Freshwater Turtles of Tropical Australia

Compilation of distributional data

Final report prepared by the Institute for Applied Ecology, University of Canberra, for the CERF Tropical Rivers and Coastal Knowledge (TRACK) Project

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INTRODUCTION

This is a report commissioned by the CERF Tropical Rivers and Coastal Knowledge (TRACK) Project headquartered at Charles Darwin University. The principal objective of the project was to collate all available reliable locality records for freshwater turtles of tropical Australia and to construct and populate a database to house the information in readily accessible form.

The proposal was to obtain records from all Australian museums and overseas museums known to house specimens from Australia for locality records and to combine these records with those held by the Turtle Tissue Collection at the University of Canberra. Data provided by individual turtle researchers was also to be included.

Obtaining the data proved to be more difficult than anticipated. Many museums, though publicly funded and relying on the generosity of researchers in lodging material with them, did not believe their collections data to be in the public domain, and levied quite substantial charges which the project could not meet. Others could not provide the data in time to meet the objectives of the project. Responses from individual researchers, was under-whelming.

Nevertheless, the data available to the project was substantial, comprising 9,864 records from museum specimens and a further 16,871 records from the UC Turtle Tissue Database. Most species distributions were very well supported by good locality data.

It is hoped that this report will be a beginning and not an end, with an open invitation to all for location records of freshwater turtles so that we can build a better picture of both individual species distributions and of patterns of distribution of turtle biodiversity in Australasia. Links to the databases supporting this report, which will serve as a repository for new information, are provided below.

METHODS

Museum Data

All museums in Australia and those overseas known to have holdings of Australian specimens were approached to provide data in addition to that which we had on hand. Location data was aggregated under a common format in Excel and each location record (n = 9864) was verified using Google Earth. The following filter was applied in the order listed to retain only reliable records.

Records have been ***deleted*** because they

(a) Lack latitude-longitude data and a specific location description.
(b) Have latitude-longitude data but have a vague location description and no named collector. This differentially affected the data provided by Queensland Museum, as they withheld collector information for privacy reasons. Example: *Nogoa River, Emerald.*
(c) Have latitude-longitude data but with a vague location description where there existed other more reliable data for the species at that location. Example: *Raglan Creek, near Raglan.*
(d) Have the genus specified, but no species name, except in the case of the northern *Emydura*.
(e) Are out of range at a location susceptible to introductions. Example: *Alice Springs*.
(f) Had a major city specified as the location of capture.

Remaining records were treated as follows.

The latitude-longitude data were compared with the specific location details using Google Earth. When these agreed, the record was accepted. In some cases where the location description was

unambiguous and specific, the location description did not agree with the latitude-longitude data. In these cases, the latitude-longitude data were corrected. This was quite common, often because the recorder did not distinguish between 0.5 and 0.05 when converting from map to digital data.

Note that in some cases, records collected by a reputable scientist or naturalist (e.g. Hal Cogger, Harry Butler) were retained when latitude-longitude data were available in the absence of specificity in the location description.

The number of acceptable records was 6024, down from 9864.

The amended museum records database can be accessed and mapped on http://aerg.canberra.edu.au/cgi-bin/musrecs.cgi. Login details are available from the author.

Tissue Data

All records held in the turtle tissue database at the University of Canberra were included in the analysis (n = 16,871). Location records with latitude-longitude data have been verified with Google Earth and are typically very accurate (waterbody visible at location specified).

The tissue database records database can be accessed and mapped on http://aerg.canberra.edu.au/cgi-bin/tissues.cgi. Login details are available from the author.

Sightings data

There are a large number of reliable sightings of freshwater turtles, with good location data, in the literature and the personal field guides of turtle researchers. These were sought from specific individuals, but the response was underwhelming. Resources available for this project did not allow for data to be extracted from the literature.

The turtle sightings database records database can be accessed and mapped on http://aerg.canberra.edu.au/cgi-bin/sightings.cgi. Login details are available from the author.

Overlays

Drainage basin and subdrainage basin assignments were made using overlays of the drainage basin boundaries and drainage lines on Google Earth. These overlays are available from

http://aerg.canberra.edu.au/documents/basin_outline.kml, and
http://aerg.canberra.edu.au/documents/drainage_lines.kml.

Taxonomic Issues

The taxonomy of Australian freshwater turtles is incomplete (Georges and Thomson 2006), and complicated by divergence of the process of assigning names (nomenclature) from the science of delineating species (systematics), a divergence accelerated in part by the availability of publishing tools to the broader community. Many names are being erected outside the normal channels of publication used by science, in magazines (e.g. Cann 1997a; McCord and Ouni 2007), in privately published documents (e.g. Wells and Wellington 1985), and more recently, in pdf files circulated on the internet. Whether these names are applied to a taxonomic entity supported by good science is a hit and miss affair, and so the proliferation of these names is a source of great confusion.

We have used names published under such circumstances where

(a) they meet the criteria of the International Code for Zoological Nomenclature, **and**
(b) there is accompanying published and peer reviewed science to indicate that the name is applied to a valid species or taxon, **and**
(c) the name has been subsequently used in a peer reviewed scientific journal (we choose not to be first referrer).

For example, *Elseya purvisi* was named by Wells and Wellington (1985), in accordance with the Code (Iverson et al. 2001), under circumstances where their delineation as species was established in a peer reviewed publication in a leading journal (Georges and Adams 1996). *Elseya georgesi*, *Emydura worrelli*, *Elseya irwini* also fall into this category.

