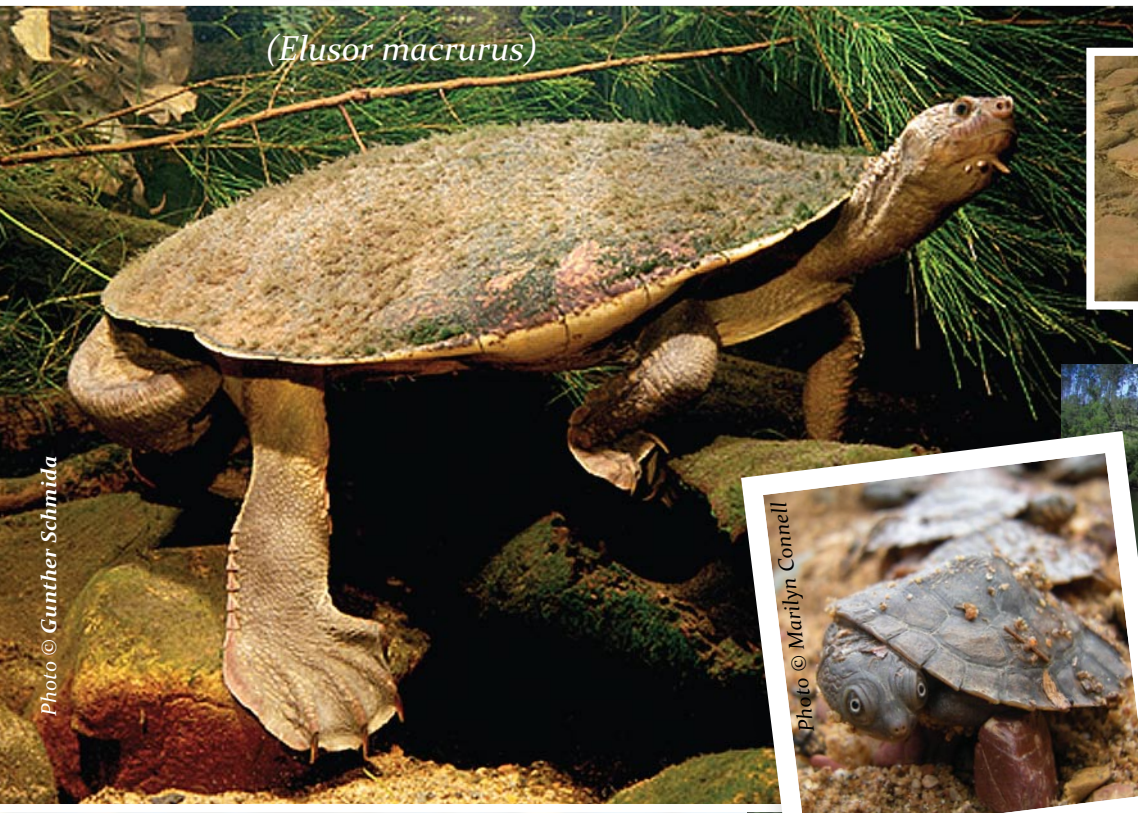


Photo © Gunther Schmida

Photo © Marilyn Connell

Tagged Mary River turtle

Photo © Marilyn Connell

Photo by Ross Smith

Nesting bank

- The Mary River is the only place on the planet where the Mary River turtle is found.
- It has a special ability to breath through its lungs and through gill-like structures in its cloaca.*
- The Mary River turtle is endangered (in Queensland, in Australia and internationally).
- Since 1974 the numbers of turtles have dropped by an estimated 95%. It is the second most endangered freshwater turtle in Australia.

Photo © Craig and Gabrielle Latta

Photo © Hamish Campbell

Marilyn Connell inspects a Mary River turtle north of Tiaro, in a research program that partners with the University of Queensland.

Photo © Graham Stockfeld

Craig Latta doing an impromptu Mary River Turtle talk for 40 kids in the river, while doing research at Kenilworth Homestead.

MY STORY...

The Mary River turtle was only described by science in 1994. It is one of six species of turtle found in the Mary River. Being a specialised river turtle, the Mary River turtle prefers flowing streams with complex habitat. Adults are often found in relatively deep (up to 6 m) river pools. Juveniles are found in shallower water up and downstream of the riffles. The turtle prefers habitat that includes macrophytes (water plants), underwater shelter, submerged logs, and basking logs and rocks[3]. Juveniles turtles are generally carnivores and they greedily gobble up food that comes their way. Older turtles eat plant matter[4] and have been observed opening freshwater mussels[5].

Predation by both feral and native predators (such as foxes, dogs and goannas), robbing of nests by human beings, trampling of river banks, and decreases in water quality (particularly lower levels of oxygen in the water) have contributed to the endangered status of the turtle.

Research has indicated that when levels of oxygen in the water are low, breathing underwater is less effective and the turtles need to surface more often[6]. Every time a young turtle surfaces, they run the risk that big fish such as the introduced yellow belly and Saratoga or a local Mary River cod will eat them, or a bird of prey will swoop down and pick them off the surface. As they get bigger, they have more chance of surviving.

Many of these threats continue today. Oxygen levels are depleted by impoundments, pollution of the river and growth of floating aquatic weeds such as hyacinth. Predation of eggs continues to be a big threat to the turtle nests. Successful breeding is essential for the populations to recover.

