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A wetland oasis – Fortescue Marsh

By Hamish Robertson

Above Fortescue Marsh. *Photo – Stephen van Leeuwen*

Fortescue Marsh is located in the Fortescue Valley in the heart of the Pilbara. Set between the Chichester and Hamersley Ranges, the marsh becomes episodically inundated, and when it floods can occupy an area of 1000km^2. Large lakes that form in the wet season can persist for up to 12 months attracting a diverse array of species. Fortescue Marsh is a Priority Ecological Community (PEC) and is listed on the Directory of Important Wetlands of Australia as a wetland of national significance. The diverse ecosystem includes endemic flora, fauna and supports a rich diversity of restricted aquatic and terrestrial invertebrates.

Fortescue Marsh forms part of four active pastoral leases, and several mining ventures surround the marsh. The pastoral leases are proposed for excision in July 2015, to be managed for conservation by Parks and Wildlife. The department is a partner in a series of collaborative projects which aims to reduce impacts associated with present and past land practices. One of the projects is the management and control of an invasive woody weed species, *Parkinsonia aculeata*, from the marsh land system. Joint partners in the project include the Department of Agriculture and Food WA (DAFWA), Pilbara Mesquite Management Committee (PMMC), Fortescue Metals Group (FMG), Roy Hill Iron Ore and Roy Hill Station, and traditional owners.

The project aims to eradicate the *Parkinsonia* infestation which extends 18km along the upper Fortescue River. Aerial surveys indicate a rate of spread of 1km per year downstream towards Fortescue Marsh. Since the inception of the five-year project, approximately 55,000 individual plants have been removed. A significant proportion of the work was undertaken by the Nyiyaparli Traditional Owners, who received training as part of this project.

A recent report published by the CSIRO (Carwardine *et al.* 2014) states that without management intervention a quarter of the Pilbara's conservation significant species will be lost within 20 years. This report ranked the management of feral ungulates

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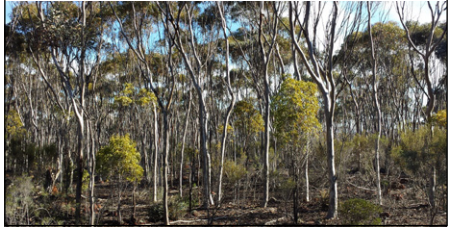

Above left Donkey located by helicopter. *Photo – Parks and Wildlife* **Above right** Newly established *Parkinsonia* infestation upper Fortescue River. *Photo – Linda Anderson*

A wetland oasis – Fortescue Marsh (continued)

and cats as the highest priority and the most cost-effective strategies. As a result of this report another collaborative project involving the removal of feral ungulates is underway. The department in partnership with DAFWA, NRM Rangelands and the Pilbara Regional Biosecurity Group established a Judas donkey telemetry program, which uses VHF telemetry collars fitted to donkeys. The Judas program relies on the social structure of a donkey mob. Feral donkeys are located by helicopter and fitted with telemetry collars before being released. The released donkey will seek out and become re-established with their mob. The collared donkey is then re-located by VHF signal and control work involves removal of animals from the system, apart from the collared animal. The collared animal will seek to become re-established to a new mob. This control cycle continues reducing the impact to a manageable level. So far more than 100 animals have been removed from the system.

Building on the success of this program there is a plan to expand it to include other feral ungulates. An integrated monitoring program using remote sensor cameras, satellite telemetry and aerial surveys commenced this year. The program will give insights to the distribution patterns and behaviour of feral herbivores on the Fortescue Marsh.

Above left Judas donkey. *Photo – Mick Elliot* **Above right** Workshop training to detect *Parkinsonia*. *Photo – Hamish Robertson*

Other key projects* have commenced at Fortescue Marsh including a five-year feral cat baiting program and the first comprehensive floristic study of the Fortescue Marsh Land System by the department's Science and Conservation Division. It is anticipated that the cross tenure model will continue, managing threats to deliver conservation outcomes for Fortescue Marsh.

For more information please contact Hamish Robertson: phone (08) 9182 2017 or email hamish.robertson@dpaw.wa.gov.au.

**Articles reporting on these projects will be presented in a future edition of* WATSNU.

Reference Carwardine J., Nicol S., van Leeuwen S., Walters B., Firn J., Reeson A., Martin T.G., Chades I. (2014). *Priority threat management for Pilbara species of conservation significance.* CSIRO Ecosystems Sciences, Brisbane.

From weeds to whales – Pilbara research meeting

By Valerie English

From left to right Welcome to Country. Paperbarks at Millstream Pools. Discussing management issues. *Photos – Valerie English*

In late June 2014 a meeting was held in the Pilbara to discuss current and planned research in the region. The venue was Millstream Chichester National Park, an area that has significant weed and water management issues. The meeting was attended by specialists from Parks and Wildlife's Science and Conservation Division and Pilbara Region, as well as the CSIRO. The meeting was opened with a Welcome to Country performed overlooking the Millstream pools by traditional owners from Parks and Wildlife's Karratha office.

