Let's talk Turtle.

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Turtle in this case refers to those chelids that live predominantly in the freshwater, have claws and webbing on their toes. In this instance I am referring to freshwater turtles. Because of my location I tend to drift towards discussing Chelodina longicollis, as this is the dominant species around Sydney.

The study of freshwater turtles is relatively young in Australia with about 8 species having been described in 19671

Australia has at present about 28 species and subspecies of freshwater turtle; give or take a couple. These are listed in an attached sheet.

Turtles belong to the class Reptilia in the order of Testudines. We have here in Australia representatives in two sub orders. One is represented by a mono typical species, this being what is commonly known as the Pig Nose Turtle, Carrettas insculpta in the family Carrettochelyidea. There are two forms of this species found in the Northern Territory, one with a salt excretion gland and the other without. The former is synonymous with the New Guinea form. The chances of one of these coming into care are relatively slim.

All the other turtles found here belong to the suborder Pleurodira (sideneck). We have for a long time generalised these into shortneck and longneck turtles. We have no native tortoises, terrapins or penny turtles.

The word terrapin originally referred to edible species of North American turtles2. Terrapin is also a genus of which none of the table turtles belong. Penny turtles were a handy term used by the pet trade for selling hatchlings. Usually they were sold with a small plastic bowl containing a tiny plastic palm tree and island.

Tortoises are found throughout the world and generally have club-like feet and live almost entirely on land. They are also in the main vegetarians.

The predominance of neck length seems to be dictated by the aquatic environment available, with longneck turtles being found more often in still or slow moving water and short necks in flowing rivers and creeks. Your location therefore will also determine what species you will mostly see.

The location of species is an important factor that we as rescuers and rehabilitators need to accept and we should adopt the practice of not releasing other species to our waterways. We should also not release any turtle of dubious origin or a turtle that we know comes from a location isolated from us by some geographical barriers. The subtlety of difference between some species makes this hard and becomes near impossible to the lay person when sub species are taken into account. The importance of identification is pointed out in a paper3 by Scott Thomson then of the Applied Ecology Research Group at the University of Canberra delivered to the 9th meeting of the Australian Wildlife Management Society in 1996. In it he pointed out that without proper identification you cannot provide fundamental information for the conservation of animals. They tend to be lumped in to an umbrella of species.

The eastern long neck turtle is a case in point. It is reported to be present in several regional forms. Those on the east coast, those to the west of the great divide, the South Australian form and the sulcata form. Those on the East Coast tend to have a narrower carapace4.

Unfortunately these turtle have been moved about in such vast numbers that the genetic integrity of any population found near our major cities would be disputed.

I remember as a teenager in Melbourne the tanks in the pet shops holding hundreds of hatchling turtles and the masses of wild caught turtles available from pet farm type establishments.

Fortunately this didn't occur in the extremes in all parts of Australia but it lent itself to the depletion of some species in some location. An example of this is another monotypic species Elusor macrurus or the Mary River Turtle described by John Cann and John Legler after a twenty-year odd search5.

Obviously this counts for little in the day to day rescue and healing of turtles that come into our care but it is important to be aware that turtles are more than two types. That they need more than a bathtub of water and some mince meat then a quick release down at the local pond. Other reasons to consider are the spread of pathogens and other diseases. The Chytrid fungus that has decimated frog populations could be transported by freshwater turtles is a prime example.

The ponds at Centennial Park in Sydney yielded forth some eight or nine species of turtle when trapping took place and Eastlakes could hold other species including the Alligator Snapping Turtle that I was fortunate enough to arrange the rescue of and now resides at the Australian Reptile Park. Our releasing of turtles now will be scrutinised in the future. I have been involved in picking up many species of turtle in

Sydney, some exotics and many out of towners. The keeping of turtles as pets is growing. Under the NSW licensing system introduced about 8 years ago it is a reasonably easy hobby to get into. This has introduced another factor to turtle rescue and release. An escapee pet turtle will in all likelihood be larger than a wild turtle of comparable age and much younger than a wild turtle of comparable size. This is because of the increased availability and nutritional value of food for captive turtles. They tend to die earlier and organ failure is purported to be a major factor. This has been borne out by over a thousand necropsies performed on C. longicollis by Scott Thomson6. Like other reptiles kept as pets we are starting to see problems that did not seem to effect our native turtles. This is probably because they tend to hide away when ill and just pass away or recuperate. Most adult turtle carry the signs of past injuries.

I have in the past released such turtles back into the wild. I cannot attest to their survival but they do seem to adapt quickly and especially when placed with other turtles of the same species. I also cannot attest to there being no impact on other aspects of the environment.