The turtles live to between 30-80 years of age, and don't start breeding until they are 15-25 years of age. They nest on sandy banks, usually after the first rains in October and continue nesting until January.

The nests average 15 eggs and incubate for around 55 days. Without nest protection loss of eggs is believed to be very high. Little is known about the survival of hatchlings that do make it into the river.

3. Kuchling, 2008 4. Flakus, 2003 5. John Cann, 1998
6. Clark & Gordos, 2008

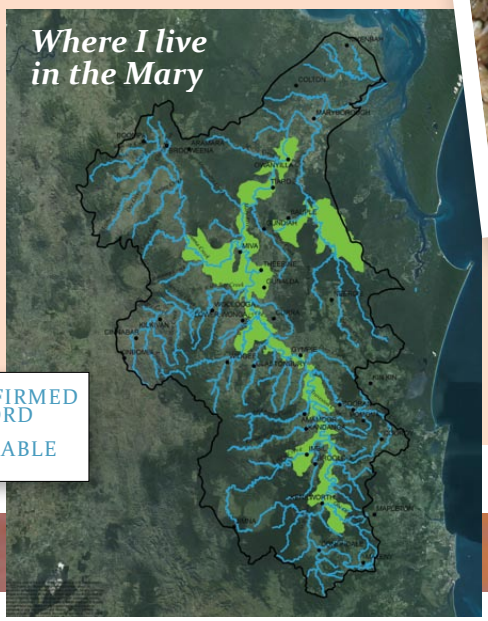



Photo © Craig and Gabrielle Latta


Photo © **Craig and Gabrielle Latta**


Photo by Glenbo

Did you know?

A baby turtle weighs about the same as a teaspoon of sugar.

The Mary River turtle was once known as the penny turtle. Eggs were collected from nesting banks, hatched and sold to pet shops throughout Australia and the world. It wasn't until John Cann, a turtle expert saw one of these turtles and after prolonged detective work, realized it was a new species from the Mary River. It is now illegal to buy, sell or own a Mary River turtle without a permit.

There are five other species of turtle in the Mary River. Mature male Mary River turtles are usually the largest turtles in the river. Individuals from different species can be seen competing for space on basking rocks and logs. Nobody knows why they do this - it may be to aid digestion or control parasites. It may even have a social role.

If you are lucky enough to spot a Mary River turtle, you can easily tell a male from a female by the size of the male's gigantic tail.

**A cloaca is a multipurpose orifice used for excreting both faeces and urine and also for reproduction and egg laying.*

Birds, amphibians, monotremes and reptiles have this opening.

Mary River cod

(Maccullochella mariensisis)

Photo © Bob Simpson

[THE HUNTER]

Photo © Gunther Schmida

Photo © John Cuttmore

- The only natural home for the Mary River cod is the Mary River.
- It is a large fish and can grow to be as heavy as the average 12 year old child.
- The cod is endangered (nationally) and is now found in less than a third of its original habitat.
- The Mary River cod is an ambush predator. Big cod eat all manner of things including small birds, turtles and water rats.
- Any Mary River cod captured in the Mary River must be released.

MY STORY...

The Mary River cod was once so common in the catchment that they were caught and used as pig food by settlers. In the mid 1990s it was estimated that there were less than 600 individuals remaining in their prime habitats in Tinana Creek, Six Mile Creek and Obi Obi Creek with an unknown number found elsewhere in the catchment. A combination of overfishing and habitat deterioration had contributed to the population decline that occurred between the 1930s and the 1960s.

Mary River cod prefer shady, deep pools with large root balls and tree trunks. Although the big cod eat pretty much anything, smaller cod eat mostly shrimps, baby mullet and small bodied fish. It takes a lot of food within a single pool to sustain a 20 kg fish. The cod is one of the major predators in the Mary River, and so the reduction in numbers is bound to have had a big impact on the food web of the river.

Cod are territorial and tend to have a home range 100 m to 1000 m in length that contains two to four core areas where the fish will spend most of its time. To breed, they will travel long distances (in the order of 50-70km). With fewer cod in the river, they are likely to travel further to find a mate. Any barriers in the way which they are unable to pass (e.g. weirs without suitable fishways, causeways, road crossings) will mean they have less chance of finding a mate.

Mary River cod live to at least 40 years of age. They breed in freshwater during summer and spring. Like related freshwater cod species elsewhere in Australia, it is suspected that the female Mary River cod deposits her eggs within submerged hollow logs and caves.

Water temperature is a critical factor during breeding. To trigger breeding, temperatures need to rise above 20°C, but if they get above 28°C then the health and survival of the fish is affected. Shading of the water by riparian vegetation helps to maintain a suitable temperature range for the cod.

A captive breeding and release program has been in place for over thirty years. Although the program began because of recreational anglers' love of the species, it has included an explicit conservation component since the late 1990s. As a result of the captive breeding program, fingerlings have been released in 85–90% of the cod's former range since 1998 [7]. However, we don't yet know whether these fingerlings have survived or been able to start breeding themselves.

