

1

Fish Ponds



Anne and Bill Magnusson at 8 Kiwong St in 1953 (left) and 1959 (right). Photos by Dorothy Magnusson.

The little boy kneeled on the path beside the fish pond, watching the goldfish pushing into the mass of gleaming white froth to suck out the black frog eggs. The hard cement dug into his knees and made the position uncomfortable, but the tiny drama unfolding in his backyard kept his attention. Five year olds are curious about most things, and I understood that I was seeing one species eating another. However, I could not imagine that I was witnessing an ecological interaction that had been written about hundreds of times in the scientific literature. It would be thirty years later, when I was sitting on a log in the middle of the Amazon forest, before I realized that much of what had been written was wrong, and that the scene I had witnessed as a child was an interaction of such fundamental importance that it probably even determined the number of species of frogs on Earth¹.

Thirty years is not an uncommonly long period for a scientist to have to ponder a phenomenon before being able to put it into context. However, I was not thinking about the interaction between fish and frogs during most of that time. I had completed a university degree and a Ph.D, but they were not the major reasons that I could make sense of my childhood observations. I first had to learn to see the fish and the frogs. Much of that learning process I did not undertake alone and many of the people who guided me were not scientists.

We like to pretend that science is a simple process of insight, hypothesis testing and conclusion, but that is usually not the case². The world is extremely complex, and we can only function in it because our brains automatically filter out the few items likely to be of use to us from the billions of bits of information that impinge on our senses every second³. The unconscious brain does not care about words or ideas, it cares about emotions. It is much faster and more reliable than the conscious brain, and it has to be to keep us alive. If we want to use it to solve logical problems, we have to make those problems emotionally important to us⁴. That is, the mightiest computer on earth only

works on things to which it has an emotional tie.



Photo 1.1 Fish ponds built by Ern Magnusson in the 1950s still support frogs and the native orchids he planted. Photo by Dorothy Magnusson in 2012.

I feel for fish and frogs, but I do not feel for them the way I did when I was five years old. I want to tell you a scientific story, but to do that I have to take you on a journey that involves my family, fishermen, friends and people of the forest. It is a journey of discovery about myself that led me to have enough empathy for the fish and the frogs that I could see them in ways that most people do not. I know that you are hungry for the science, but let's go back to that five year old kneeling beside the pond at 8 Kiwong St, Yowie Bay in Sydney, Australia.



My father was a working man who started with almost nothing and made a secure home for himself and his family. Orphaned in his teens, he and his two brothers were taken in by my maternal great grandparents. When he married my mother, he set about building a house in Yowie Bay, a southern suburb of Sydney. This was just after World War II and Yowie Bay was connected to the city proper only by dirt tracks running through pristine bushland. The block he chose was on the crest of a ridge, with an easterly aspect to catch the north-east winds and the early morning sunshine.

The ridge was formed by weathered sand- and ironstone and the soil could not support anything but the hardiest of native plants. Therefore, my father cleared the land, built retaining walls, and brought in truck loads of soil from the alluvial flats of the Hawkesbury River. He covered the flat terraces with buffalo grass and vegetable gardens bordered by introduced shrubs, such as camellias and hydrangeas. He left only two scribbly gums in the back yard, one of which was very big and still dominates the landscape with its smooth white trunk and arching branches.

It took several years for my father to complete the house, but by the time I was born the house and garden were worthy of the pride of any middle class family, and he did it without borrowing a penny or having to subcontract any of the work. The well kept gardens of most middle-class Australians in the 1950s were virtual deserts compared to the complex bushland they replaced, but my father had been a bushman and a hunter during the great depression, and he was not content with the bowling-green terraces⁵. He set about building fish ponds to break the monotony and there were four when I was five years old. They were vaguely oval shaped and varied from less than 1 m to almost 2 m long. About 60 cm deep, my sister and I used the largest as a swimming pool when we were small.



Photo 1.2 A kookaburra watches the ponds for unwary fish.

Photo by Bill Magnusson.

