Musing on the Murray

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A fat witchetty grub disrupts the calm of a lush river, falling into the water with a gentle "plonk!". A fish resting in a deep hole below the shady surface is alerted and moves out from her refuge ready to attack. She strikes the grub aggressively and hooks herself firmly on the line of another predator - an eager fisherman. She twists and turns, thrashing her tail, but no matter how hard she pulls, she cannot get rid of the fisherman's hook. She plunges down into the cool, dark water but the young fisherman is patient and slowly hauls her to the surface where he nets her into the boat.

This Murray cod is about 25 years old. Image © Gunther Schmida.

She is a one metre Murray cod, a bright mosaic of green and yellow sign that she has been living in dean, healthy water. She weighs at least 20kg, and the fisherman thinks she is about. 20 years old. She's a youngster compared to oldest ever Murray cod caught, just under 50 years of age. It's thought that these Australian giants could have been as old as 100 years of age before Europeans arrived.

This Murray cod would have accomplished a great deal in her 20 years. She might have meandered down large, slow-flowing, silty rivers in the floodplains of the lower Murray Darling Basin, or she may have travelled through surprisingly small rocky upland streams as high as 1000 metres in the Great Dividing Range. Only a few months ago she may have migrated as far as 120 km upstream to spawn, returning back to this very same snag on this well vegetated river.

At her age, this Murray cod would have produced almost 100,000 eggs this spring, a low egg count in the fish world, but that is always the case with this species. Her genes are valuable; she's a threatened species and she's survived for many years in a harsh environment.

In fact, female Murray cod between the 15 – 25 kg mark are the most valuable breeders. They produce larger larvae with larger yolk sacs, meaning the survival rate is higher for her young than the young of less experienced breeders. However, her young will need somewhere to live. Will there be enough habitat available for them?

The fisherman gently returns the fish to the river and he watches her breathe the warm water with relief. Once recovered she quickly returns to the safety of the submerged log, or snag, that is her home.

Places for food and sex

Snags, riverbank vegetation and free flowing water play a crucial role in the life of many Australian freshwater fish. For Murray cod they are essential to breeding, spawning, feeding and in providing protection.

Let's follow the path of this female Murray cod and her offspring during the spring spawning and breedjng season.

She sets off in winter, moving upstream with a swollen and heavy belly. On the way she shelters from the downstream currents around submerged logs that also provide good feeding grounds, for small fish also use the logs for protection.

Once she arrives upstream she pairs up with' a male cod; together they find, and clean a hard surface, perhaps a rock or a hard clay mud bank, but most likely a well protected spot on a snag. A hollow snag is ideal as it provides a shield from strong currents.

Murray cod larvae at approximately one to two days after hatching. They are protected and nurtured by a high nutrient yolk sac. Image: Steve Thurstan I&I NSW.

She lays her eggs on the selected surface, and the male fertilises them. She returns downstream to her home snag while the male guards the eggs for about a week until they hatch into larvae. He continues to look after them for another week or so until the larvae are ready to leave the safety of the nest site. The importance of the male guarding the eggs is so crucial that it is a major factor in the fishing closure for three months of the year, from September to the end of November.

The larvae need high quality water if they are to grow strong and healthy. High quality water depends on riverbank vegetation and snags for these things help control soil erosion and prevent nutrients, sediments and chemicals entering the waterway. Without riverside vegetation, the Murray cod larvae might become weakened or killed by chemicals or pesticides or suffocated by sediment.

Many agencies, including I&I NSW is helping to replant streamside vegetation across the state, including in the Murray Darling Basin. Slowly but surely native fish, including Murray cod, are returning to live and breed in these revegetated waterways.

Leaving home

The larvae of the Murray cod pair are now on their own as they float down the river or stream. Once their yolk supply is used up, like any babies, the Murray cod larvae need to be fed constantly, so they are reliant on a healthy ecosystem to provide clean water and a variety of food sources for them.

They travel with the current, so need plenty of snags to rest near while they make their perilous passage down the river. The more snags along the way, the more chance they have of becoming juvenile fish.

Their downstream journey is hazardous. They can be eaten by introduced species such as carp and redfin, sucked into irrigation channels, or prevented from moving on by road crossings, dams, and weirs.

Any larvae that found their way into dams or irrigation channels can still grow into maturity providing they have enough food and shelter; but larvae in dams have a lower chance of survival. In 2007, I&I NSW conducted a study on the impact of irrigation systems on fish and up to 200 fish per day were removed by pump systems in the Namoi River. Murray cod breed best in flowing water, which probably accounts for why there is always a higher survival rate of young in natural flooding years.

Larvae that get over weirs are often killed by the subsequent drop down to the water surface. An I&I NSW study found that 25 % of NSW's 7000 in-stream structures prevent fish moving up and down stream. Many of these structures can be improved by replacement with fish friendly weirs and crossings. I&I NSW has helped implement many of these upgrades, with more in line for the future.

Eventually, some of the larvae arrive at nursery habitat such as a wetland, shallow, shady water or even a highly vegetated riverbank. Such habitats are becoming rare, due to human development, further reducing the larvae's survival chances.

Having no safe haven means they are easily eaten, or they die from lack of food or pure exhaustion. I&I NSW's Aquatic Habitat Rehabilitation program is helping to revive wetlands and riverbanks through its programs 'Wetlands on Farms' and 'Fish friendly Farms'.

Australian smelt are a common food source for Murray cod. At only 10 cm in length smelt hide amongst the twisted snags where Murray cod hunt for a quick snack. Image © Gunther Schmida.

The Future of the Murray Cod

The natural health of the river and its surrounds is crucial to the survival of the Murray cod. Conversely, the Murray cod is important to the health of the river; it is a top order predator, and in any ecosystem these predators are needed to give the environment

relative stability. A healthy river is also important to the range of aquatic animals, many of which the Murray cod depends on. For example, a primary source of food for the Murray cod are small fish such as smelt, galaxias and gudgeons. All native animals are part of the food web.

The dependency of the young Murray cod on snags and river bank vegetation will continue well into adulthood – they will use these environments as feeding places, and for shelter and protection. They will eat the fruit and insects that drop from trees, shrubs and grasses overhanging the river, and spend most of their time under or near snags to avoid fast currents and to be protected from direct sunlight.

Fishing clubs, councils and community groups have been releasing Murray cod larvae into healthy streams around NSW, but these fish still need places to live – so let's hope that with more habitat combined with knowledgeable regulation of fish populations, there won't be a need to re-introduce stock in the future.

More habitat is the key to more Murray cod; this species has specific habitat requirements that they use throughout their life cycle. If one habitat is damaged or removed, the Murray cod cannot complete its essential life stages. That's why, if you're not getting snagged on vegetation under or overhanging the water, then you are fishing in the wrong place!

You can help ensure that there will be plenty of habitat for the Murray cod by planting and conserving native riverbank vegetation and by not removing snags from our rivers.