

GLOBAL RE-INTRODUCTION PERSPECTIVES

Re-introduction case-studies from around the globe



**Edited by
Pritpal S. Soorae**



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Cover photo: Clockwise starting from top-left:

- Formosan salmon stream, Taiwan
- Students in Madagascar with tree seedlings
- Virgin Islands boa

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Re-introduction and conservation introductions of the western swamp tortoise in south-western Western Australia

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Introduction

The western swamp tortoise (*Pseudemydura umbrina*) meets 'Critically Endangered' (CR) under Criteria A2c; D under IUCN (2001) Red List Categories. It is listed as CR in the **2007 IUCN Red List of threatened species** and as 'critically endangered' under the Australian Commonwealth **Environment Protection and Biodiversity Conservation Act**. It has been declared as fauna

'likely to become extinct or is rare' under the Western Australian **Wildlife Conservation Act** and is listed on CITES Appendix I. Specimens have been recorded only from scattered localities in a narrow strip of the Swan Coastal Plain with alluvial clay soils. Almost all this land is now cleared and either urbanized, used for intensive agriculture and viticulture, or mined for clay for brick and tile manufacture. From the 1960s until 2000 there were two known and monitored wild populations in Ellen Brook (EBNR) and Twin Swamps (TSNR) Nature Reserves, which were created to protect the tortoise's habitat in 1962. Populations were estimated at 30 (EBNR) and 200 (TSNR) turtles during the mid-1960s, but by the late 1980s the TSNR population had nearly disappeared. Since 1988 successful captive breeding takes place at Perth Zoo and since 1994 captive-bred juveniles are used for re-introduction and conservation introductions.



Released western swamp tortoise with vehicle traffic visible on nearby highway

Goals

“to decrease the chance of extinction of the western swamp tortoise by creating at least three wild populations and increasing the total number of mature individuals to >50”. (One wild population persists at EBNR, thus two additional populations have to be created through re-introduction and conservation introduction).

Success Indicators

- Indicator 1: Persistence of a population of more than 40 adult sub-adult and juvenile (>2 years old) tortoises at Twin Swamps Nature Reserve and reproduction (egg laying) of re-introduced tortoises demonstrated by 2007.
- Indicator 2: The creation of a population from captive-bred animals at Mogumber Nature Reserve of more than 35 adult, sub-adult and juvenile (>2 years old) tortoises by 2007.
- Indicator 3: The total number of adult wild western swamp tortoise being >50.
- Indicator 4: The maintenance of a captive population of at least 12 breeding adults producing at least 20 two-year-old animals each year.
- Indicator 5: The selection by the Recovery Team and endorsement by relevant authorities of a third suitable translocation site.

Project Summary

Twin Swamps Nature Reserve (TSNR):

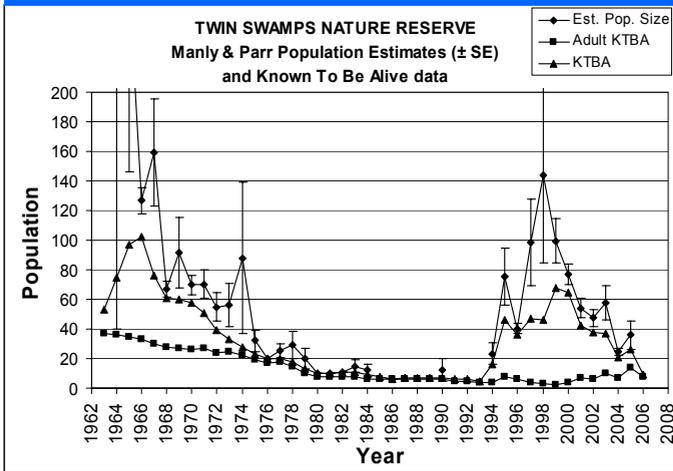
Feasibility: the feasibility of re-introduction of western swamp tortoise to TSNR was based on the following rationale:

- TSNR provided a very good habitat during the mid-1960s. Recruitment was then successful and the population was considered to be expanding.
- The main factors responsible for the decline of the TSNR population during the 1970s and early 1980s were identified as:
 - ⇒ predation by the introduced European red fox;
 - ⇒ a drying climate, leading to a shorter duration of swamp life in the seasonally-wet swamps and
 - ⇒ susceptibility of tortoises aestivating under leaf litter, shrubs or logs to summer wildfire.
 - ⇒ Since 1989 the implementation of a successful captive breeding program at Perth Zoo provided captive-bred juveniles for re-introduction.