Major management issues at the site including control of date palms and *Passiflora foetida* (a weedy passionfruit species), and managing the erosion along the river pools, and the Millstream aquifer were discussed during a walk alongside the stream. This important aquifer feeds the rare permanent pools and is a water source for local towns and industry, as well as providing habitat to stygofauna and many birds, mammals and other fauna. A new order of crustaceans for Australia – Spelaeogriphacea – was identified from the Millstream aquifer and represents an ancient lineage of stygofauna perhaps up to 200 million years old. The presence of this important group, and a suite of other important stygofauna led to the listing of the aquifer habitat as a Priority Ecological Community.

Other research discussed included management of threatened mammals, fire management, control of feral animals and weeds, monitoring and management of Pilbara islands, marine fauna issues, using genetic signatures to help guide management of rare flora, and managing impacts of development in the Pilbara. Many of the projects discussed are supported through funds from offsets for industrial and mining developments in the region.

The Pilbara is dominated by grasslands and two important types were examined and discussed on the journey between Millstream and Karratha. There are eight priority and one threatened grassland types in the region. These grasslands are often highly impacted by grazing and development, and more research into the flora that comprise them, and distribution and condition is a priority, with a view to seeking to protect the best areas.

The knowledge shared and networks established will greatly facilitate the future management of important marine, island and mainland areas in the Pilbara and the important flora and fauna that they support.

For more information please contact Val English: phone (08) 9334 0409 or email val.english@dpaw.wa.gov.au.

Tarin Rock Representative Landscape Area – a little-known gem in the Wheatbelt

By Marissah Kruger

Tarin Rock Representative Landscape Area (TRLA) straddles the Avon and Blackwood Catchment divide, and spans across the Kulin and Dumbleyung shires.

Since 2002, management of TRLA has been a joint effort between Parks and Wildlife, the Avon Catchment Council, Southwest Catchment Council, Dumbleyung Landcare Zone and private landholders.

This Representative Landscape Area was strategically selected for priority planning based on set criteria and was considered as having the greatest likelihood of achieving biodiversity aims. In 2006, it was also identified and selected as one of 12 priority ecoscapes. This was largely due to the high number of vegetation associations within a small area which were not well represented elsewhere, with large areas of intact remnants that have high area – boundary ratios, and low salinity risk.

Biodiversity values

TRLA has high biodiversity values, particularly in comparison with other Wheatbelt landscapes. The area comprises 44,600ha and contains 22 per cent intact remnant natural vegetation of which 50 per cent is in lands managed by the department. Approximately 5 per cent of remaining remnant vegetation is contained across various Crown reserves and 45 per cent is on private remnants, with the department continuously reviewing new acquisitions into department-managed land to ensure adequate representation of identified vegetation associations. TRLA contains a diverse range of landscapes and vegetation including woodland, mallee and heath, supporting a high diversity of flora and fauna.

Flora and fauna

TRLA contains three threatened flora species – the stilted tinsel lily (*Calectasia pignattiana*), echidna wattle (*Acacia depressa*) and Conostylis rogeri, in addition to 37 priority flora species and four threatened fauna species – malleefowl (*Leipoa ocellata*), Carnaby's cockatoo (*Calyptorhynchus latirostris*), western whipbird (*Psophodes nigrogularis*) and the red-tailed phascogale (*Phascogale calura*). TRLA is also home to a significant collection of mammals, frogs and reptiles but in particular also acts as a significant refuge for birds. Fifty-eight bird species were identified within five nature reserves in 2002 and 13 of these are considered rare in the Wheatbelt Region.

Threats to TRLA

Fragmentation of habitats has been identified as the greatest threat to nature conservation in the area. Other threats considered high risk to the biodiversity values include introduced animals, and the loss of ecosystems and habitats due to clearing and altered fire regimes.

To date, recovery and protective measures include more than 100km of fencing of private remnants protecting 1500ha of land and reducing grazing pressure. In addition, planting of 200,000 seedlings of mixed native species and local provenance, and planting 37,000 oil mallees as part of cost-sharing projects to connect landscapes and create ecological corridors between remnants.

A number of ongoing management actions continue in partnership with landholders and community groups including:

- fire ecology assessments
- ongoing fencing of remnants
- revegetation projects to create buffers, manage and reduce weed threats; and continue linkage establishment
- flora and fauna monitoring, particularly bird surveys
- fox and rabbit baiting, covering more than 10,000ha of Crown and private remnants.

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Top right Tarin Rock breakaway. **Above right** Tarin Rock woodland. *Photos – Marissah Kruger* **Above middle** Parks and Wildlife staff handling a red-tailed phascogale. *Photo – Carla Tassone* **Far right** Stilted tinsel lily. *Photo – Marissah Kruger* **Above left** Tarin Rock. *Photo – Ray Pybus*

Above *Grevillea murex*. *Photo – Gemma Phelan* **Above right** *Kunzea acicularis*. *Photo – Andrew Brown*

New flora Interim Recovery Plans approved

By Andrew Brown

Eleven new flora Interim Recovery Plans (IRPs) have recently been approved by the department's Director of Science and Conservation (see page 9). Five are new plans and six are updates of previously adopted plans. To view the full IRPs for all eleven species go to http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/198-approved-interim-recovery-plans#flora.