The ponds were made to look as natural as possible. Dad formed the outlines of the ponds and surrounding caves out of many layers of crushed chicken wire so that they looked part of the landscape rather than human intrusions. The wire was covered by cement, layer by layer, and the unstressed concrete was very strong. The grey cement was not attractive, so Dad mixed sulfate of iron in water and let it soak into the cement. It was initially a greenish color, but the iron rusted, making the ponds appear to be formed from ironstone. The rockeries around the ponds even had some native plants, such as rock orchids and felt fern.

The ponds were stocked with gold fish with colors varying from deep red to light gold, and Dad had prized blue Shubunkins. Some of them had veil tails, because they had been bred for an abnormality that resulted in two drooping tail fins. The veil tails always looked clumsy to me, even when I was a youngster, and I much preferred the more streamlined comets. The goldfish swam among various

types of aquatic plants, and would hide under the floating leaves of the water lilies if threatened. However, brightly colored fish that had craftiness bred out of them were no match for the white-faced herons and kookaburras that were attracted to the ponds, so my father put chicken wire over the ponds to keep the birds out.

It was not only the birds that saw the ponds as a new resource. Striped marsh frogs could get through the wide mesh of the chicken wire and were soon breeding in the ponds. The scientific name of the marsh frogs is *Limnodynastes peronii*, which means Peron's lord of the marsh. They were certainly the lords of our back yard. The "tok" sounds of their calls can be overwhelming at some times of the year, but I only know that because I have returned to Kiwong Street after many years of absence. When I was a child, the sound had always been there and my brain filtered it out. I have no memory of their calls in the early years, even though they must have constituted the loudest and most consistent sounds of my childhood.

The frogs would often put their foam nests in shallow nooks beside the ponds where the clumsy goldfish could not reach them, but some eggs that were high in the foam often survived even in nests floating in open water. The fish did not eat the black tadpoles, but as a child I never wondered why. The frogs only went to the ponds to breed, and at other times we would find them under stones or in leaf litter in the garden. Regular watering and mulching had changed the landscape from a desert horror to a Garden of Eden for the marsh frogs.



The presence of the ponds changed my young world. The kookaburras and herons were not the only birds the ponds attracted. Tiny spotted pardalotes nested in burrows around the ponds. Dragonflies flew over them and water beetles swam in them, making the natural world more interesting than games

that could be played on the smooth green lawns. Even socially, the ponds were an important element, though perhaps not as positive.



Photo 1.3 A striped marsh frog, *Limnodynastes peronii*, guarding its floating foam nest in a fish pond. Photo by Bill Magnusson.

The family that lived on the other side of the road had a son of the same age as me. He was, however, much bigger, and their family were rugby-league fans, whereas my family did not follow any team sports. My mother had always insisted that I should not get involved in fights, and made me feel that doing so would be letting her down badly. When I was small, my father said nothing about such things.

I was playing in the backyard with my friend from across the road and he was asserting his position in the social hierarchy by pushing me around and hitting me when he had the chance. I didn't like it, but followed my mother's advice, either out of social pressure or prudence because my opponent was much bigger than I was. My father saw what was happening, called me to one side, and said "You can't let him do that! Go back and get him."

I was in a delicate situation. I was receiving different instructions from each parent, and I couldn't see how I could resist the attacks without provoking further damage. The fish pond provided a solution. I hit my aggressor and ran around the fish pond. He was off balance as he made the turn and I jumped back and got him in a headlock as we both fell into the pond. I held my breath as we went in and I kept pressing his head under water. In the water and tangled by the wire he could not use his superior strength and he was almost drowned by the time my father pulled us out. My mother was not happy, but my father nodded approval. My friend never bullied me again.

As I got older, I started to explore the streams around where I lived. By the time I was 10 years old, most of the higher ground had been occupied by housing, and bushland only remained in the reserves around the small streams that flowed into the estuaries. I would hike upstream from where the streams ran into the bays, often sneaking through backyards when the creek became too small to be surrounded by public reserves. This was before Sydney had an integrated sewerage system, and waste water ran into septic systems that often drained into the streams. The water was not of good quality, and there were few fish in the streams, but eels could survive there, along with occasional Cox's and bigheaded gudgeons.