I don't do it anymore and now run a programme whereby unreleasable turtles are relocated to the permanent care of suitable licensed keepers. I have started to give reasons why I would consider a turtle to be unreleasable. I should emphasise that common sense and the individual situation should play a role in where and how to release.

Care

Any turtle undergoing treatment should not be released especially if being treated for a shell fracture, fungal infection or other diseases. These animals can of course be released eventually. Any disability that would not allow the turtle to survive should also be looked at.

You need to be aware of requirements put in place by your local wildlife management authorities but these should be questioned if they appear to be inadequate. In NSW an animal can be released into an area within twenty kilometers of where it was found and if the species is found there. This has resulted in Emydura macquarrii being released into the rivers, creeks, lakes and ponds of Sydney when they don't naturally occur there but have been recorded as occurring in the Nepean River. John Cann's pronouncement of there being a sub species found in the Nepean also gave credence to some of these releases. It appeared for a while that nearly every shortneck species rescued in Sydney for a while was an E.m.dharuk. NPWS in NSW placed it on the Reptile Keepers species list for a time but since a major restructure of the Australian freshwater turtle taxonomy has taken place it was subsequently removed.

There are numerous reasons why turtles come into care. The most obvious are either shell fracture (usually due to cars) or just being in the perceived wrong place. The former is being covered in this forum. Depending on location fishhooks also feature highly.

Most longneck species will walk overland and in many cases seek a hiding spot or another water source. This is usually how shell fractures occur though not always. I have on one occasion been presented with a turtle with shell fractures received when a group of young men used it as a frisby. I have also heard stories of people deliberately running turtles over on the road. Another too common injury is from turtles being used as chew toys by dogs.

C longicollis can spend up to 60% of its life out of the water. During high summer it will often take refuge out of the water and bury itself or hide under something. They may also do this in colder months or when food becomes scarce or if water quality becomes extremely poor. Many a poor turtle has been picked up while wandering only to be taken back to where it started its journey. In Sydney periods of heavy rain lead to high numbers of turtles being found roaming the streets. I have always put this down to them being able to escape from people's ponds because of the rise in water levels. Shortneck turtles will also strike of overland but much less so but again usually after or during heavy rainfall. During extreme conditions they have been know to walk long distances. During a drought along the Cooper's Creek john Cann found Emydura emmotti that had walked several kilometers from the dam that they previously inhabited with no obvious other water source available.

In the past veterinary treatment for turtles was almost non-existent and as such we as wildlife carers gave little importance to their health needs. One of the nice things about reptiles being kept as pets is the need for more specialised vets. With this comes a greater knowledge base that we can tap into.

Turtles can be prone to numerous complaints but most of these will only become obvious if they are kept in care for any length of time. Wild turtles are also prone to stress, which can also lead to a decline in health.

Shell rot and infection

Algae growth on the shell inst a problem and should not be removed as damage may occur to the shell and cause later problems. A minor infection on the shell may cause shell rot, which will kill the turtle. Shell rot needs to be treated with antibiotics. As an obvious thing it can appear as an eating away of the shell or in some case may occur beneath the scutes on the carapace and appear as only a slightly discoloured spot. The area infected will generally feel soft to touch and give way under finger pressure. Abrasions to the plastron can lead to further infection so any abrasive or sharp surfaces should be removed. The infected area needs to be debrided until only clean healthy tissue is left. The wound should then be treated with an appropriate ointment.

Abrasions can be treated with Betadine or a similar ointment. The turtle should be kept out of the water for about 24 hours to a month if necessary. Good water quality will also help ward off infection. In extreme cases antibiotics may be required. Keep in mind that treatment with antibiotics can also have a detrimental effect on the health of an animal. Your vet should run culture tests before prescribing them whenever possible. The most commonly prescribed antibiotic is Baytril. It does have some side effects and is also a painful drug if given in the wrong spot and should not be given intramuscular. Baytril is designed to be administered orally after an initial intravenous injection7. Consultation with a vet is a must when using medications to treat sick or injured turtles.

Parasites and worms

The most prevalent external parasite on turtles would appear to be leeches. Cann recommends placing the turtle into a strong solution of salt water until the leeches drop off. This of course should not be done with species that breathe through the cloaca though a milder solution is advised I would only use it if the turtle's health relied upon it. Mites have been found on wild turtles but tend not to survive well when the turtle returns to the water.

The presence of intestinal worms usually becomes apparent when they are noticed wriggling around on the bottom of the tank. Any worm treatments should be done in consultation with a vet who has some experience in the treatment.

Fenbenzadole has been used successfully. But Ivermectin should NOT be used under any circumstances. It WILL cause death in a turtle.

Eye problems

Eye problems usually occur because of poor water quality, scratches or as a secondary infection due to other organ failure. The first two can be treated with an antibiotic cream or powder while the latter tends to be due to a system collapse.