In this article I provide a summary of each of the five species covered by new plans. All five species are specially protected under the Western Australian *Wildlife Conservation Act 1950* with *Caladenia lodgeana* ranked as Critically Endangered, *Androcalva perlaria*, *Daviesia dielsii* and *Grevillea murex* ranked as Endangered and *Kunzea acicularis* ranked as Vulnerable.

Lodge's spider orchid *(Caladenia lodgeana)*

Caladenia lodgeana is a late flowering species formally described by Stephen Hopper and Andrew Brown in 2001 when they named it in honour of Harry Lodge, a foundation member of Western Australian Native Orchid Study and Conservation Group (WANOSCG).

Plants grow from 200–400mm high with a single, erect, hairy leaf 100–200mm long by 5–10mm wide. The species has up to two cream to creamy-yellow, red marked flowers 50–100mm across with narrowly-clubbed petals and sepals and a white labellum (lip) with long fringe segments and four or more rows of pale red calli. It is distinguished from the similar *Caladenia serotina* by its narrowly clubbed petals and sepals and slightly earlier flowering period. *Caladenia lodgeana* belongs to the *C. huegelii* complex which is characterised by having clubbed sepals and shortened petals. However, *Caladenia lodgeana* lacks the dark maroon labellum apex typical of most members of complex, with only the closely related *C. busselliana*, *C. interjacens* and *C.* sp. *Collie* (E. Bennett s.n. PERTH 08396051) sharing this feature. *Caladenia lodgeana* differs from these species in its later flowering period and confinement to the Augusta area.

The first collection of *Caladenia lodgeana* was made in Leeuwin-Naturaliste National Park south of Augusta by Eric Chapman in 1984. A single mature plant was then found at Margaret River by Stephen Hopper in 1987. Despite numerous searches by Parks and Wildlife and members of the WANOSCG, no plants have been located at either of these sites since the original collections were made. *Caladenia lodgeana* is currently known from a single population at Augusta, growing under low scrub in seasonally moist to wet clay soil on the margins of low granite outcrops.

The main threats to the species are possible future clearing, inappropriate fire regimes, four-wheel-drive access, picking and trampling, grazing, weeds and small population size.

Diel's daviesia *(Daviesia dielsii)*

Daviesia dielsii is an attractive species, formally described by Ernst Pritzel in 1904 when he named it in honour of Friedrich Diels who collected widely in WA between 1900 and 1901.

Plants grow to 90cm high by 1.8m wide and have densely hairy branchlets and phyllodes (leaf-like structures). The phyllodes are 2–4mm long by 1–3mm wide, flattened, obliquely oval and have a sharp point. Flowers are also small and are borne singly in the axils of the upper phyllodes. Each flower has calyx lobes that are much shorter than the tube. The outer part of the standard petal is orange or orange red, and the inner part and the wings and keel are a dark red. The fruit is a triangular pod, about 1mm long and has convex valves.

Daviesia dielsii is restricted to the Moora, Watheroo and Dalwallinu areas where it grows in brown and grey sandy loam with chert over laterite and yellow sand.

The species is currently known from 19 populations, 13 of which are located on road reserves that have little or no natural habitat and are infested with weeds. Many mature plants are senescing with little natural recruitment occurring and five of the 19 populations no longer have extant plants. The main threats to the species are road, track and firebreak maintenance, altered fire regimes, habitat degradation and grazing.

Shell-fruited Grevillea (*Grevillea murex*)

Grevillea murex is northern Wheatbelt species formally described by Don McGillivray and Robert Makinson in 1986 from specimens collected south-west of Morawa in 1976. The name murex refers to the similarity of the fruit surface to that of the shellfish Murex, which has pointy projections on its surface.

Plants grow from 1–2m tall and have many hairy branches. The leaves are on stalks up to 1.5mm long and have four or five blunt-tipped lobes. The dome-shaped flower heads are at the ends of the branchlets and contain cream to yellow flowers about 3cm long. The fruits, 9–13mm long, are oblong to ellipsoid in shape and are covered with irregular shiny protuberances to 2.5mm high. The species is related to *Grevillea crithmifolia* but has hairy branchlets, smaller leaves and hard-coated seed pods with irregular projections.

Grevillea murex was first collected north of Three Springs by C. Chapman in 1975, with subsequent collections made between there and the Mingenew–Morawa Road, growing in lateritic-gravel, brown clay-loam or red clayey-sand soil on gentle lower valley slopes or flat areas. Habitat is open York gum (*Eucalyptus loxophleba*) woodland over open low scrub, grasses and herbs.

The species is currently known from 10 populations comprising 314 mature plants. All but one population are located on narrow road reserves which are under threat from road maintenance activities. The main threats

New flora Interim Recovery Plans approved (continued)

to the species are road, track and firebreak maintenance, insect infestation, altered fire regimes, weed invasion and rabbits.

Kunzea acicularis

Kunzea acicularis is an attractive pink-flowered species formally described by Hellmut Toelken and Gillian Craig in 2007 from specimens collected north-east Ravensthorpe in 2001. The name acicularis refers to the 'needle-like' bracts.