The names recently circulated by Wells on the internet do not, in my opinion, meet the criteria laid down by the Code, and so are not used. The name for the Kimberly form of *Chelodina burrungandjii* (McCord and Ouni 2007), although valid under the code, is not in a journal widely accepted as being a peer reviewed scientific journal nor is the article accompanied by peer reviewed science to demonstrate that it is a valid species. Thus, the Sandstone Snake-neck, *Chelodina burrungandjii*, is considered to include both the Arnhem and Kimberly forms.

Chelodina kuchlingi was described from a single specimen of uncertain origin, reported as Kulumbaru in the tropics (Cann 1997c). It was held for a substantial period in captivity and, following a preliminary morphological analysis, we also have doubts about its separate identity from *C. rugosa*.

The traditional view of subspecies is adopted here. They are morphological variants distinguished at the level of the population -- 75% or more of the individuals of the populations of one subspecies can be distinguished from those of other subspecies. *Emydura macquarii krefftii* is distinguished from *Emydura macquarii macquarii* by the presence of a distinct yellow eye-stripe and shell shape, characters present in some individuals of *Emydura macquarii macquarii*. The subspecies of *Emydura macquarii* follow those of McCord (McCord et al. 2003). Subspecies are used sparingly, based on utility. Distinct geographic clades within species are regarded alternatively as Evolutionarily Significant Units (Moritz 1994) and are not named.

The genus name *Macrochelodina* is a valid name under the Code (Iverson et al. 2001) but there has been no peer reviewed account in support of the erection of this new genus. Despite its widespread use by turtle fanciers, wechoose not to use *Macrochelodina* because

(a) It is a Wells and Wellington name erected with no satisfactory scientific analysis to demonstrate that it is valid taxon or a necessary change.
(b) It serves no clear purpose, in that there was no unacceptable paraphyly that needed to be resolved.
(c) It will most likely generate yet another monotypic genus in *Chelodina oblonga*.
(d) It places in different genera, species that undergo widespread and common natural hybridization in Australia to yield viable offspring in the wild (e.g. *Chelodina rugosa* and *Chelodina canni*).