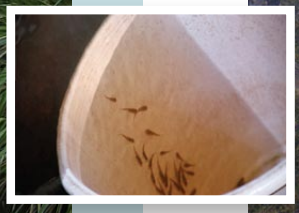
Bob Simpson releasing cod fingerlings

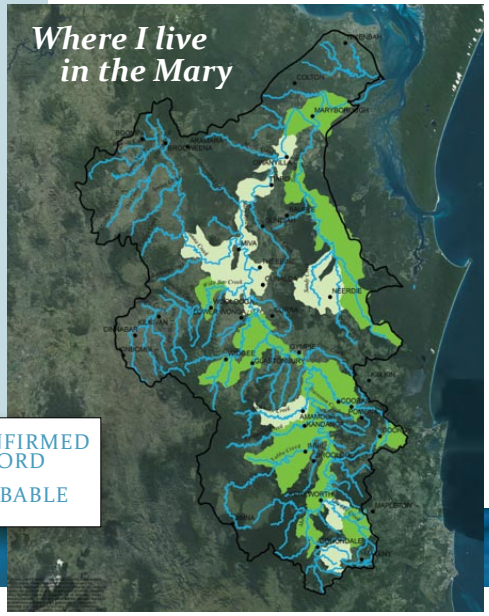
Did you know?

Some scientists suspect that the Mary River cod is the same fish that once lurked in the shadows throughout many waterways in South East Queensland such as in the Brisbane River.

The male cod is a doting Dad, who guards the eggs and then stays with the young fish for several days after they hatch. He needs to be fit, healthy and full of food to maintain this vigil.

Studies have shown that small shallow streams (1-2m wide and 10-15cm deep) can heat up by 10°C a kilometre downstream of a shaded area. Minimum water temperatures are less affected by shade, for several reasons, including the heat absorbed by the river bed during the day. In wider streams, where shade covers less of the water surface, the deeper pools are important for maintaining habitat with more stable water temperature.





7. Jackson, 2008

Australian lungfish

(Neoceratodus forsteri)

[THE ROMANTIC]

Photo © Gunther Schmida

Photo © Gunther Schmida

- The Australian lungfish is an ancient creature, unchanged since the dinosaurs walked the earth.
- It has a single lung that it can use to obtain oxygen from the air.
- Lungfish are only found in a small number of rivers around South East Queensland.
- They are vulnerable to extinction.
- If you accidentally catch a lungfish, you are required by law to release it immediately.

Lungfish eggs, collected for research

Photo © Eva Ford

Lungfish breeding habitat

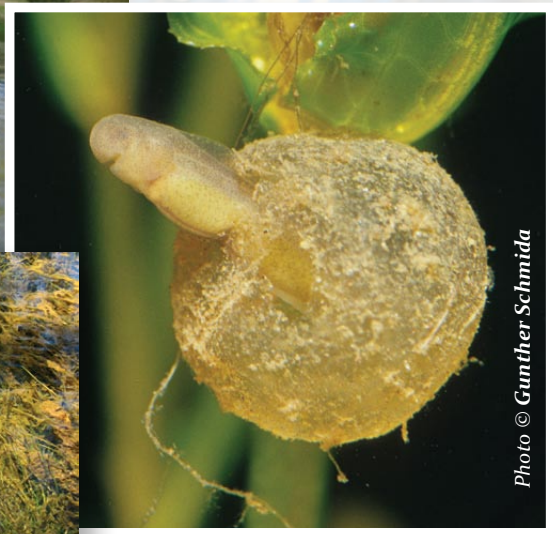
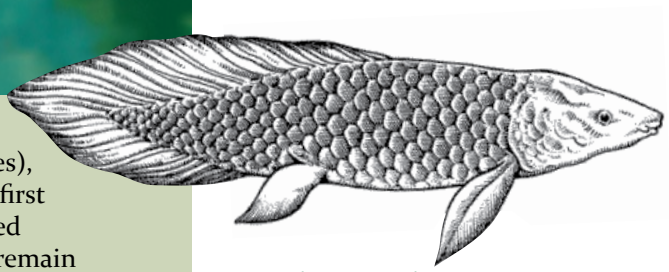


Photo © Gunther Schmida

Lungfish egg hatching

MY STORY...



The Australian lungfish is regarded as a living fossil, a predecessor to all land vertebrates (land animals with backbones), which has not changed for the last 200 million years[8]. When it first became known to the scientific world in the late 1800s, it aroused tremendous curiosity. Some of the mysteries about the species remain unresolved today.

The population of lungfish in the Mary River is regarded as healthier than populations elsewhere, including in the Burnett River to the north. In the past, the lungfish is believed to have been much more widespread throughout Australia. Researchers have speculated that their survival in the Mary River and other nearby catchments may be a result of a combination of lack of large predators (i.e. crocodile) and the ability to out compete ray-finned fish during Queensland's long, hot summers when water quality declines[8].

Australian lungfish spend their life entirely in freshwater. Adults mature at approximately 10-15 years of age. In captivity they have lived as long as 80-100 years[8] and perhaps 50 years in the wild. Recent records show that they grow to a size of 1.5 m, though historical records document larger fish up to 1.7 m. Similar to the Mary River turtle, the diet of the lungfish changes over its life. When young, they are mainly carnivorous, but as they age they eat more plant material and are therefore considered omnivores.

They are primarily nocturnal. After a night of feeding and socialising, during the day they retreat to their preferred home range of a 1 - 1.5 km stretch of river. Like the Mary River cod and turtle, they prefer habitat that is complex - with submerged trees, tree root balls, overhanging vegetation, bank undercuts and rocks.