Plants grow to 2m tall with few erect stems, each of which is irregularly branched. Young branches are densely covered with fine spreading hairs. The inflorescence comprises three to five pink to mauve flowers. *Kunzea acicularis* is similar to the southern form of *K. preissiana* with both having similarly-lengthed bracts. However, *Kunzea acicularis* is distinguished by being usually taller, having broader leaves and different-shaped, long-pointed bracts on the inflorescence, as well as longer, acute, triangular calyx lobes.

The species is known from one population north-east of Ravensthorpe where it grows in pale orange clay-loam soil in open mallee woodland and heath. The main threats to the species are narrow distribution, road maintenance, altered fire regimes, *Phytophthora* dieback and potential future mining operations.

Pearl-like androcalva (*Androcalva perlaria*)

Androcalva perlaria (formerly *Commersonia* sp. *Mt Groper*) is a spreading shrub first collected by Ray Cranfield and Dave Kabay from north of Mount Groper in 1993. The species was formally named by Carol Wilkins in 2011 from specimens she collected east of Wellstead in 2006.

Plants grow to 50cm high by 1m wide and have shallowly to deeply lobed grey-green leaves. The cream and white flowers appear between September and December with spot flowering at other times of the year. The fruit is green-grey in colour with a velvety hairy covering.

The species is found over a range of approximately 33km around Wellstead, approximately 100km east of Albany, growing sandy-clay soil in seasonally-waterlogged sites. Five populations are known, four of which are extant and together contain 207 plants. Live plants are absent from a fifth population where the species is thought to persist as a soil stored seed bank.

The main threats to the species include grazing, mining, altered hydrology and water quality, weeds and inappropriate fire regimes.

For more information please contact Andrew Brown: phone (08) 9334 0122 or email andrew.brown@dpaw.wa.gov.au.

Above top *Androcalva perlaria. Photo – Shane Turner* **Above** *Daviesia dielsii. Photo – Lorraine Duffy*

Re-introduction of chuditch into Flinders Range National Park, South Australia

By Abby Thomas

Chuditch (*Dasyurus geoffroii*) are medium-sized marsupial carnivores that once occupied approximately 70 per cent of the Australian mainland, ranging throughout much of central, western and southern Australia, including most of South Australia (SA). Chuditch have declined from their former range probably due to fox (*Vulpes vulpes*) and feral cat (*Felis catus*) predation and competition. They are now only extant in Western Australia between Kalbarri and Esperance, where they are listed as threatened fauna under the *Wildlife Conservation Act 1950*. The estimated population size is between 10,000–12,000 mature individuals.

In SA, chuditch are listed as endangered (presumed extinct) under the SA *National Parks and Wildlife Act 1972*, and were last recorded in the SA landscape in the 1950s, with the last museum specimen being collected in February 1933. The SA Department of Environment, Water and Natural Resources (DEWNR) Bounceback program is a long-running landscape-scale conservation program that aims to restore the semi-arid environments of the Flinders, Olary and Gawler Ranges in South Australia.

As part of the program, a translocation proposal between DEWNR and Parks and Wildlife was approved to re-introduce wild chuditch from WA into Flinders Range National Park. The aim of the translocation is to re-establish a self-sustaining population of chuditch outside WA. Chuditch were considered the ideal species for re-introduction as they were previously known from the area, and possibly less sensitive to cat predation than many other locally extinct mammals. They are an opportunistic generalist that adapts well to different environments and an important totem animal for Adnyamathanha people of the northern Flinders Range.

As part of Parks and Wildlife's recovery program, chuditch have successfully been translocated by Parks and Wildlife to Julimar Forest, Lake Magenta Nature Reserve and Kalbarri National Park in WA.

Between March and April 2014, Parks and Wildlife staff and volunteers trapped chuditch from two populations – Julimar State Forest (proposed Conservation Park) and Perup Nature Reserve. Over two trapping periods, 20 females and 17 males were captured and consequently transported and released into Flinders Range National Park. Between the time of capture and the flights to the Flinders Range National Park, the chuditch were housed and cared for at the 'chuditch hotel' (Native Animal Rescue facilities) in Malaga.

Above top Chuditch caught in camera monitoring. *Photo – Parks and Wildlife*

Three months of intensive monitoring by DEWNR staff, using aerial radio tracking, camera monitoring and trapping, indicates that the released animals are in good physical condition and settling into their home ranges with many females now carrying pouch young. The translocation will be deemed successful if these translocated animals continue to thrive and reproduce within the Flinders Range and become a self-sustaining population. This chuditch release will contribute to the national recovery of this species and will be a land mark as the first reintroduction of chuditch outside WA.

For more information please contact Abby Thomas: phone (08) 9219 8636 or email abby.thomas@dpaw.wa.gov.au.

Highlights from recovery team annual reports 2013

Albany District

Sarah Barrett

Fourteen new population and sub-populations of threatened flora were located. Of particular significance were three new populations of the Critically Endangered (CR) *Calectasia cyanea*, previously known from about 200 plants in two populations.