I had often caught eels on my uncle's farm with my father. The stream ran through pristine bushland and the green leaves of the spike rushes lining the banks contrasted with the dusty eucalypts. We set strong cord lines baited with fish in the evening and checked them each morning. The rushes were covered with dew that soaked our clothes early in the day, and it must have been cold, but I didn't feel the cold as I do now when I was a child, and have no memory of it. It was exciting to run to each line to see if it was stretched tight. If it wasn't, it meant that the bait had been taken or the eel had found a log to wrap around and gain leverage to break the line or straighten the hook.



Photo 1.4 Bill with an eel caught on his uncle's farm. Photo by Dorothy Magnusson.

Dad would pull in the line and dangle the struggling eel for a few seconds before swinging it in a wide arc to shock against the ground. Only one or two swings were enough to stun the eel. If there wasn't enough room to swing the eel, we would grab a handful of sand or fine leaf litter so that we could hold it without slipping on the slimy mucous, and throw it up the bank to where it could be dispatched with a blow to the lower body by a hefty stick.

Skinning the eel was not easy. Dad would string a cord through its mouth and gill slit and suspend it from a low branch. After cutting a shallow circle around the neck, he would use pliers to hold the slippery skin and pull down until the black tegument came off like a sock, revealing the glistening white flesh that

often trembled in post-mortem twitches. If no pliers were available, he would carefully separate enough of the skin to be able to wrap it around a dry stick and use that to pull down and strip off the skin. The eels seemed very big to me when I was a child, and they often came up to my shoulder and were as thick as my forearm.

Eels are delicious. Dad would fillet them and fry the white flesh covered in a thin coat of flour until it was golden brown. The resulting slices were firm textured and oily with a strong fish flavor. I therefore saw eels from the point of view of a fisherman. They stimulated me to release endorphins and other pleasure hormones from the thrill of the chase and the gratification of my taste buds.

There were other fish in the stream, but I saw them differently. We called them minnows, but they were really galaxias, the small southern-hemisphere equivalents of trout. We would lie on the bridge, watch them swimming just below the surface and throw them bush flies with one wing torn off. We sometimes caught them for bait, but that seemed wrong to me because I had seen them as complex living creatures in their watery world. The eels were different. They existed only as an idea of adventure before they were ripped from the water and quickly dispatched.

The creeks within walking distance of Kiwong Street were generally shallow and rocky. The water was clear, but the sediment was grey colored and marsh gas bubbled out if you dug too far into it. I looked for water skinks and other reptiles that lived along the banks, and often disturbed small eels when I shifted rocks and tree trunks that were partly in the water. Catching the eels was not easy. If you grabbed one in the water and squeezed, its slimy skin made it shoot out of your grasp. By slowly sliding both hands under it while in the water, you could throw it onto the bank, but it was almost as agile out of water as in, and I didn't want to damage the sensitive skin by throwing dry sand on it. After many failures, I finally got a few into buckets of water with leaf litter on the bottom.

The leaf litter was essential, because if you put the eel in a bucket with no cover it would just shoot out.



Photo 1.5 A long-neck tortoise, *Chelodina longicollis*.
Photo by Arthur Georges.

I tried many species of native fish in my father's fish ponds, but the eels were the only ones that survived for long because the ponds became hot in summer, and my father used Derris dust to keep insects off his tomatoes. Derris is not very toxic to humans, and is not absorbed by the tomatoes, but is a strong fish poison and is used as such by the South American Indians.

I also had a long-neck turtle, which lived in the ponds for over 20 years. It would frequently change ponds, but never left the yard. I fed both the turtle and the eels on chopped meat, and they would come to edge of the pond if I splashed the water. The eels grew, but I think they must have been territorial because only one remained in each pond. My favorite eel lived in the largest

pond for over ten years, and became very friendly. It would come to investigate my hand if I splashed, and if I didn't have any food it would rub its head against my fingers. It felt like velvet, and the mucous did not come off and stick to your fingers as it did if you handled an eel out of water.