Lungfish are quite romantic creatures who undertake a courtship period before laying their eggs. Lungfish will move long distances to find mates and breeding areas. Some scientists suggest they return to the same breeding areas year after year. The courtship period and breeding usually occurs between August and November. They deposit their eggs on particular aquatic plants. Beds of Vallisineria nana are popular breeding areas. Vallisineria nana is a native aquatic plant that grows in shallow water and looks like green ribbons wafting in the water. Even though it is not a weed, it is sometimes referred to as *'ribbonweed'*.

About a quarter of the known breeding habitat for the species has been lost through construction of water infrastructure on the Burnett River. The breeding grounds in the Mary River are crucial for the recovery of the species. Suitable breeding habitat is very specific. In addition to submerged aquatic plants, it must provide protection from predators, appropriate levels of dissolved oxygen for developing embryos and abundant food supplies for recently hatched lungfish. Oxygen levels and necessary food supplies are provided by flowing water and a healthy ecosystem upstream. If water levels change or the Vallisineria nana beds are trampled by people or livestock, the eggs can be destroyed. The eggs may also be eaten by both native and introduced fish and crustaceans.

The ability of the lungfish to breath air through its single lung provides it with an adaptation to low dissolved oxygen.

However poor water quality can have a detrimental impact on their eggs, with sediment contributing to fungal disease and death of the eggs.

Did you know?

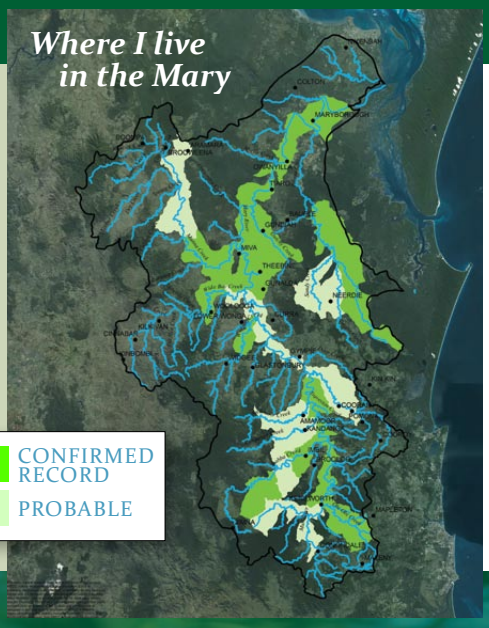
In the first year of their life, until they are about 300mm long, young lungfish are seldom seen and little is known about their behavior and habitat preferences. People speculate about what they do during this time. Do they bury themselves in the riverbed to avoid predators for their first year? Or do we humans just not know how to spot them?

Floods can completely devastate the breeding areas of lungfish as can human activity that alters the flow of water and sediment in the river.

The lungfish has particular significance to the Gubbi Gubbi people and is known to them as Dala.

Swimming to and fro, over and through the weed, they gave the appearance of playing *'follow the leader'*. During this time the second fish repeatedly nosed the cloacal region of the leader and was seen to *'bump'* it several times with its snout. This same fish was seen several times to take in its mouth a long strand of what appeared to be weed, and wave it about.

Description of lungfish spawning by Gordon Grigg.[9]



8. Joss, 2004

Giant Barred Frog

(Mixophyes iteratus)

[THE ORNATE PRINCESS]

Photo © Eva Ford

Photo © Eva Ford

- The Giant Barred frog is endangered.
- It is one of the largest frogs in Australia.
- Females are larger than the males and both have beautiful patterns that differ between individuals.
- One of the tell tale signs of a Giant Barred frog is their eye – the iris is a golden colour and the pupil is vertical.

Photo © Eva Ford

MY STORY...

The Mary River is the northern limit of the Giant Barred frog distribution which extends down through eastern NSW to Coffs Harbour. It is a stream dependent frog which means that it lives close to and depends upon forested streams. The Giant Barred frog relies on riparian rainforest and is therefore limited to the parts of the catchment where rainforest is the natural riparian vegetation. In areas where the MRCCC has been undertaking frog surveys for the last 10 years, populations appear to be relatively stable, but the total number of Giant Barred frogs sighted is low.

Generally larger frogs have longer lives than smaller frogs. A big Giant Barred frog, which can grow up to 115 mm in size, could be somewhere around 20 years old.

They start breeding about 3 years after emerging from the egg as a tadpole. During summer months, males will venture out into the open to call for females to come to them for breeding. Their call is a deep guttural grunt that a human can reproduce with some practice. After the eggs are laid and fertilized in the water, the female undertakes an amazing feat of flicking the eggs up onto overhanging surfaces such as those found in bank undercuts. The eggs stick there, developing in the moist air, but out of the water and away from predators. When they hatch the tadpoles drop into the water below. Like their parents, the tadpoles are large (up to 12 cm long). They need permanent water to develop into frogs which takes at least 9-10 months. They are vulnerable during this time to predators, damage to their habitat and drought.

The Giant Barred frog is nocturnal. When hungry, the frogs may venture up to 40 m away from the stream to find food. They eat insects, worms and sometimes other frogs!

Over winter, the frogs go quiet and are not seen or heard. Where they go during this time is a mystery. It is thought that the frogs may reappear in the same area the following year.