RESULTS

Carettochelydidae

Chelidae

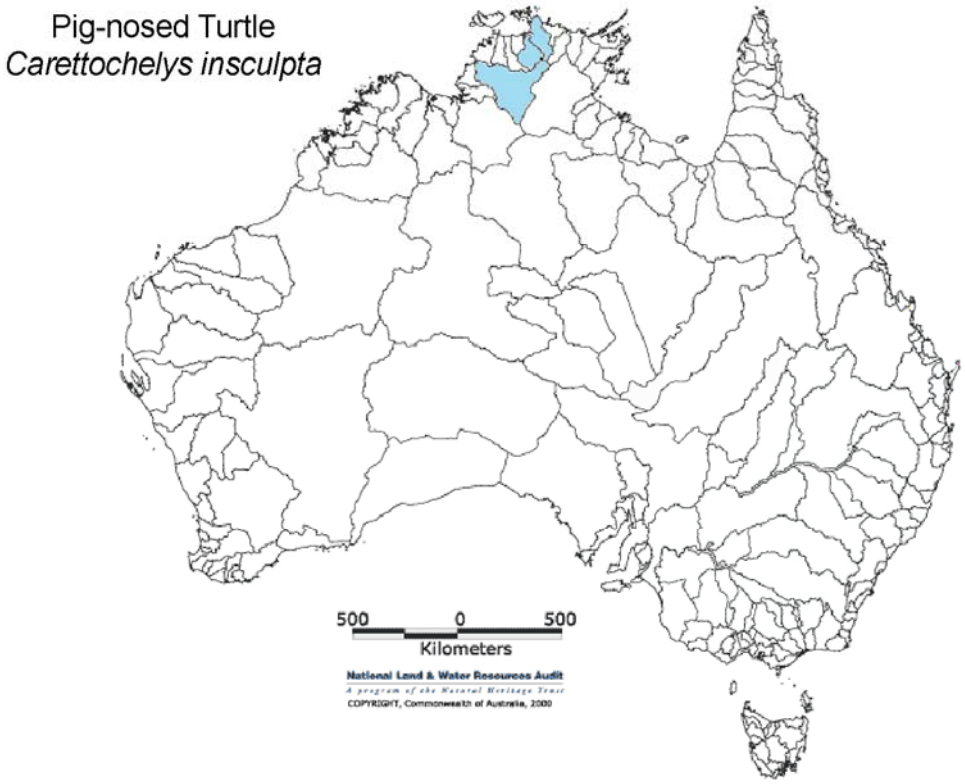
Snake-necked turtles

Long-necked turtles

Australian snapping turtles

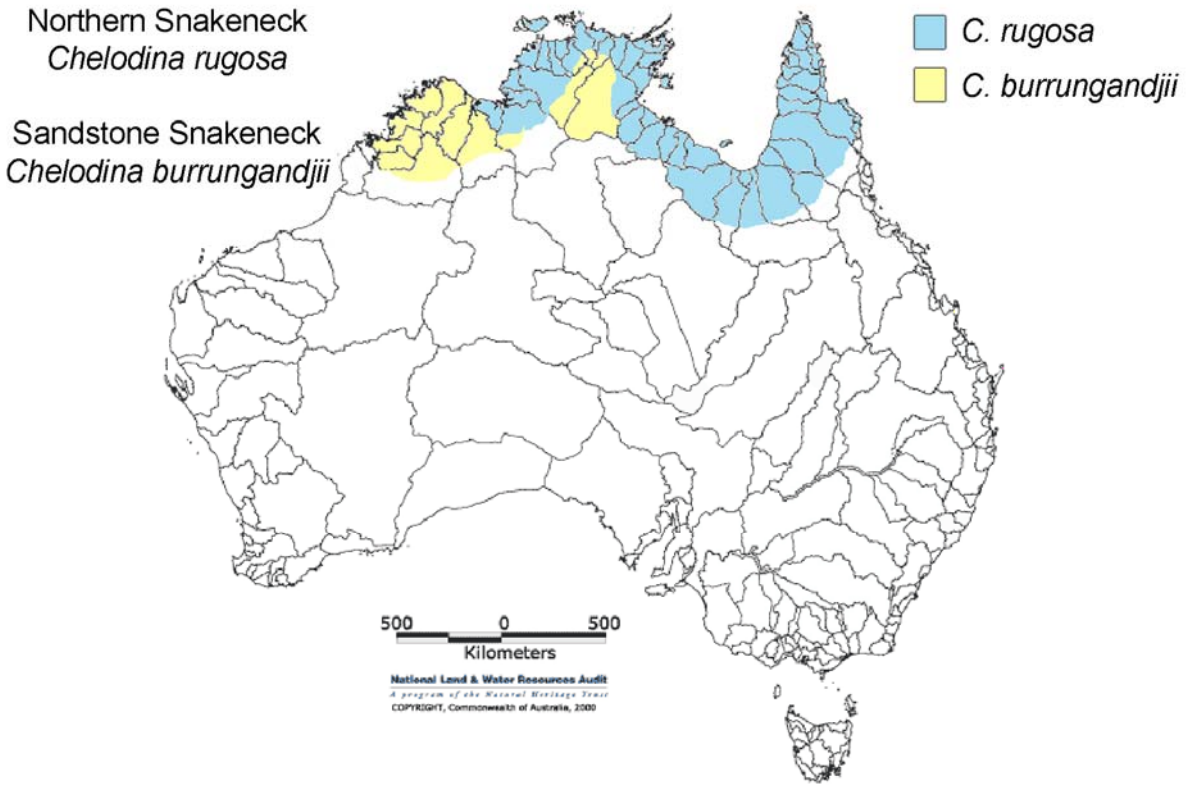
Australian Sawshell Turtles

Australian Short-necked River Turtles



Supporting Data

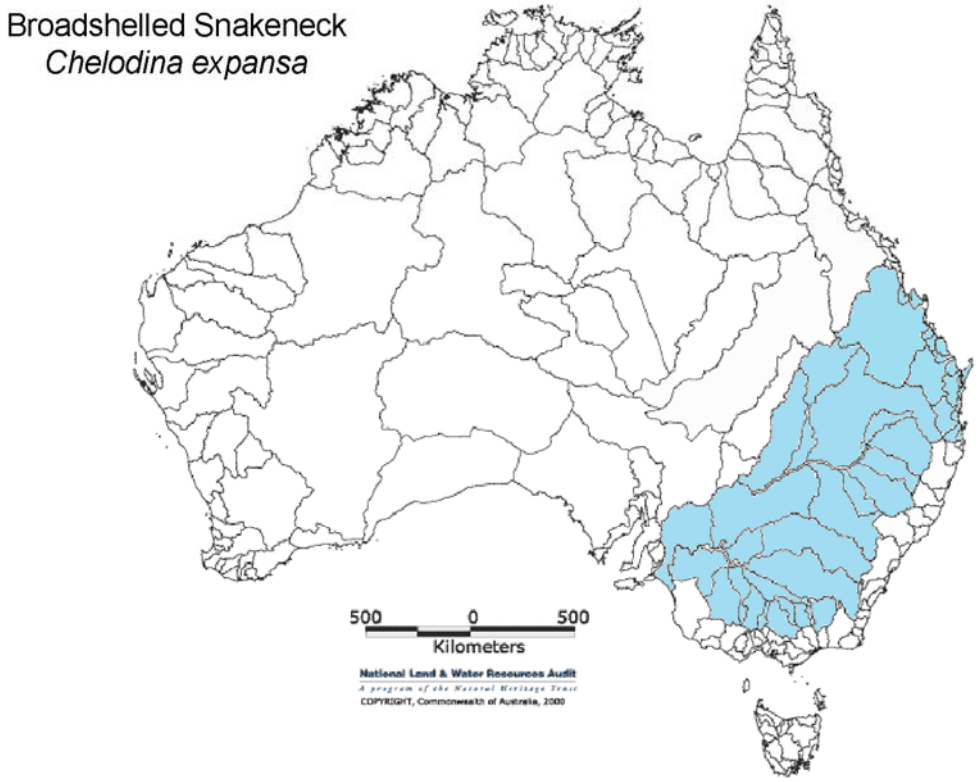
Figure 1. Distribution of the Pig-nosed Turtle *Carettochelys insculpta (Ramsay 1886)*. This species is also reported from the Victoria River (Cogger 2000), and one animal was caught at Roper Bar in the Roper, but these records are either unsupported by data or specimens. Extralimital in PNG.