The most surprising thing about its behavior was in relation to the tortoise. They were sworn enemies at feeding time. I was sitting beside the pond and splashed with an empty hand before offering the meat that was in a plastic bag beside me. The eel played with my hand, but the tortoise soon lost interest and went away. When I started to feed the eel, the tortoise came rushing back, but instead of looking for the meat it latched onto the eel's pectoral fin. The eel only managed to get the tortoise off by swimming through a ceramic pipe on bottom that was too narrow for the tortoise's shell. The tortoise returned to the food and was alone for a minute, but when the eel came back it did not go for the food. It grabbed the tortoise around the neck and they disappeared into the depths with the tortoise desperately trying to claw off the eel.

I could see that I was going to have trouble if the eel and the tortoise fought every time I fed them; one would surely end up killing the other. However, the eel solved the problem for me. The next time I fed them, the eel did not go to my hand, where the meat and the tortoise were. It jumped out of the water and slid toward me until I handed it a piece of meat, whereupon it rolled back into the water. From then on, there were few fights. The eel would just jump out of the water to get its piece, return to the pond and swallow it far from the tortoise.

The solution was ingenious, and perhaps if I had thought about it long enough I would have come up with the idea of one of them leaving the pond, but I am sure that I never would have thought that the eel rather than the tortoise would take the initiative. I became very attached to that eel, and was heartbroken when I found her dead in the garden near the back fence after a night of heavy rain. When I caught her, I did not know that eels breed far out at

sea, and that one day her urge to mate would make her risk the overland journey to the estuary. In fact, she probably would have made it if she had been able to get under the fence.



Photo 1.6 *A freshwater eel, Anguilla sp. being fed by a tourist in the Lamington National Park. Photo by Bill Magnusson.*

I would later see eels interacting with people in the wild. There is a crater lake, Lake Barrine, in the Atherton Tablelands that is preserved because of the surrounding rainforest. Many visitors, especially those who cannot do the long walk around the lake, take a short tour of the lake in a boat.

The operator throws food to the ducks and a pelican that accompany the boat on its rounds. I was surprised by the reactions of the ducks to a large eel that also came for the free food. They panicked as it got close and it seemed keen to keep them away from the food. Even the large pelican was wary of the eel. I had heard stories that eels grab ducks by the feet, drag them down and drown them.

Freshwater eels have only short, sandpaper-like teeth and I had not believed the stories. However, after seeing the reaction of the birds, I am not so sure. In any case, the eel had learned to come to the boat and it was one of the principle tourist attractions.

There is also a long walk in the Lamington National Park that takes you down the track through the rainforest to Canungra Creek, and hikers generally get there about midday. A large pool surrounded by sandstone platforms makes an ideal place for lunch. I often took visitors from overseas to walk through the rainforest, and one of the highlights was to show them the bright blue and white yabbies that can be seen in shallow backwaters. These large crayfish can have bodies wider than a coffee cup, and make a spectacular sight, especially if you find them foraging for fruits away from the stream. They raise their claws, which may be more than a hand span long, and spin to keep facing you if you try to approach them from the side.

The tourists are usually just as fascinated by the large eel that lives in the pool. I assume that most visitors feed it, even though that activity is frowned on by the park authorities. If you put your hand in the water, the eel will come up and investigate it for food and the velvety skin makes it feel like a child's soft toy. I suspect that the eel does a lot for park public relations.

Interacting with a few individuals changed eels from fish to be caught into wonderful creatures that deserved my love and respect. I had not realized how much I had been infected by the fisherman's ethic that does not see fish as fellow creatures. I still like to eat eels, but I find it very hard to kill them.





Photo 1.7 *A pelican at Lake Barrine was frightened by an eel a tenth its size.*
Photo by Bill Magnusson.