Fiftysix new populations of priority flora were located and nine species removed from the priority flora list due to survey.

Fencing undertaken or commenced in 2013 will be critical for the reproductive success of a number CR taxa and components of the Montane Thicket of the eastern Stirling Range Threatened Ecological Community (TEC). Significant seed collections were made from poorly collected CR taxa such as *Latrobea colophona* on Bluff Knoll. Fencing has enabled heavily grazed plants of this species to grow and set seed. Similarly, fencing has increased the number of plants of *Daviesia ovata* that are now reproductive and increased the number of source individuals for seed collections from six individuals to almost 40, enabling a translocation to be planned.

Goldfields Region

Jennifer Jackson

The priority 1 flora species, *Ptilotus chortophytus*, was relocated at Niagara Dam. This species has not been collected for 40 years. It was previously known from just two other populations, north of Geraldton and north of Kalgoorlie.

Several new sub-populations of P1 flora species *Ptilotus rigidus* was found on Lake Goongarrie. This was formally described in 2009 and Florabase records indicate that it has not been collected for 20 years.

A survey of the Carnarvon Range in conjunction with the Science and Conservation Division was completed in May 2013. Over 530 taxa were recorded with a total of 809 herbarium collections.

Lake Bryde

Greg Durell

The TEC *Muehlenbeckia horrida* subsp *abdita* with *Tecticornia verrucosa* exists on three lake beds within the Lake Bryde Recovery Catchment (Lake Bryde, East Lake Bryde and on one lake in Lakelands Nature Reserve). The monitoring project which was established in 2008 is now in its second phase with the reduction of TEC monitoring to an annual regime. Monitoring in 2013 saw the lake bed covered in purple due to flowering *Tecticornia verrucosa*. This attracted visitors including landholders to see this beautiful and colourful spectacle. In one of the occurrences (Lakelands Nature Reserve) fencing was erected to protect the TEC from grazing which thought to be caused by rabbits. This has proven to be successful in allowing the community to recover from grazing.

Above Flowering *Tecticornia* within the Lake Bryde Recovery Catchment. *Photo – Wendy Chow*

Wendy Chow from Species and Communities Branch has completed a project on the TEC at Lake Bryde as part of her postgraduate studies. The recovery catchment will look to draw on the findings of this work to manage the TEC in the future as part of the Lake Bryde Recovery Catchment Recovery Plan which will be completed in 2014.

Great Southern District

Greg Durell

The Great Southern District and Caring for our Country research project, 'Towards recovery: Reversing the trend of threatened flora habitat senescence', was completed during 2013. All remaining sites were monitored and a final report and field guide has been produced. The project measured the level of senescence in the critical habitat of 28 threatened flora populations. A prioritisation metric, using threatened species attributes and the habitat senescence measures, was developed. This ranks the 28 threatened flora sites to identify those requiring urgent management.

On-ground activities commenced in 2013 for the State NRM funded, 'Improving habitat condition and recruitment at a population of the threatened flora species, *Banksia oligantha*'. The population of this species is on private property that was historically cleared for agricultural purposes. Weed incursion and grazing by rabbits are identified as ongoing threats. A rabbit exclusion fence was installed in 2010 and focus is now on restoring the habitat.

The threats of grazing and habitat destruction by rabbits continue to be managed with rabbits controlled at 28 threatened flora sites. A new assessment and monitoring program has been introduced and a new database has been developed to manage more than 50 rabbit and stock exclusion fences at threatened flora sites in the district.

Moora District

Bree Phillips

Survey of approximately 60 populations of threatened flora was undertaken as part of translocation and monitoring of threatened flora species. Recruitment was observed at the translocation site of *Grevillea calliantha*. Other implementation activities to protect threatened flora included firebreak maintenance as well as road and utility maintenance.

A research burn plan is being developed for *Acacia cochlocarpa* subsp. *cochlocarpa* translocation site at Gunyidi Nature Reserve.

Lake Clifton

Paul Tholen

Focus over the past two years has been to determine the catchment boundaries and water quality influences on Lake Clifton thrombolite TEC. A series of postgraduate studies are currently proceeding, the outcome of which will assist management of the TEC in future. Studies into formation and health of the microbial assemblages, hydrological characteristics, geology and evolution, and mapping of critical habitat continued for the Lake Clifton TEC.