Supporting data – *C. burrungandjii*

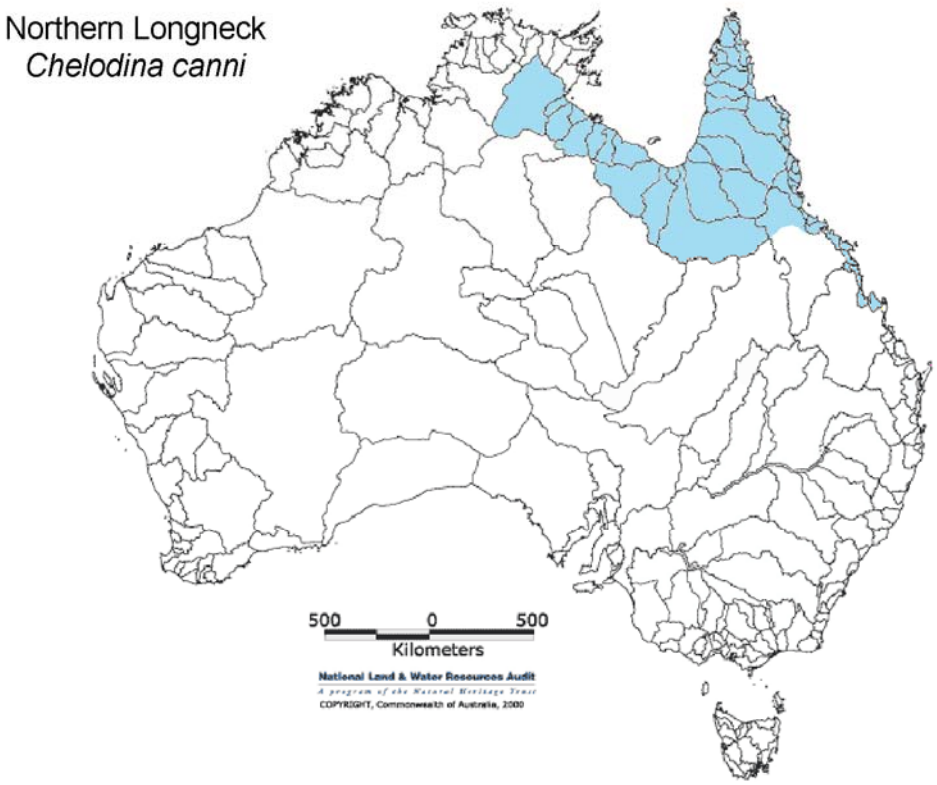
Supporting data – *C. rugosa*

Figure 2. Distribution of the Northern Snake-necked Turtle *Chelodina rugosa* (Ogilby 1890) and the Sandstone Snake-necked Turtle *C. burrungandjii (Thomson et al. 2001)*. *C. rugosa* inhabits lowland ephemeral swamps, billabongs and rivers. *C burrungandjii* inhabits streams and associated billabongs of the sandstone plateaus and associated escarpment country. They hybridize in areas of sympatry with some evidence of introgression (Georges et al. 2002). *C. burrungandjii* is an Australian endemic. *C. rugosa* is extralimital in New Guinea.



Supporting data

Figure 3. Distribution of the Broadshelled Snake-necked Turtle *Chelodina expansa (Gray 1857)*, the distribution of which extends into the tropics in the Fitzroy-Dawson Drainage. Occupies permanent rivers, oxbows and billabongs throughout its range. Australian endemic.