Implementation: The main factors responsible for the near-disappearance of the species at TSNR were addressed through:

- The construction of a fox-proof fence around TSNR and fox eradication with 1080 poison baits (continues about twice a year in case of fox intrusions).
- The provision of a groundwater bore and pipelines for water supplementation into two swamps during dry winters and springs.
- Maintaining a system of strategic low fuel internal buffers by winter/spring prescribed burning to ensure the total area burnt in any one wildfire is minimized.
- Since 1994, a total of 162 captive-bred juveniles >95 g have been re-

Figure 1



introduced at TSNR.

Post-release Monitoring:

- All individuals are permanently individually marked by filing notches into marginal scutes.
- Some of the released individuals are radio-tracked to monitor movements and survival.
- Ultrasound scanning demonstrated that several released females produced eggs in every year since 2002.

- Mark-recapture is used to estimate population trends with the following results as shown in figure 1.

TSNR: Known to be alive (KTBA) data, adult KTBA and estimated population size using Manly & Parr (1968) with standard error bars.

Notes: 1) KTBA is significantly lower than actual for at least the most recent five (or so) years because of low sample size. The figures for recent years are not a reliable estimate of actual population size; 2) Animals with carapace length >110 mm are assumed to be adults; 3) Juveniles are one or more years old, but <110 mm carapace length & 4) Manly & Parr estimates are not possible in the first and last year of sampling and in some other years due to small number of animals captured. Accuracy of these estimates depends on the proportion of a population captured each year - the larger the better.

Mogumber Nature Reserve:

Feasibility: the feasibility of conservation introduction of western swamp tortoise to Mogumber was based on the following rationale:

- Anecdotal reports in the 1960s suggested that western swamp tortoise once occurred in seasonal swamps near Mogumber.
- 180 ha of privately owned natural bush land which includes three clay swamps with vegetation cover appropriate for western swamp tortoise was acquired for conservation by the Western Australian Government in 2000.
- Since no wild specimens of western swamp tortoise were ever reliably recorded in the area, the translocation was classified as conservation introduction.

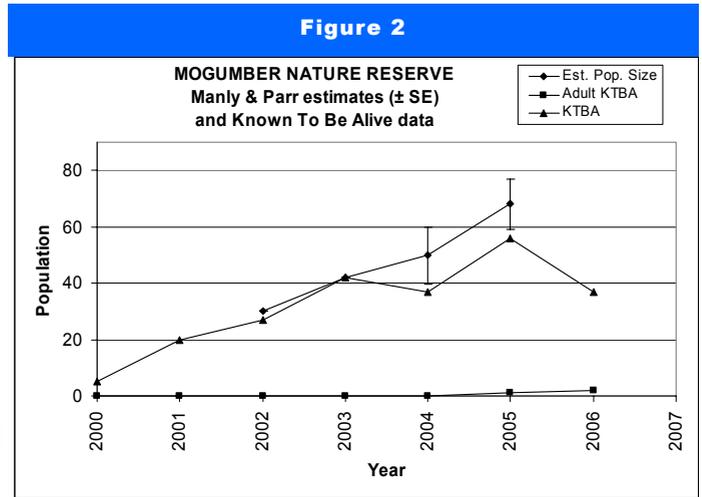
Implementation:

- Since 2000 fox control through monthly 1080 baiting at Mogumber Nature Reserve and some adjacent properties.
- A total of 151 juvenile tortoises have been released at Mogumber Nature

Reserve since 2000.

Post-release Monitoring:

- All individuals are permanently individually marked by filing notches into marginal scutes.
- Some of the released individuals are radio-tracked to monitor movements and survival.
- Mark-recapture is used to estimate population trends with the following results as shown in figure 2.



Notes: Mogumber Nature Reserve: KTBA, adult KTBA and estimated population size using Manly & Parr (1968) with standard error bars. See notes above under 'TSNR'.

Moore River Nature Reserve:

Feasibility:

- A GIS study to identify potential western swamp tortoise habitat in 2002 suggested that the south-eastern part of Moore River Nature Reserve could offer good habitat for the species.
- Investigations in 2004 and 2005 have shown that, while the area is largely suitable, it does not hold water for long enough to support western swamp tortoise. Artificial bunding could deepen some swamps and limited mechanical deepening may also be necessary to make the area suitable.
- A main proportion of suitable habitat is a Threatened Ecological Community and listed as "Vulnerable" in Western Australia. This complicates the approval process for earth work.