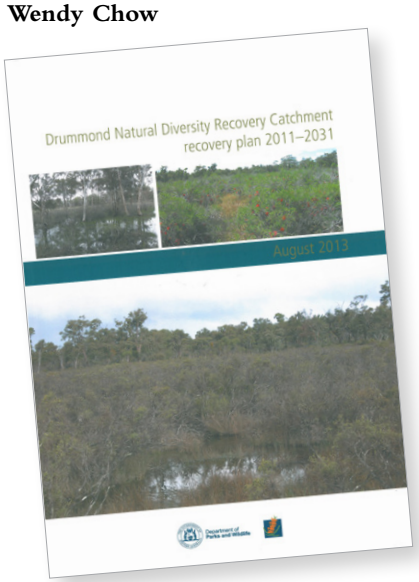
Warren Region

Janine Liddelow

Threatened flora survey in the Frankland District which involved monitoring population numbers and habitat survey conducted in 2013 included *Verticordia apecta, Banksia verticillata, Reedia spathacea, Rhacocarpus rehmiannus* var. *webbianus, Caladenia christineae, Tetratheca* sp. *Kent River, Hybanthus volubilis, Hemigenia microphylla, Synaphea* sp. *Kwornicup* and *Thelymitra jacksonii*. New populations were found of *Sphagnum, Drosera binate, Banksia porrecta* and *Leucopogon alternifolius*. In the Donnelly District threatened flora surveys were conducted for *Caladenia dorrienii*, *C. harringtoniae. C. winfieldii, Diuris drummondii, Grevillea acropogon, Kennedia glabrata, Myriophyllum trifidum, Reedia spathacea* and *Rhacocarpus rehmannianus* var. *webbianus, Brachyscias verecundus* and *Andersonia annelsii* which included survey for potential translocation sites.

Drummond Nature Reserve

Wendy Chow



Above Drummond recovery plan.

The *Drummond Natural Diversity Recovery Catchment recovery plan 2011–2031* was recently published by Parks and Wildlife. The recovery plan describes the biodiversity values which are under threat of altered hydrology and salinity. The plan focuses on the biodiversity assets: the ecological communities 'Claypans with mid dense shrublands of *Melaleuca lateritia* over herbs' and 'Wandoo woodland over dense low sedges of *Mesomelaena preisii*' by altered hydrology. The plan can be used as a guide for management by various stakeholders such as catchment mangers, landholders and community members. A biophysical threat analysis revealed that the most important management issues are; hydrological processes, weeds, nutrients, fire regimes and attitudes towards conservation assets. Some works that have been undertaken thus far in the catchment has been bore monitoring of surface and ground water, weed control, revegetation and fencing in the surrounding surface water catchment and community involvement and consultation.

Reference Department of Parks and Wildlife, 2013, *Drummond Natural Diversity Recovery catchment plan 2011-2031*, Department of Parks and Wildlife, Perth.

Black-flanked rock wallaby

David Pearson and Katherine Howard (WWF)

In 2013 the conservation of black-flanked rock wallabies was enhanced by the national endorsement of the recovery plan for five species of rock wallabies.

The recovery of the *Petrogale lateralis lateralis* subspecies was boosted by the establishment of a predator-proof sanctuary at Nangeen Hill Nature Reserve in the central Wheatbelt. The fence was erected through a partnership between the department and WWF-Australia.

In August and September 2013, 26 black-flanked rock wallabies were translocated from the Calvert Ranges to Durba Hills in the Little Sandy Desert. These animals were monitored in November 2013, indicating that 12 of the 15 animals fitted with VHF transmitters were still alive and all five animals fitted with satellite transmitters were active.

Camera traps deployed by the department in Cape Range in 2013 produced some very interesting results, including images of a black-flanked rock wallaby 'crèche'. The pictures revealed three young at foot playing together with one adult in attendance. The cameras also detected a rock wallaby very close to Exmouth town site closer than any previously known sighting.

Community and volunteer involvement in 2013 has been integral to the monitoring of rock wallabies in the Cape Range and the Exmouth areas, with staff and students from Hale School deploying a remote camera transect and Conservation Volunteers Australia and Cape Conservation Group volunteers providing assistance with the rock wallaby monitoring.

Carnaby's cockatoo

David Mitchell

The department and BirdLife Australia are continuing to band Carnaby's cockatoos (*Calyptorhynchus latirostris*) and have encouraged people to report and photograph banded birds. They also held the fifth Great Cocky Count (GCC) in April 2013, with 250 sites surveyed by over 250 volunteers, including 48 sites surveyed outside the Swan Region and not previously surveyed during a GCC. There are now over 450 GCC sites in the south-west, including 174 confirmed roosts.

The *Jandakot Banksia Woodland Restoration* project is a large offset project that has restored 22ha of banksia woodland through topsoil transfer and planted a further 6ha of Carnaby's feeding habitat.

Carnaby's cockatoo road warning signs have been designed and erected at some locations where road kills have occurred to help raise public awareness of cockatoos in the vicinity and prevent or reduce vehicle strike. Liaison with Main Roads WA will assist the identification of "black spots" where Carnaby's cockatoo are being hit by cars so that signage can be installed in these areas.

An Edith Cowan University Master of Science research project that investigated food availability for Carnaby's cockatoos has been completed. A UWA PhD project continued to investigate roost site fidelity and resource use by Carnaby's cockatoo on the Swan Coastal Plain, including through the use of satellite tracking tags attached to 24 birds. Both projects were undertaken in partnership with Parks and Wildlife and utilised offset funding.

Monitoring of breeding sites and the use of artificial hollows continues to build on a long-term dataset and produce insights into the breeding behaviour.

Dibbler

Tony Friend

Dibbler (*Parantechinus apicalis*) recovery through the establishment of wild populations has continued to progress. Numbers have increased on an island at Jurien Bay after several years of poor rainfall, the re-introduced Peniup reserve population in the south-west has recorded increased population numbers even without further supplements of new individuals.