Most of these problems don't manifest in wild turtles as a sick or injured turtle that doesn't get rescued is going to be around for long.

Tanks and enclosures for keeping turtles.

I read a surprising thing in a Doctor Harry magazine once. It was an article on keeping turtle that started off by asking the reader to think of a very large pond then double it. The article then said that this would not be big enough to keep a turtle in. I have to agree.

The ideal for keeping a turtle while in care would be a large tank, about 4.x2x2 in the old measurements but the bigger the better that has continuous water change. The tank needs extremely good filtration and a turtle will place a lot more pressure upon a system than a tank full of fish.

I was fortunate enough to live for a while in a house with cellar.

I had set up an above ground pool in there and using a biological filter and a submersible pump that moved incredible amounts of water I was able to keep at one stage 25 adult eastern long neck turtles for some time. Be aware that submersible pumps create heat so in a confined tank you could accidentally cook the turtles in your care.

Plans for biological filters are readily available and can also be purchased as a unit. Aquarium shops also have filtrations systems available. Whatever you end up using it isn't cheap.

As a subrate Scott Thomson recommends crushed coral as it also works as a pH buffer but aquarium gravel is also okay but be aware that if swallowed it can cause gut impaction. The water depth should be deeper than the circumference of the carapace to allow the turtle to turn over easily.

The turtle will also need an area that it can climb onto out of the water and in the case of most longneck species it will need to be completely dry. In an aquarium a glass or Perspex ledge can be put in place using silicone. A non-slip surface needs to be applied to this as well. Marine carpet or artificial grass work well. The top of the tank will need to be covered to stop the turtle escaping. The glass lids that usually come with the tank will cause to high humidity. A lid made with nylon fly screen or pegboard can be used.

The waters pH needs to monitored and kept between 5. and 8.2. There are turtles in parts of the country that live in water with quite low pH values. The average is about 7. But you should make yourself aware of the pH values of water bodies in your area.
A slightly higher than neutral pH tends to make it harder for fungus and decreases infection risk. This though in itself creates a problem unless a good biological filter of replacement system is used. Ammonia converts to ammonium at 7.6 and it is extremely toxic8.
Test kits are readily available from most aquarium shops. You may need to use a marine test kit for high pH values
Temperature for turtles is hotly debated but southern species have been observed still operating in single figure temps but they were not feeding. It is recommended that they be kept between 16 to 20 degrees Celsius with access to a radiant heat source. This can take the form of a basking light.
Turtle require UVA and UVB. This can be accommodated using special fluorescent tube and are very expensive with useful life expectancy of around three months. Sunlight is a cheap and more efficient alternative. Take the turtle out in to the sun. This way you won't need to give vitamin D supplements.
Most Vitamin D supplements are made from oyster shell. Excessive calcium can cause major health problems to any animal and especially turtles; it can cause renal failure. They can often contain heavy metals. Once or twice a week for half an hour or so take the turtles into the sun and this should be sufficient.
All this is moot if the turtle has shell fractures and needs to be kept out of the water. Water should be offered to drink and misting using a spray atomizer helps.
Feeding
Only one species of Australian freshwater turtle has salt excretion glands. This is of course the previously stated Kakadu form of the pig nosed turtle. This then needs to be taken into account when feeding turtles. The use of seafood can cause long term harm but when used short term should be okay.
It is recommended that you soak any seafood in freshwater to reduce the salt level.
Naturally turtles would eat what was available in the wild. Longneck turtle don't eat vegetation. While lost short neck species will. In the wild most turtles will take any aquatic life they can fit in their mouths and some that wont.
I have seen turtles turn a pigeon into nothing more than a few bones and a set of wings floating on top of the water. They take tadpoles and fish. Most insects including crickets and mealworms will also be accepted
Because we are concerned with the short term care of an animal that is going to be released in good health should we take into considerations of excess protein, salt and fat? I think we should.
Most tinned cat food is made from marine fish. Whitebait and prawns are also marine and thus high in salt. If these are used they should be soaking in freshwater for at least an hour. Mussels are a good source of thiamine, which if deficient in a turtle's diet can cause neurological problems. These also should be leeched of salt. People offer a wide variety of foods for turtles and these include commercial preparations. Live foods such as fish, yabbies, shrimp, insects, tadpoles, worms of varying types and snails are usually readily available.
I have found that turtles can be hard to feed and if only in for a short period and not undernourished it I wouldn't worry. In groups they will often follow the lead of another turtle and can be introduced to new food items this way or encouraged to feed.
Some turtles have been observed to feed out of the water but most prefer to feed in. turtles are messy eaters so unless your filtration system is up to it arrangements should be made to feed them in another tank or pool. A child's wading pool can be good for this. It is important that if you use a pool that it cannot become too full and allow the turtles to escape.
On occasions turtles may need to be force-fed. This can be done using a crop needle and syringe. The food should be ground to a fine paste and have a reasonable fluid consistency. It will require two people to force-feed. The turtle's limbs should be restrained. This can be done using a towel of pillowcase. The head and neck need to be grasped firmly and the second person needs to open the turtle's mouth. The tip of a teaspoon or other flat and blunt rounded object may be used. Once the mouth has been prised open the wet crop needle can be fed down the gullet to about halfway down the neck. It is important that the needle be at least half way so the food doesn't come back out. Hold the turtle in an upwardly inclined position to help the food to be swallow. Stroking the throat seems to help.
An over weight turtle will have bulging skin when it retracts its legs and head while an undernourished one will likely have more space the necessary. A turtle should fit snugly into it shell. There are of course