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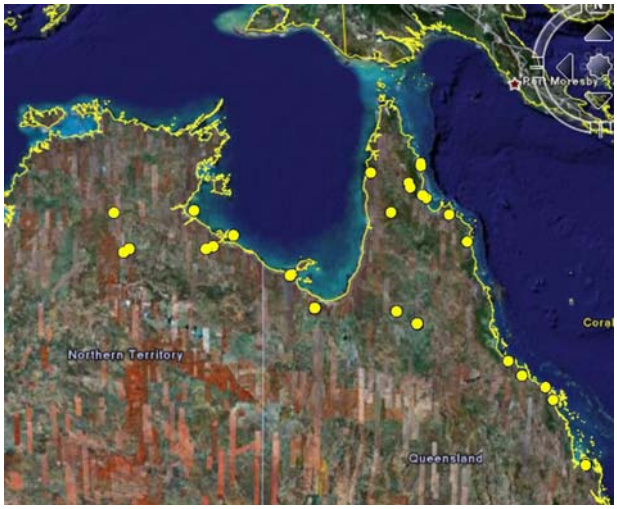
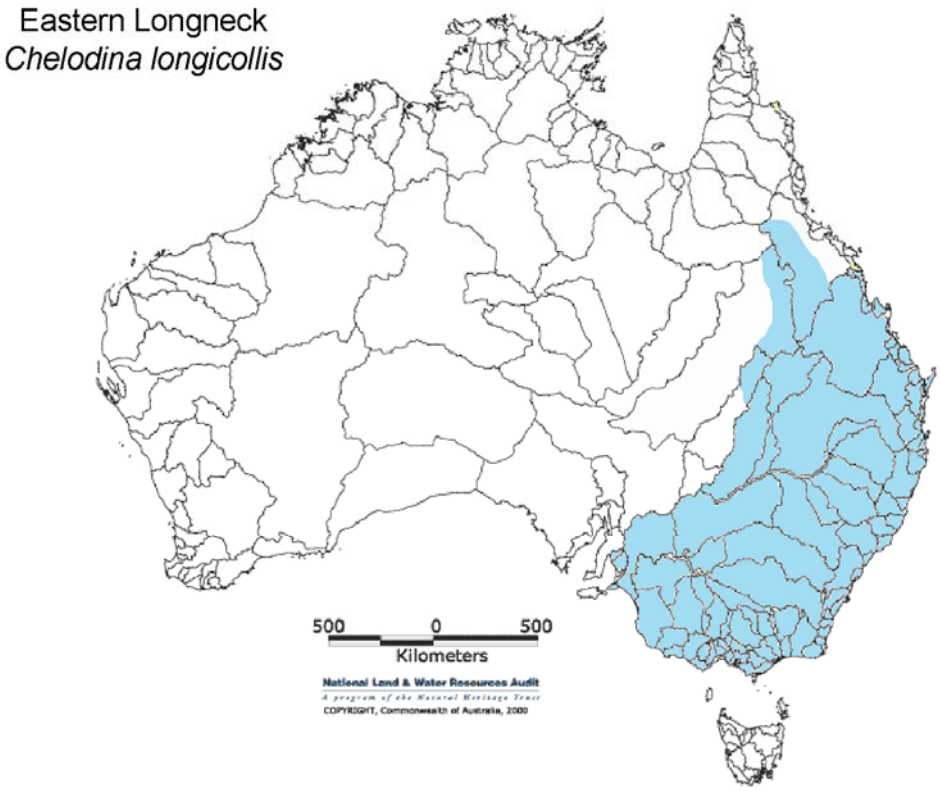
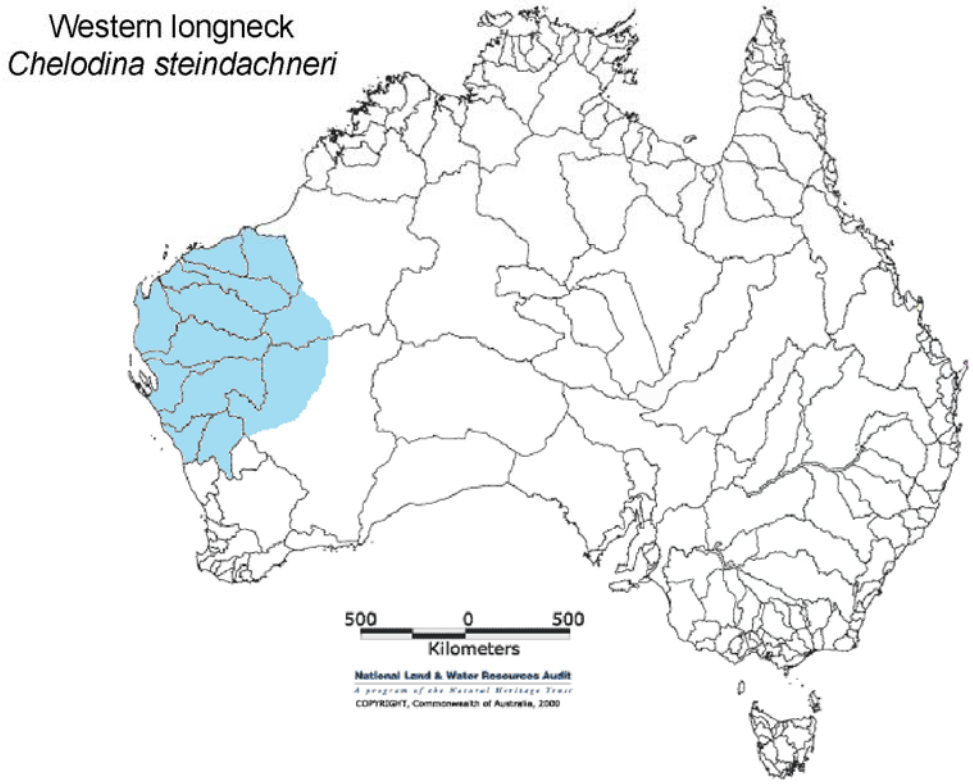


Figure 4. Distribution of the Northern Longnecked Turtle *Chelodina canni (McCord and Thomson 2002)*. This species inhabits primarily ephemeral waterbodies and is capable of aestivation for long periods on land which enables it to extend its range further into drier regions than most other tropical species. Hybridizes with *Chelodina longicollis* to yield viable offspring in the coastal swamps of the Styx River region at the southern-most extent of its range. Australian endemic with close relative *C. novaeguineae* in New Guinea.



Supporting data

Figure 5. Distribution of the Eastern Long-necked Turtle, *Chelodina longicollis (Shaw 1794)*, the range of which extends into the tropics. Occupies a range of permanent and ephemeral waters in eastern and south-eastern Australia. Capable of extensive overland movement and terrestrial aestivation. Hybridizes with *Chelodina canni* to yield viable offspring in coastal swamps of the Styx River region in the northern coastal extent of its range. Extends north into the Burdekin River west the Great Dividing range, and west into the headwaters of the Cooper and Paroo drainages. Australian endemic.