The breeding program at Perth Zoo provided 68 dibblers in 2013 for release into the Waychinicup National Park enclosure. Monitoring of this population has detected breeding for the first time, indicating that this reintroduction is heading for success.

Forest black cockatoos (Baudin's cockatoo and forest red-tailed black cockatoo)

Brad Barton

The conflict between human resources or activities and forest black cockatoos (Baudin's cockatoo, *Calyptorhynchus baudinii*, and forest red-tailed black cockatoo, *Calyptorhynchus banksii naso*) continued in 2013. In an attempt to reduce conflict with orchardists, the department provided funding for orchards to buy netting and contribute to a Department of Agriculture and Food WA research project. This project is funded by a *Royalties for Regions* scheme that looks at the costs and benefits of using netting for tree crop protection from forest cockatoos.

The department, in partnership with Alcoa Australia, also contributed funding in 2013 for a research project (by Murdoch University and University of Western Australia) studying functional habitat use by forest black cockatoos on an Alcoa mining lease site in the Myara locality, Perth Hills District.

Monitoring of known roost sites and breeding locations continued in 2013 with anecdotal reports from recovery team members indicating that numbers of both species are lower than last year.

Geocrinia (white-bellied frog and orange-bellied frog)

Kim Williams

Forty-eight sites were monitored in 2013 across the distribution of the threatened white-bellied and orange-bellied frogs (*Geocrinia alba* and *Geocrinia vitellina*), indicating that larger populations at three sites are relatively stable. Monitoring has shown successful establishment of white-bellied frogs at the Witchcliffe Forest site, and all previous establishment sites of the orange-bellied frog. Froglet breeding by the Perth Zoo has continued, with 70 white-bellied frogs translocated to Forest Grove, and 65 orange-bellied frogs translocated to three Adelaide Creek sites.

Gilbert's potoroo

Sarah Comer

The annual census of the critically endangered Gilbert's potoroo (*Potorous gilbertii*) in natural and established populations progressed in 2013, with current population estimates for Bald Island being 60, for Two Peoples Bay 20, and Waychinicup National Park enclosure being 15 individuals. Potoroo numbers have been remaining stable in the wild populations on Bald Island and in Two Peoples Bay. Breeding has been recorded in all three populations of potoroos and the Bald Island population had a range expansion in 2013. In 2013 the Gilbert's Potoroo Action Group published and distributed their new brochure on the plight of the Gilbert's potoroo, with funding from Lotterywest.

Hairy marron

Rodney Duffy (Department of Fisheries)

A morphometric key for the hairy marron (*Cherax tenuimanus)* was published in 2013, and subsequent training in how to use it has been conducted with the Cape to Cape catchment groups and volunteers. Captive breeding of this species was successfully undertaken in 2013.

Numbat

Tony Friend

Monitoring of numbat (*Myrmecobius fasciatus*) populations in 2013 indicated that the Manjimup populations appear to be healthy and expanding and the translocated populations at Tutanning and Dragon Rocks Nature reserves are still persisting. Nine young females from the breeding program were translocated to the reintroduced population at Batalling to boost population numbers and genetic viability of the population.

Community involvement continues to provide important support for the numbat recovery program. In 2013, Project Numbat provided funding for radio collars for translocations, radio-tracking flights to monitor translocated animals, motion sensor cameras for research into population numbers and DNA analysis work. Volunteers from Project Numbat, the Friends of the Fitzgerald River National Park and the community provided valuable assistance while the department conducted the Boyagin diggings survey.

Quokka

Brad Barton

In 2013 the Quokka (*Setonix brachyurus*) Recovery Plan was approved by the department and subsequently nationally endorsed in January 2014 and published on the Commonwealth Department of the Environment's website.

Shark Bay marsupials

Manda Page

Monitoring at Faure Island in Shark Bay has indicated that western barred bandicoots (*Perameles bougainville bougainville*), banded hare-wallabies (*Lagostrophus fasciatus fasciatus*) and burrowing bettongs (*Bettongia lesueur lesueur*) have each established self-sustaining populations on the island.

All reintroduced populations of burrowing bettongs have increased in population size.

Twelve banded hare-wallabies were successfully translocated from the Peron Captive Breeding Centre to Wadderin Sanctuary in the eastern Wheatbelt in 2013.

South Coast threatened birds

Sarah Comer

In 2013 the noisy scrub-bird (*Atrichornis clamosus*) sub-population on Mount Gardner was surveyed, and the translocation population of birds to the Angove site was monitored, with a territorial male being detected. Western ground parrot (*Pezoporus flaviventris*) recovery efforts continued, with no further decline being detected in the Cape Arid National Park population. However extensive surveys have failed to find ground parrots still persisting in Fitzgerald River National Park.

Cat baiting trials continued with State NRM and Biodiversity Fund support in Cape Arid and Fitzgerald River national parks. Results to date are encouraging with a significant decrease in cat activity recorded in the 2013 trials.

In 2013 there was significant volunteer participation in project work for all South Coast threatened birds, with more than 2000 volunteer hours being contributed to the recovery of these species. Regular articles for the Friends of the Western Ground Parrot newsletter, and features in *LANDSCOPE* magazine and Great Southern Great Science magazine were published in 2013.