One threat to the frog is the chytrid fungus, which can be spread from area to area on vehicles and on people. If you encounter a frog, it's best not to handle it, just in case.

A custodian of the Riparian Zone

Any activity that impacts on the Giant Barred frogs riparian or stream habitat will impact on the survival of the frog. Such an activity also impacts on numerous other species in the river, including the Mary River turtle, lungfish and cod. This is because the riparian zone is such a crucial part of a river ecosystem. This layer of trees, shrubs and grasses provides shade, protects the bank from floods, filters runoff from surrounding land, supplies complex nutrients and carbon to the food chain and provides a supply of the tree trunks and roots that the cod, turtle and lungfish love so much. It also provides important habitat for numerous other species of animals and plants, many of which are threatened - Coxen's fig parrot, koala, grey-headed flying fox, Richmond bird-winged butterfly and Cossinia australis.

Did you know?

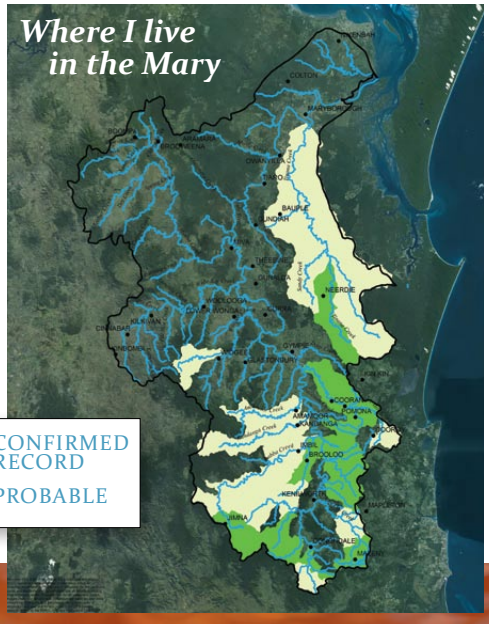
Believe it or not, they are sometimes mistaken for cane toads. Please think twice before you try to run over a cane toad near a bridge or in a rainforest area - apart from the cruelty involved, it might just be one of our endangered frogs!

Stream dependent frogs have experienced rapid and, as yet, unexplained declines in population, which in some cases have sadly lead to extinctions, two right here in the Mary River catchment. Possible contributing factors include Chytrid fungus, increased UV rays, climate change, chemical pollution as well as a range of localised threats such as habitat clearing.

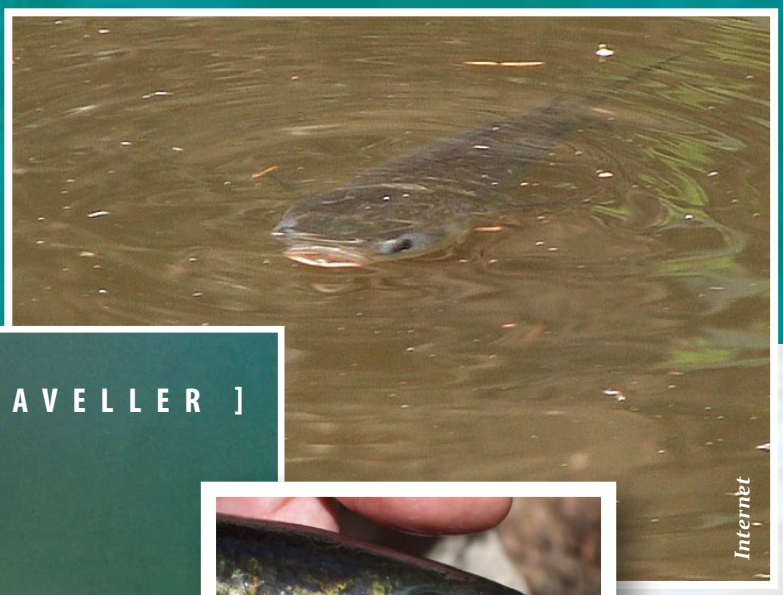
The Great Barred frog is similar in appearance to the Giant Barred frog. However, their eyes are jet black, and they make a call that sounds a lot like a duck quacking! They are also a bit more adventurous than the Giant Barred frog and head up into ephemeral streams after rain.

Giant Barred frogs have fully webbed feet with no pads on their toes.

Where I live in the Mary



Freshwater mullet *(Myxus petardi)*



Internet

[THE TRAVELLER]

Photo © Lindsay Titmarsh

Photo © DAFF

Photo © Rudie H. Kuiter

My story...

The Freshwater mullet is also known as the Pinkeye, Richmond or River mullet. The Mary River is close to the northern limit of its distribution which extends from the Georges River in New South Wales to the Burnett River in Queensland.

They can get pretty big - up to 800 mm in length and live to be up to 14 years old.

These fish are often seen in deep pools where the stream is flowing slowly, moving at the surface and slightly below the surface in schools or shoals. They are very obvious at the surface when they are feeding on microscopic plants and animals. They feed around submerged logs, rocks and other structures where they are believed to eat biofilms of algae and bacteria.

Young mullet are often found near riffles where they have a food source and protection from predators. There is some evidence to suggest that the mullet has a reliance on riparian vegetation.

Mullet play a very important role in the food web of the river. In large schools, they eat large amounts of plant material. By incorporating this plant material into their bodies, or excreting it, the mullet makes it available to other animals in the food chain who can't eat or don't prefer plants as food. For example, young mullet are believed to be eaten by carnivorous Mary River cod.