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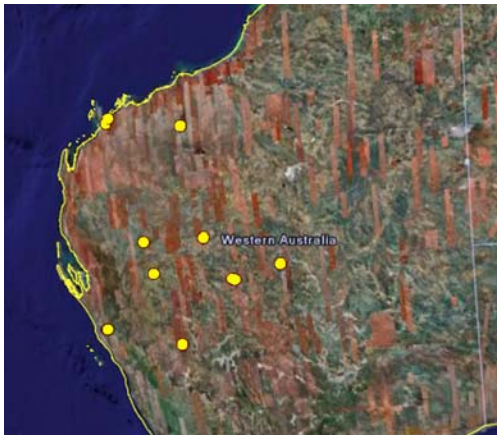
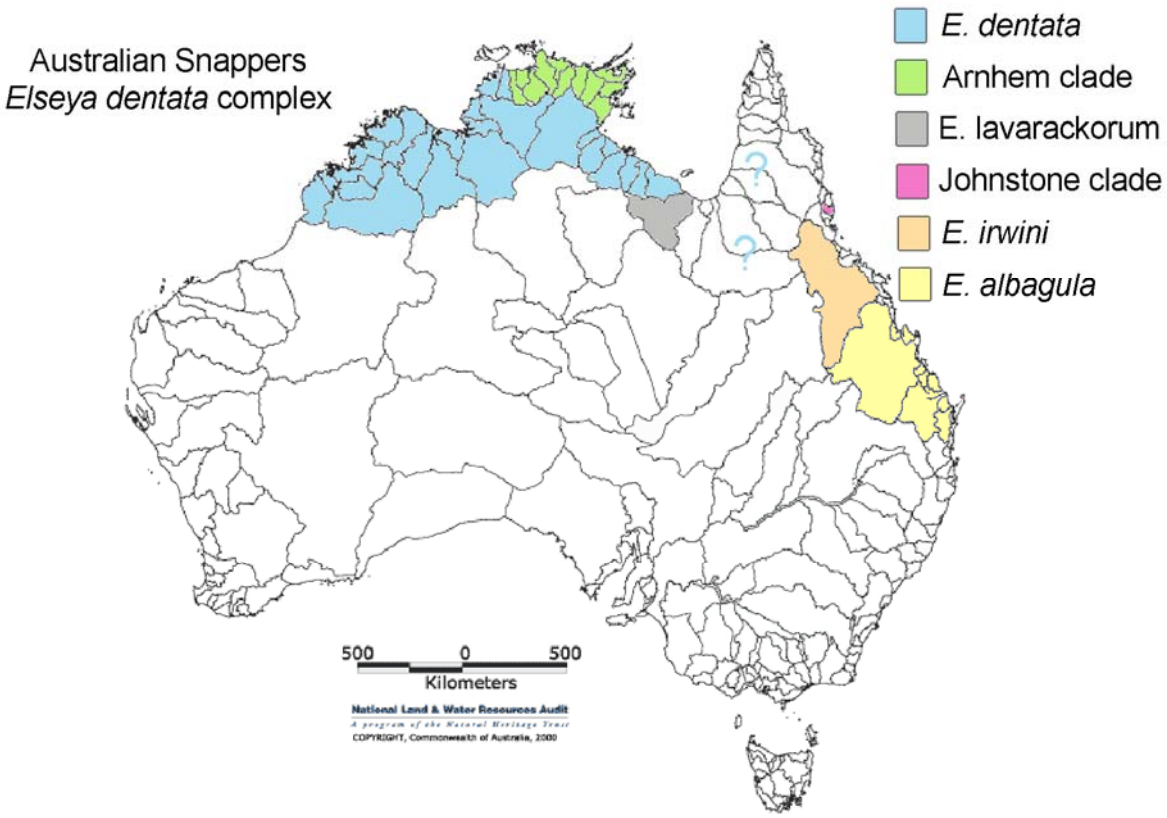


Figure 6. Distribution of the Western Long-necked Turtle *Chelodina steindachneri (Siebenrock 1914)*, the range of which extends into the tropics. This species occupies permanent, semi-permanent and ephemeral waterbodies throughout desert rivers of the semi-arid and arid regions of central western Australia. Australian endemic.