South Coast Threatened Invertebrate Group

Deon Utber

In 2013 four species of assassin spiders of the genus *Zephyrarchaea* (*Z. barrettae, Z. marki, Z. melindae* and *Z. robinsi*) were listed as threatened fauna.

Research was conducted in to the molecular phylogeography of *Bothriembryon* in WA, with an emphasis on the south coast region. This work was conducted by the WA Museum by Corey Whission, Dr Bram Breure and Lisa Kirkendale.

Western swamp tortoise

Craig Olejnik

Western swamp tortoise (*Pseudemydura umbrina*) populations at Ellen Brook Nature Reserve, Twin Swamps Nature Reserve, Mogumber Nature Reserve and Moore River Nature Reserve are all showing signs of recruitment, following annual monitoring and management of the reserves.

The department in 2013 has purchased an additional 5ha to the west of Ellen Brook Nature Reserve, which will increase the area of protected land available to the western swamp tortoise.

Department staff and volunteers from the Friends of the Western Swamp Tortoise planted 5000 plants in Ellen Brook Nature Reserve and 10,000 plants in Mogumber Nature reserve in an effort to revegetate suitable degraded habitats for the western swamp tortoise. Fifty years of monitoring and recovery efforts for the western swamp tortoise was celebrated in 2013 at an event attended by the Environment Minister.

Woylie

Manda Page

In 2013 the conservation status rank for the woylie (*Bettongia penicillata ogilbyi*) was upgraded from endangered to critically endangered following further monitoring that demonstrated ongoing decline in this species.

Intensive management of woylies continued in 2013, with further animals translocated out of Perup Sanctuary to Yendicup, and new genetic stock from Dryandra and Kanyana rehabilitation centre (Tutanning stock) introduced to the Perup enclosure. Fenced or island populations are increasing in size, and animals that were translocated to Julimar State forest in 2013 are persisting.

Publicity for the recovery of the woylie occurred in response to the decline in its conservation status. Coverage included a *LANDSCOPE* article, a *WATSNU* article, a Today Tonight television story and Woylie Outbreak Workshop article in The Australian newspaper.

Recovery plans

Flora interim recovery plans recently endorsed by the department's Director of Science and Conservation:

No.	Title	Prepared by	Parks and Wildlife region involved
340	*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands (SCP community type 30a - Gibson *et al.* 1994).	Val English	Swan
341	Pearl-like androcalva, *Androcalva perlaria*	Shane Turner, Sarah Barrett	South Coast
342	Lodge's spider orchid *Caladenia lodgeana*	Robyn Luu, Andrew Brown	South West
343	Butterfly-leaved Gastrolobium *Gastrolobium papilio* (*Brachysema papilio*)	Robyn Luu, Andrew Brown	South West
344	Prickly honeysuckle *Lambertia echinata* subsp *echinata*	Robyn Luu, Andrew Brown	South Coast
345	Albany cone bush *Isopogon uncinatus*	Robyn Luu, Andrew Brown	South Coast
346	Cactus banksia *Banksia anatona*	Robyn Luu, Sarah Barrett, Andrew Brown	South Coast
347	*Kunzea acicularis*	Robyn Luu, Andrew Brown	South Coast
348	Late hammer orchid *Drakaea confluens*	Robyn Luu, Andrew Brown	South Coast, South West
349	Diel's daviesia *Daviesia dielsii*	Robyn Luu, Andrew Brown	Midwest, Wheatbelt
350	Shell-fruited grevillea *Grevillea murex*	Robyn Luu, Andrew Brown	Midwest, Wheatbelt
351	Foote's grevillea *Grevillea calliantha*	Robyn Luu, Andrew Brown	Midwest,

Fauna Recovery Plans recently endorsed in WA and/or adopted under the *Environment Protection and Biodiversity Conservation Act 1999* **(EPBC Act) as National Recovery Plans**

No.	Recovery plan title	Year	State or National
56	Quokka (*Setonix brachyurus*) Recovery Plan	2013	National
55	Recovery plan for five species of rock wallabies: Black-footed rock wallaby (*Petrogale lateralis*), Rothschild rock wallaby (*Petrogale rothschildi*), Short-eared rock wallaby (*Petrogale brachyotis*), Monjon (*Petrogale burbidgei*) and Nabarlek (*Petrogale concinna*)	2013	National
52	Carnaby's cockatoo (*Calyptorhynchus latirostris*) Recovery Plan	2013	National
50	Western swamp tortoise (*Pseudemydura umbrina*) Recovery Plan	2010	State
		2013	National
59	White-bellied and Orange-bellied Frogs (*Geocrinia alba* and *Geocrinia vitellina*) Recovery Plan	2014	State
58	Western ringtail possum (*Pseudocheirus occidentalis*) Recovery Plan	2014	State
44	South Coast Threatened Birds Recovery Plan	2014	State

All plans will be made available on Parks and Wildlife site: www.dpaw.wa.gov.au.

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Department of Parks and Wildlife

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