- Freshwater mullet breed in the estuary, but live mostly in freshwater.
- Their numbers are declining. They have almost vanished from neighbouring rivers to the north.
- They move in schools, feeding on algae and microscopic invertebrates and plants.
- Barriers to their movement affect their breeding and survival. It is believed that they are no longer found in Tinana Creek.

Photo © DAFF

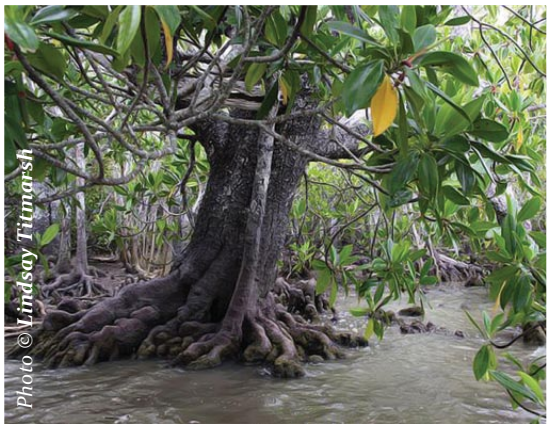


Photo © Lindsay Titmarsh

Breeding for freshwater mullet involves an amazing journey over hundreds of kilometers. They spawn in the estuary during late Summer and early Autumn, probably in areas of low salinity.

When the young mullet living in the river mature at about 4 years of age (when they are about 360-400mm long) they travel into the estuary to breed every year (if obstacles such as weirs and causeways don't prevent their journey). After breeding, the young and adults return to the river. Some of them are found just downstream of Baroon Pocket dam on Obi Obi Creek near Maleny.


Photo © MRCCC

Although they can survive in brackish water, if barriers prevent them returning to the freshwater section of the river, they do not grow as quickly and are more likely to be eaten by predators. If they are stranded below a barrage, weir, or other obstruction in the river, they are also not able to play the important role that they play in the freshwater food web.

Once the numbers of Freshwater mullet have declined in a river system, recovery of the population can be slow because the freshwater mullet doesn't tend to move out into the ocean and travel from one river mouth to another like the Sea mullet *(Mugil cephalus)* does. Therefore it is best to act now to help ensure the freshwater mullet can breed successfully and flourish in the Mary River once again.

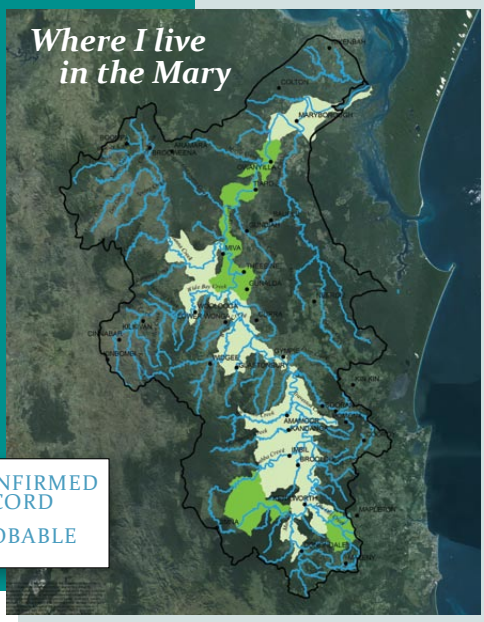
Connectivity in the River

Connectivity, on which breeding of the freshwater mullet depends, is an important river process which affects many other species, including the Mary River cod, lungfish and Mary River turtle in direct and indirect ways. As explained earlier, the cod, lungfish and turtle also need to be able to move through the river system. Therefore taking care of the mullet will help take care of other species, particularly the species that also move between the estuary and freshwater as part of their life cycle. These include freshwater eel, Australian bass, jungle perch, sea mullet, bullrout and striped gudgeon and barramundi.

In the Mary River system and adjacent estuarine and coastal waters several mullet species can be found however the Sea mullet is most similar to Freshwater mullet in its form and habitat use. Freshwater mullet is less common in the Mary River system than the Sea mullet [10].

Barriers currently lacking fish passage devices include:

- *Tallegalla Weir (Tinana Creek)*
- *Gympie Weir*
- *Imbil Weir*
- *Borumba Dam*
- *Baroon Pocket Dam*
- *Cedar Pocket Dam*



Did you know?

Mullet used to be common throughout the Mary River. For example, a landholder reported that we used to have big shoals of mullet through the Traveston reach and up Kandanga Creek back 20-30 years ago. Similar tales are told in other parts of the catchment.

The complex organic compounds the mullet excrete provide fuel for various microscopic animals and invertebrates such a freshwater shrimp and worms and also molluscs such as freshwater mussel.

Watching mullet scrape biofilm off a log is like watching a person eating a corn cob!

The Freshwater mullet is an important species in indigenous culture, particularly in the middle and upper catchment.
It is a totem species for around the Gympie area [11].