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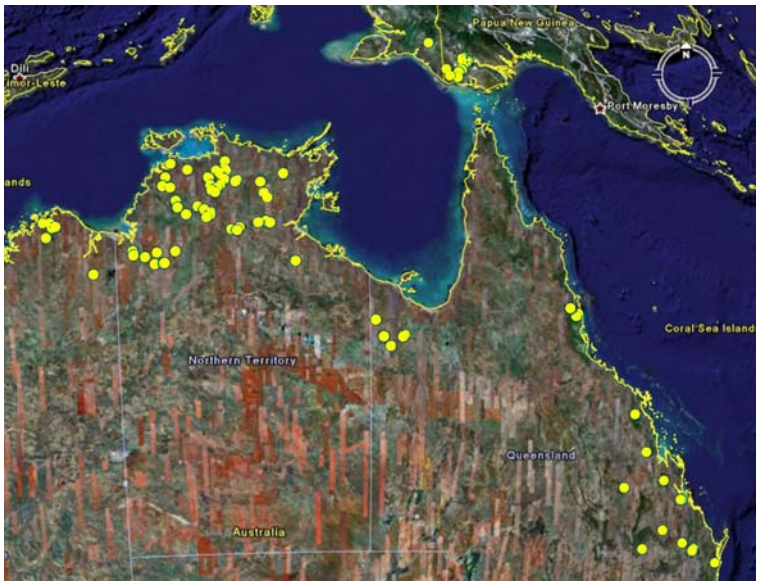
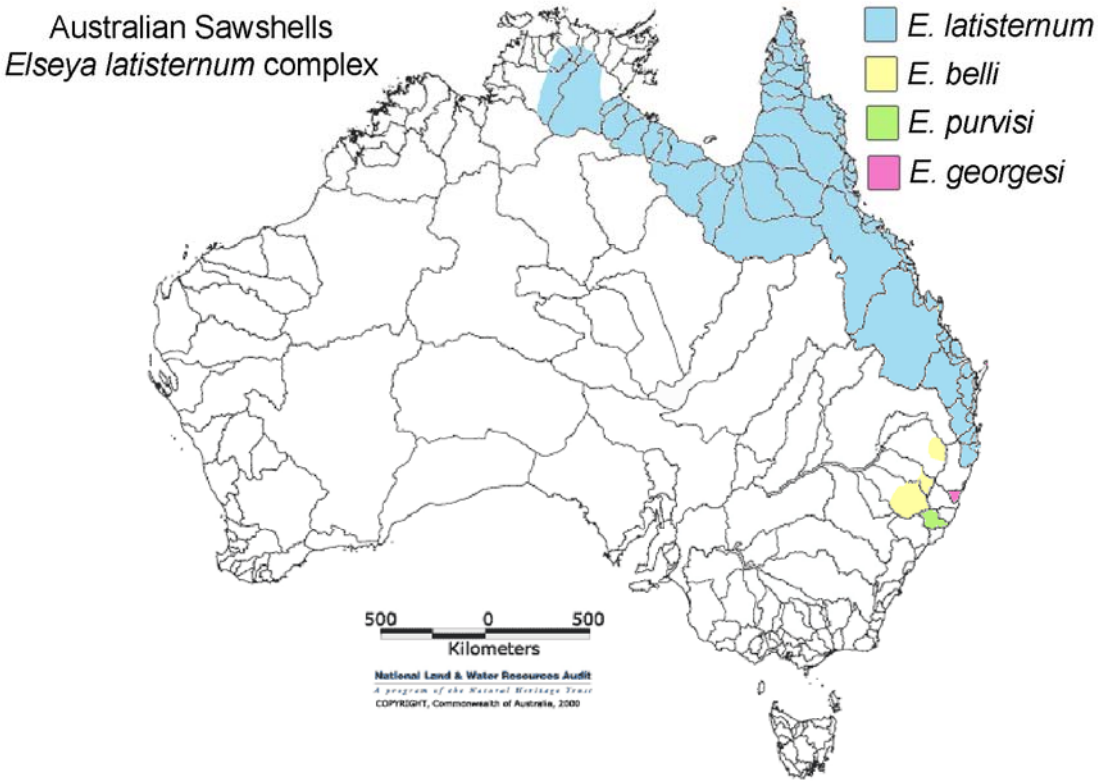
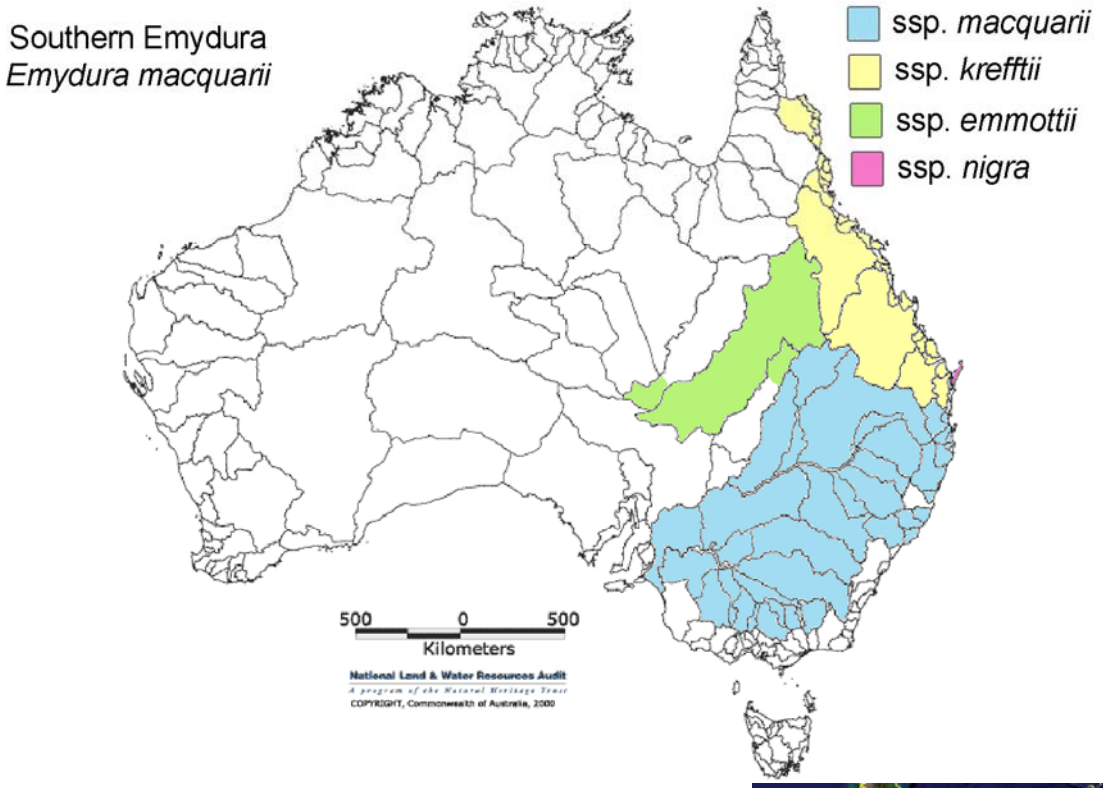


Figure 7. Distribution of the Australian Snapping Turtles, *Elseya dentata* and closely aligned species. The *Elseya dentata* complex, once thought to be a single species, is now regarded as a series of highly divergent allopatric species. Among them is *Elseya albagula*, recently described from the Fitzroy-Burnett-Mary drainages of central eastern Queensland (Thomson et al. 2006), *Elseya irwini* from the Burdekin River (Cann 1997b), a distinctive undescribed form from the Johnstone Rivers system (Georges and Adams 1996), *Elseya lavarackorum* from the Gregory-Nicholson system in the gulf (White and Archer 1994; Thomson et al. 1997), and *Elseya dentata sensu stricto* (Gray 1863) from the Northern Territory and the Kimberly region. This last form is probably a complex of species. Complex is represented in New Guinea as *Elseya branderhorsti*.