My father taught me how to construct things with chicken wire and cement, including bird cages and aquariums. The aquariums required plate glass, which was expensive and not readily available in the suburbs. Therefore, I was continually looking for glass that I could scrounge. Just a few streets away was a convent. It was a luxurious building made of sandstone blocks and surrounded by landscaped gardens and a high sandstone wall. When I was in primary school it had been inhabited by nuns, and the kids were always intrigued when the nuns appeared on the street in their tiny three-wheel car, but we never had any idea what went on behind the walls.

When I was in high school, the convent was closed and sold for housing development. That was my chance, and I climbed over the walls, always on the lookout for the caretaker who still roamed the gardens. The gardens were

luxurious with winding paths through an acre of rockeries. It was a garden of the rich, and very different from the terraced deserts of middle-class Australian homes. The garden must have been laid out by a brilliant landscape architect who had taken advantage of the natural lie of the land and many of the native trees, especially in the part furthest from where the nuns lived. The native fauna still used the area, and I found green-tree frogs as big as my hand in the overgrown rockeries.

The green-tree frog is one of Australia's largest frogs, and I was thrilled to be able to hold one. It did not try to jump away, but just clung to me with the suckers on its fingers and toes, which were almost as big as thumb tacks. It exuded a musky sweet odor, and I was surprised that it was as aromatic as the leaves of the rainforest trees that it apparently imitated. I pulled it off my hand, but the suckers held until the legs could be stretched no more, and it curled up like a fallen leaf. The bright green on its back gave way to coppery brown on the edges of the toes and creamy white on the underside, and its big brown eyes gave it an owl-like expression.

I tried to introduce the tree frogs to our backyard, but they moved on. Although they often occur around human habitations, they are apparently not as adaptable as the marsh frogs. That was about as much as I related to frogs as a school child. There were many other species in the district, but they were invisible to me. I could appreciate their color and scent, but it was only much later when I associated with people who had much better hearing than I have that I was able to appreciate the wonderful variety of frogs that occur in most parts of the world.

The convent also had an enormous walk-in aviary that was a dozen meters in each dimension, including vertically. The birds were gone, but there was plate glass along one side. Many of the panels had broken, but there were still a few in good condition and I prized out the nails and putty that held them in position so

that I could carefully lower them to the ground. It was not easy to manipulate the 50 cm by 50 cm glass plates, which had not been beveled and had sharp edges that I held with folded cloth. I could take only one on each trip back to my house, but I was feeling pretty confident when I came back for the third pane.



Photo 1.8 *A blue yabbie foraging in a stream in Lamington National Park.
Photo by Bill Magnusson.*

The frames of the bird cage had started to distort after it was abandoned, and there was pressure on the third plate, which was half a meter above ground level. I pressed my knee against the bottom of the glass to keep it from falling and started to lift the glass out by its edges. Something gave way, and the glass splintered, forming a triangle with a long narrow lower point that fell into the top of my foot.

The sliver of glass on the point was a centimeter wide and it separated the bones that ran along the top of my foot as it went through. It did not reach the

sole on the other side because I managed to grab the sides of the falling pane, and it stopped about 5 cm in. I couldn't put any weight on my damaged foot, so I was balanced on the other and had to keep a hold on the glass to stop it going down further or splintering in the muscle.

Very slowly, I started to pull the glass out. The edge of the needle-shaped flake in my foot was serrated, so it did not pull out cleanly. As it had separated the bones, each time I pulled it up a notch it felt like I was sawing into them and I wanted to kick and scream, but I had to keep the glass vertical to stop it snapping and doing further damage.

When I finally got it out, I decided that I had enough plate glass from the convent, and thought it best not tell anyone what had happened. The next day, I had trouble fending off questions from a curious neighbor who wanted to know why there were bloody footprints for several blocks along the road leading to my house. The glass had cut the nerve that runs under the bones from the ankle to the toes. For some years I could feel nothing in the upper part of one side of my foot. Later, as the nerves regenerated, I would feel pain if something scratched along the top of my foot. Bending my big toe upwards still causes a lot of discomfort.



Photo 1.9 A green tree frog, *Litoria caerulea* calmly nestled in Jeni Magnusson's hand.
Photo by Bill Magnusson.