exceptions. Chelodina oblonga has a hard time getting itself fully tucked away and some northern species have macrocephalia, which precludes the head being retracted. Other signs of malnutrition are loose skin and lack of elasticity. This can also be caused by dehydration. The easiest way to rehydrate a turtle is to place it in water.

Keep in mind that turtles need to be able to maintain a body temp to digest food so a basking point is very important.

Transport and handling

When transporting turtles you should be aware that the have strong legs and can easily kick away from your grip. You should always use two hands. Never carry turtles in a wet bag, pillowcase or towel as they can suffocate. Don't transport them in water as again they can drown or be thrown about as the water sloshes about. Unlike most other animals they cannot hang on so you need to make the turtle snug and secure. A dry towel or folded newspaper in a plastic clip top box work well. If you transport the turtle in a carry cage be aware that it can stick its head out of the wire and this may lead to injury if the cage should move. When turning a turtle over it becomes obvious that they don't enjoy the process. Always turn them over slowly. Its how you would do it with other animals so why not turtles?

The easiest way to hold a turtle is in a container. I prefer to place the turtle in a dry inside-out pillowcase in a plastic cliplock box. When transporting make sure that the box is kept out of the sun and in a cool position.

Be aware that like all animals you need to keep your own hygiene standards as well. In the United States of America much is made about reptiles and especially turtles and salmonella. This bacterium exists in the gut of all animals but turtles if not maintained well will end up swimming in it. It is a major cause of skin infection and can cause symptoms of food poisoning.

Conclusion

This is intended as a discussion paper. It also hopes to elevate the status of turtles with most wildlife carers and rescuers. Turtles are often overlooked and given little consideration by many groups. This has been changing slowly. Like most animals they have their supporters. They are, though, unlike any other animal and the people who care for them tend to be different from those that care for other animals. A quick search of Internet sites devoted to turtles and tortoises yields groups of people passionate about the welfare of this family. There seems to be an astonishing lack of abrasiveness in the groups and apologies are freely given if some one feels aggrieved.

There are many factors that make life hard for turtles. Foxes, dogs, wild pigs and humans raid their nest. They are caught in fishing nets, lines and yabby traps. Fishermen and aquaculturists kill the as they are seen as competitors for fish and other aquatic produce. Waterways are drained and barriers place in such ways as to restrict movement to better environments when tough times prevail. In capture surveys turtles caught are nearly always adult but almost never hatchlings. Is this because they live in a different micro-environment or are there just less of them. We can help make a difference

Taxonomy9

References

Kingdom	*Animalia*
Phylum	*Chordata*
Class	*Reptilia*
Subclass	*Anapsida*
Order	*Testudines*

Suborder	*Cryptodira*

Superfamily	**Family**	**Subfamily**	**Genus**	**Species**
Trionychoidea	*Carettochelyidae*	*none*	*Carettochelys (1.0)*	*insculpta*

Suborder	*Plurodira*

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		WCT Care Sheet		*longicollis*[34]
				mccordi
				novaeguineae
				oblonga
				pritchardi
				reimanni
				steindachneri
			Elseya (10.0)	
				bellii
				branderhorsti
				dentata
				georgesi
				irwini
				latisternum
				lavarackorum
				novaeguineae
				purvisi

Superfamily	**Family**	**Subfamily**	**Genus**	**Species**
			Elusor (1.0)	

				macrurus
			Emydura (8.5)	
				australis
				krefftii[37]
				macquarrii[37]
				subglobosa
				tanybaraga
				victoriae
				worrelli
				sp.[38]
				sp.[39]
			Macrochelodina (5.0)	
				burrungandjii[35]
				kuchlingi
				expansa
				parkeri
				rugosa[36]
			Pseudemydura (1.0)	
				umbrina
			Rheodytes (1.0)	
				leukops