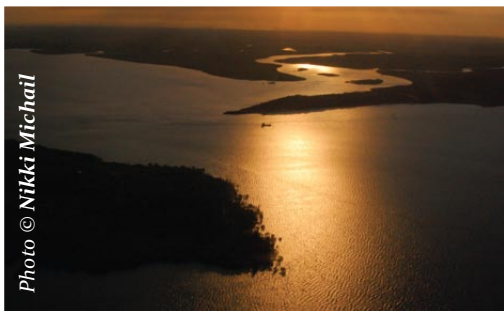
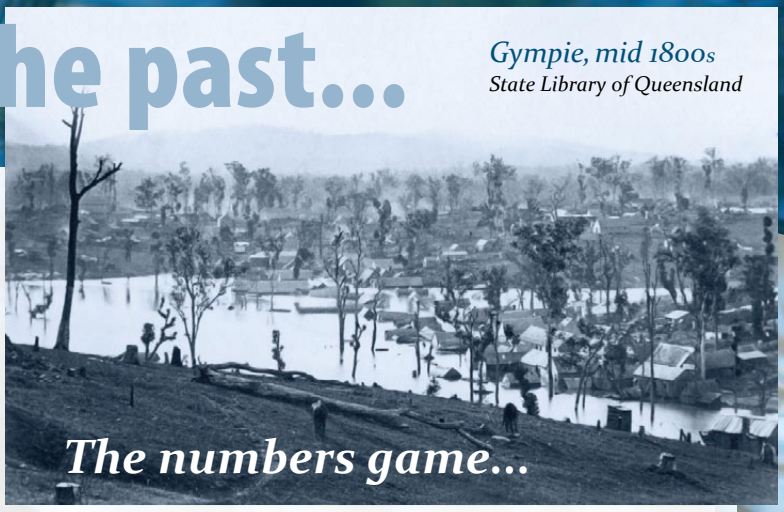


Photo © Nikki Michail

To find a factsheet about how to identify a freshwater mullet, go to:

10.Hutchison, 2012 11. Bargo, 2012.

Learning from the past...



Gympie, mid 1800s
State Library of Queensland

For thousands of years the Mary River and tributaries provided a pathway for aboriginal groups including the Butchulla, Kabi Kabi/Gubbi Gubbi and Wakka Wakka. They were a place of abundance connecting the coastal mullet fishing grounds with the rich source of food provided by Bunya pines in the Bunya mountains. Aboriginal groups harvested food and materials from the catchment and managed the landscape to increase its productivity and maintain the complex web of species.

Early settlers to the Mary River catchment referred to the riparian vegetation as 'jungle'. After they arrived in the mid 1800s clearing, logging particularly for red cedar, hunting of wildlife and mining for gold transformed the river ecosystem. These transformations continued into modern day with construction of weirs, dams and barrages, gravel and sand extraction, water extraction and use of river banks for grazing and stock watering.

In his 1994 article, Stan Tutt [12], a Local Historian, captures the worst of these changes:

[The river has] changed beyond comprehension of those who knew it even 50 years ago. It has changed from a deep clean stream guarded by shaded scrub (rainforest) which reached back to the ranges, or by the open forest flats saddled high in the native kangaroo grass, to a sand clogged watercourse fighting for its life between eroded banks held by thinly scattered trees.

Comparing photos of the early 1900s with the river today shows the river's great capacity to regenerate. Although the river is forever changed from the place the aboriginal people and early settlers knew, as a community there is much we can learn from past practices - both those that helped and hindered the river.

Many landholders now know the importance of riparian vegetation for bank stability, water quality improvement and biodiversity. They have volunteered to change the way they manage more than 400 km of riverbank. These reaches are now being rehabilitated. This involves stock fencing and off-stream watering infrastructure to manage cattle access to the riparian zone and riparian vegetation management e.g. revegetation, encouraging regeneration and weed control. This is a good start.

We are also beginning to understand the importance of biopassage, not only for our threatened species but for the productivity of recreational and commercial fisheries in the Great Sandy Strait. Fish ladders have been installed on the Mary River and Tinana Creek barrages and there are plans to improve fish passage through the Gympie Weir. Some significant barriers to movement remain that have been prioritized as part of the Burnett Mary Region Biopassage strategy.

We still have much to learn and some major challenges to address to create a healthy and vibrant Mary River. These challenges include reducing sediment loads into the Mary River, controlling noxious weeds, managing water extraction as population growth in our region continues and making good decisions regarding possible new industries such as mining and coal seam gas.

12. Stan Tutt (1994)

The numbers game...

- *42% of the catchment is subject to mining exploration applications.*
- *Just over half (52%) of the sediment load in the Mary River comes from bank erosion. Another 41% comes from erosion of hillslopes and the rest from erosion of gullies* [13].
- *In the mid 1990s a study found that more than two thirds of the river banks were in poor or very poor condition* [14].