Implementation:

- A trial release (conservation introduction) of 10 captive-bred, juvenile, radio-tracked western swamp tortoise started in August 2007.
- Trial bunding of one swamp outside of the Threatened Ecological Community successfully extended the swamp life in this area.
- Approval has been obtained from the WA Conservation Commission for further modification to improve habitat in 2008.

Post-release Monitoring:

- After 10 weeks of monitoring the tortoises showed similar growth rates to those in the other wild populations. The trial was completed and seven of the tortoises were returned to Perth Zoo. The three others had lost their radio-transmitter (because they shed their scutes) and remained at Moore River

Reptiles



“Friends of the Western Swamp Tortoise” group releasing tortoises under supervision of staff

Nature Reserve.

Major difficulties faced

- Following the exclusion of foxes from EBNR and TSNR predation of tortoises by native ravens and introduced black rats.
- Several farm dams adjacent to TSNR attract tortoises to the fence when swamps inside the reserve do not contain much water or are dry. In this way dams adjacent to the fences are potential death traps for western swamp tortoise which are prone to perish at fences through over-heating.
- Due to the drying climate since

the mid-1970s the swamp life at TSNR is now too short to allow successful natural recruitment despite the availability of a ground water bore to supplement one of the swamps. Although some of the released, captive-bred females produce eggs since 2002, no juveniles have been recruited into the population.

- A hot summer wildfire at Mogumber Nature Reserve in December 2002 immediately killed half of the radio-tracked tortoises. The survivors were rehabilitated at Perth Zoo. Post-fire mortality of non-radio-tracked tortoises may have been close to 100%, since none of those tortoises has yet been recaptured.
- Due to changes in aestivation management at Perth Zoo (new pens did not provide holes for aestivation, only leaf litter) released tortoises from 2003 - 2005 preferred to aestivate under leaf litter rather than in natural holes or in artificial aestivation tunnels. This makes them much more prone to die in wildfires.

Major lessons learned

- In addition to fox control, raven and black rat control is also necessary in EBNR and TSNR which are surrounded by agricultural developments.
- During early 1997 and since small ‘dams’ were constructed inside the nature reserve opposite major farm dams with the aim of minimizing undesirable tortoise movements to the fence.
- In 2006, the Department of Environment and Conservation contracted hydrological consultants to investigate the hydrology of TSNR and report on options for improving swamp depth and swamp longevity. An upgrade of the bore and pump system to sustain key swamps if dry climatic conditions continue, will be undertaken in 2008.
- During the wildfire at Mogumber Nature Reserve in 2002 all three radio-tracked tortoises that aestivated in trial artificial aestivation tunnels (then 16 in total) survived the fire. For that reason an additional 160 artificial aestivation

tunnels were since installed at Mogumber Nature Reserve to fire-proof the reserve. About the same number of artificial aestivation tunnels were also installed at TSNR.

- Since late 2003 Perth Zoo changed the aestivation management of juveniles to “train” them again to use holes for aestivation. Since 2007 released juveniles now again preferentially choose holes including artificial aestivation tunnels for aestivation. This increases their chance of survival in a wildfire.

Success of project

Highly Successful	Successful	Partially Successful	Failure
	√		

Reasons for success/failure:

- Indicator 1 most probably reached (persistence of a population of more than 40 adult sub-adult and juvenile (>2 years old) tortoises at Twin Swamps Nature Reserve and reproduction (egg laying) of re-introduced tortoises demonstrated by 2007): although KTBA for 2007 is lower than 40, it is likely that a number > 40 will be demonstrated once future recapture data allow a better population estimate. Egg production was recorded by ultrasound scanning in every year since 2002. However, successful recruitment of juveniles into the population still has not been demonstrated.
- Indicator 2 reached and fulfilled (the creation of a population from captive-bred animals at Mogumber Nature Reserve of more than 35 adult, sub-adult and juvenile (>2 years old) tortoises by 2007): The KTBA number at Mogumber in 2007 was 45 individuals including three adults.
- Indicator 3 (the total number of adult wild western swamp tortoise being >50) cannot yet be demonstrated to be fulfilled, but will most likely be reached once future recapture data allow better population estimates.
- Indicator 4 reached and fulfilled (the maintenance of a captive population of at least 12 breeding adults producing at least 20 two-year-old animals each year): in 2007 Perth Zoo held 25 breeding adults and 35 captive-bred juveniles were released.
- Indicator 5 reached and fulfilled (the selection by the Recovery Team and endorsement by relevant authorities of a third suitable translocation site): a trial release at Moore River Nature Reserve has been authorized and was successfully completed in 2007.