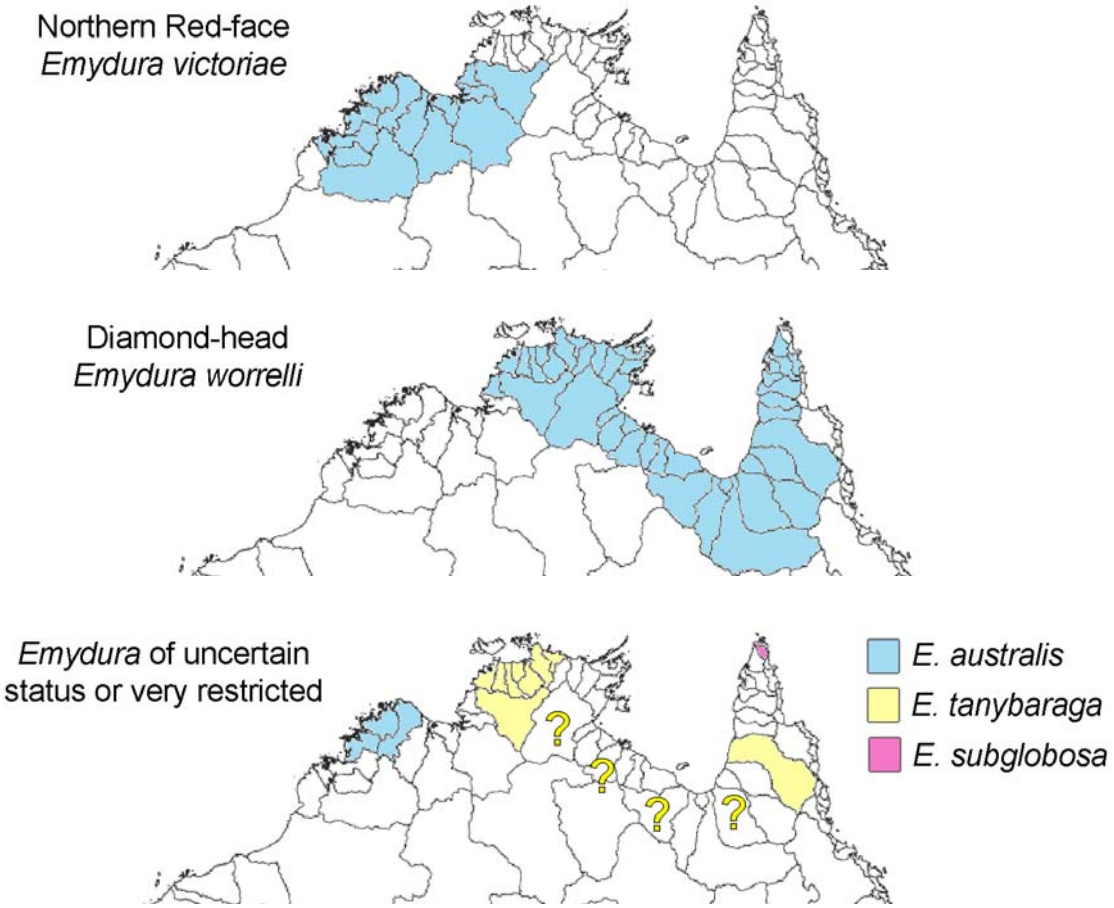
Supporting data

Figure 8. Distribution of the Common Sawshell, *Elseya latisternum (Gray 1867)*, the range of which extends into the tropics. This species is widespread in Eastern Australia where it occupies the headwaters, smaller tributaries, wetlands and swamps of coastal river systems. In the Gulf Country and the rivers draining Arnhem Land, the species is typically restricted to the sandstone plateaus and escarpment country at its periphery. The species has a close relative, *Elseya belli* (Gray 1841), in the granite country at the headwaters of the Severn, Namoi and Gwydir Rivers of NSW and southern Qld. Other species in the broader group include *Elseya georgesi* (Cann 1997a) restricted to the Bellinger River and *Elseya purvisi* (Wells and Wellington 1985) restricted to the Manning-Barnard drainage. Australian endemic.



Supporting data

Figure 9. Distribution of the Southern Emydura, *Emydura macquarii* (Gray 1830), the distribution of which extends into the tropics. This taxon has a chequered taxonomic history. Some regard it as a series of distinct biological species, but nowhere are they found in sympatry despite abutting distributions and none of the characters used to define the species are diagnostic. Allozyme analysis indicated that they share even rare alleles (Georges and Adams 1996). For the purposes of this report, we regard the species as comprising a series of subspecies – *E. m. nigra* is a melanistic pigmy form from Fraser Island; *E. m. emmottii* is an exceptionally large form from Cooper Creek and the southern extent of the Diamontina drainages of central Australia; *E. m. krefftii* extends from the Mary River in the south to Princess Charlotte Bay in the north; *E. m. macquarii* is found in the Murray-Darling drainage and a series of coastal drainages from Brisbane to Sydney (McCord et al. 2003). Australian endemic.



Supporting data

Figure 10. Distribution of the northern *Emydura* complex. This group is very poorly known taxonomically, and species demonstrated using molecular technologies are difficult to distinguish morphologically. Some species designations have been reversed, adding to the confusion. *Emydura victoriae* (Gray 1841) is the only readily diagnosable form, having a distinctive horny plate covering the upper surfaces of the mouth, and a clear iris lacking leading and trailing eye spots. *Emydura worrelli* sometimes has a bright salmon eye stripe, bordering on red, probably diet related, and this has led to misidentification as *Emydura victoriae*. The species designations in the Museum database are not at all certain, and the designations of *Emydura worrelli* and *E. tanybaraga* (Cann 1997d) in the tissue database are nominal (grouped as "yellowface"), awaiting resolution. *Emydura worrelli* and *E. subglobosa* (Krefft 1876) are very closely related, possibly subspecies. *E. subglobosa* extralimital in New Guinea.

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