What the community say about the river and her future:

To us it seems like the river desperately needs a much wider strip of vegetation to protect it from the rain events. The trees seem to hold each other together and act like an interlocked brace.
STELLA WIGGINS - KENILWORTH

If you over use the river, you are only doing damage to yourself. The river is not an endless thing... you've got to be fair. When the river gets low, you have got to back off.
AUNTY MARIE WILKINSON - BUTCHULLA ELDER HERVEY BAY

We need a vision that recognises the value of primary production equally with environmental values.
MARK AMOS - BAROON POCKET

Rivers are an important fundamental part of their surrounding ecosystems, money will not fix them if they are too seriously degraded. RUSSELL LUCK - KANDANGA

Valuing the role of the river in the ecosystem and to human existence. We need to respect its role and ensure that it becomes healthier through a commitment as a community. DIANE COLLIER - CONONDALE

We need to create a sense of belonging.
GYMPIE CARING FOR MARY FORUM JUNE 2012

It's the stuff of legend. SALLY MACKAY- MOY POCKET

We need to involve all levels of government and community. RON BLACK - TIARO

We need a strategic plan for filling the gaps in information required to make informed and science based decisions on the Mary and catchment. ROSS SMITH - TIARO

Encourage increased stewardship of river and increased community understanding of river values and river processes. RECOVERY PLAN SURVEY RESPONSE

...to create a river of our dreams

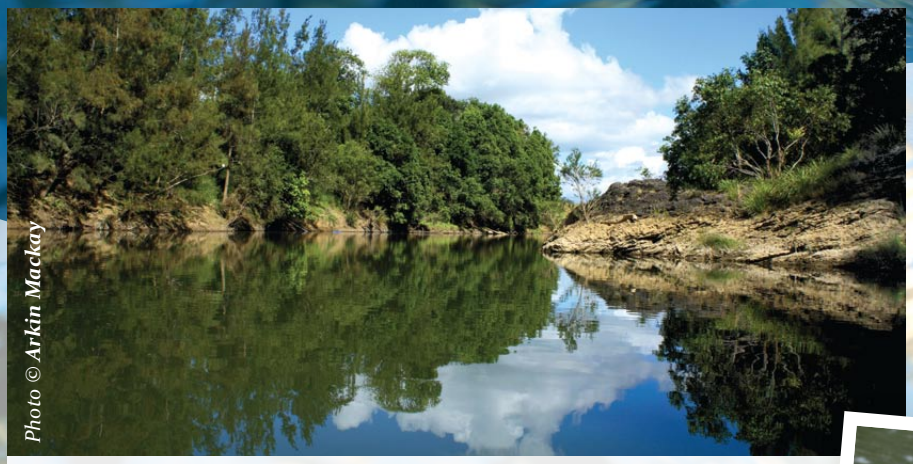


Photo © Arkin Mackay

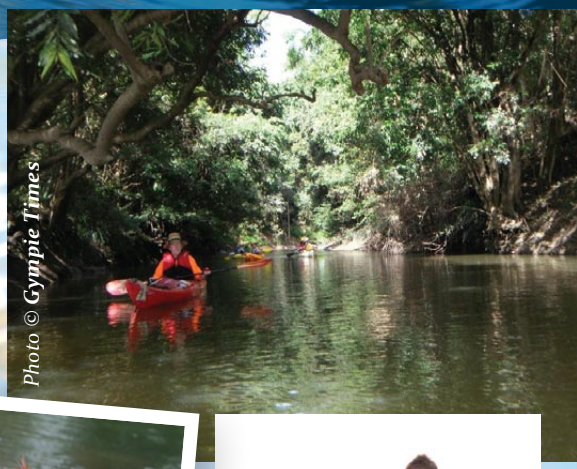


Photo © Gympie Times


Photo © Eva Ford


Photo by Glenbo

The communities of the Mary River continue to demonstrate great commitment to improve the health of the river and protect and value our threatened species. There is something that each of us can do to help the Mary River. This could be reducing the demand on the water resources of the river, preventing pollution entering the river, or restoring and protecting habitat, both within the river and tributaries and along its banks.

Urban dwellers : think about your water use, your use of chemicals in your garden, runoff when you wash your car, cleaning up after your dog. Put all litter in the bin.

Farmers and rural residents : if you have stream or river frontage, you can restrict stock access, encourage revegetation of native plants and control weeds. Use water from the river efficiently. Leave the tree trunks and snags in the river.

Recreational fishers : use barbless non-stainless steel hooks that do less damage to any lungfish, turtle or cod you catch and make sure you release them carefully. Collect all your gear when you leave the river.

Recreational river users : leave no tracks. Always remove and take home any rubbish. Avoid disturbing sandbanks in spring and summer.

School kids : find out all you can and be a messenger for all the animals that live in the Mary River, encourage your school to adopt your local creek or part of the river.

Water managers : leave enough water to maintain a healthy river, ensure barrages and weirs have fish ladders or other fish transfer devices.

Local politicians : learn about what is special about the Mary River, help our community become stronger & develop the capacity to act as custodians for the local environment. It makes for happy, stronger communities. Support research and rivercare activities.


Photo © Arkin Mackay

Anyone can become a Rivercarer...

- ***Contact MRCCC*** for details of current opportunities. Ph 5482 4766.
- ***Join a Landcare group***. Landcare groups include Tiaro, Gympie, Noosa (Pomona) and Barung (Maleny).
- ***Learn from local leaders*** who can demonstrate how to care for your patch of the Mary.

Inspiring Community Connection to Mary River Stories

*This book was created in 2012 for the **'Inspiring Community Connection to Mary River Stories'** project which is part of the Mary River Threatened Aquatic Species Recovery Plan.*

It is part of a package of information available to interested individuals and groups who would like to spread the word about the Mary River, her unique creatures and what we can do to help them.
*This project was funded by a **Be Natural Landcare Grant**.*

To download this book and the associated A3 poster, and to find out more about the Mary River, go to : www.mrccc.org.au

For links to other groups, go to www.mrccc.org.au/landcare.html

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