

LANDSCOPE EXPEDITIONS

Western Australian Department of Conservation and Land Management,
Locked Bag 29, Bentley Delivery Centre, WA 6983
in association with
UWA Extension, The University of Western Australia, Nedlands, WA 6907

**Rock Pools and Rugged Ranges –Wildlife of the Nullagine River 2000.
LANDSCOPE Expeditions. Report No. 36**

FROM THE EXPEDITION LEADERS

On behalf of CALM and UWA Extension, we would like to thank all expedition members for their enthusiasm, stamina and splendid good humour during our Meentheena expedition. Despite some terrible weather and flooding rains, we managed to collect a great amount of very valuable information on the fauna and flora of this remote, rugged and remarkable area. The expedition provided some first's for the leaders, including catching bilbies and rock wallabies in traps, finding *Leggadina* living high on stony hills, and collecting some unusual plants previously unrecorded in the eastern Pilbara. And Helen will be pleased to know that the cage trap lost in the raging Nullagine was recovered some months later just down stream from where she went for her inadvertent swim.

The expedition leaders extend their deepest thanks once again to Yvonne Muller for cooking such wonderful meals for cold and hungry expeditioners, and to Chris Muller for so ably assisting his dear wife in that multitude of camp chores, especially fire wood collecting and hot water provisioning. Most importantly, to all of you, we give the greatest thanks of all, as without you we would never have got this expedition off the ground. We all hope you will return again to work with us in the Pilbara, either again at Meentheena, or on some other *LANDSCOPE* Expedition.

Peter Kendrick, Stephen van Leeuwen, Bob Bromilow & Michael Hughes



Members of the Rock Pools and Rugged Ranges (Pilbara) *LANDSCOPE* Expedition 2000

BACKGROUND TO THE SURVEY

Fortunately, the Meentheena 2000 expeditioners were lucky enough to follow along behind the efforts of the Pilbara 2000 Green Corps team. These volunteers did the hard work of installing the 200 pit traps at the 20 sites used during the survey, and the 200 drift fences. I'm sure those *LANDSCOPE* expeditioners are as grateful as the CALM staff were for this. All told they used over 200 sticks of explosive to dig the holes in that rocky ground.

The pit trap sites were installed to ensure that most of the major landscape surfaces of the Meentheena area were represented. Meentheena landscapes vary from low-relief plains and rolling hills through to ragged gorges and breakaways. Generally, to the west the low relief plains are of stony clay soils or colluvial deposits, with granites protruding in some areas. Along the Nullagine River lie small areas of orange sandplain, but more usually rugged and ancient sedimentary ranges. The rocky ridges and hills are almost all ancient sandstones and mudstones, often heavily silicified. Some were formed by some of the most ancient living things on earth, the stromatolites. The stromatolites of Meentheena are well known all over the world, and attract a small but steady trickle of overseas researchers.

More detailed information on the geology can be obtained from maps and explanatory notes of the 1:250 000 Geological Series Nullagine Sheet (Hickman 1978).

All told, we trapped 248 mammals and 265 amphibians and reptiles. Of the 513 animals trapped, we retained a total of 80 (20 reptiles and 60 mammals) as specimens for the WA Museum. These were creatures that were significant in some way, were required for ongoing research (such as the set of death adders that were collected), or for which specimens were needed to confirm identifications.

DIARY OF THE ROCK POOLS AND RUGGED RANGES WILDLIFE OF THE NULLAGINE RIVER *LANDSCOPE* EXPEDITION 2000

Monday May 22 A leisurely start – cups of tea at Karratha CALM office and the first introductions while the trucks and cars were loaded. Patches of Dampier's (not Sturt's) Desert Pea flowering by the roadside – a driver's "smoko stop" just happened to coincide with a very photogenic patch on the Roebourne Plain.

This may be a diary about rain. It started before Port Hedland, dripping steadily at the service station where we stopped for lunch. Mild excitement fording the Shaw River. Saw my first *Grevillea wickhamii* flowering and a hakea? Also a couple of mulla-mulla species. The small bloodwoods are dripping flowers. Next stop Marble Bar – note that when the tourists' literature says "sealed road", interpret this as "bits and pieces of sealed road, with not much logic as to where they occur". Didn't have time to see the "Bar". Rain, rain – dark red rocks with the spinifex getting greener by the kilometre. White scraggly Kanji

wattle, some bloodwoods with graceful trunks in contrast with the rocks.

Arrived at Meentheena about 4.00 pm, to find campsite set up about 2 km from the old homestead, as the road was impassable. Communal living is in a large open-ended machinery shed, with racks at the side that are just tailor-made for food and grog containers, fridges, etc. Learned how to set up a "tropitent". Briefing after tea was brisk and then we each introduced ourselves to a "Stimson's python" – a slender snake about 15 cm long, with the amazing ability to stay horizontal even when supported only at one end. Before bed, the stars appeared, well, one or two. Then it rained.

Tuesday May 23 Advantage of rain – it doesn't get very cold at night. My fears of having to leap out of bed, breakfast, wake up and be on the road within half an hour were baseless – it's raining and we are to "take our time because we are not in a hurry".

I chose the "scenic drive" out to the main road, watched Bob become embarrassed at his three tries to find the turnoff to the homestead. Some more exciting creek crossings, in the rain of course, a couple of head-banging bumps but lovely scenery. (Looking forward to drier times when it's worth stopping for photos.) But we did stop – Steve got bogged. While some of us stood around discovering that the pebbly areas between spinifex are the worst places to stand in the wet – your boots sink through the crust to the mud beneath, and that can be ankle-deep. So, prickly as it is, spinifex is safer to stand on. The bogging, heralded by a plaintive cry over the radio, was a three star event - One star for each try. Attempt number one resulted in snapped "snatch 'em strap", number two nearly jerked Bob's vehicle backwards. Number three was the heavy duty, dig in the jack, send John out to disappear into the spinifex and come back with a dead tree (trees are small in the plains of the Pilbara), attack the tree with an axe, put the pieces under the back wheel and – success.

Two minutes later, it was "everyone out" again (did I say that the rain was falling all this time?) – our first pit trap and 10 Elliot traps in a row, sort of. On to the second site at the side of an old airstrip – no spinifex was the indicator. The ground there was so hard that the pit wasn't draining water, so rather than drown the poor little animals, we didn't open the trap or set any others (just as I was getting the hang of rolling sticky bits of rolled oats into a ball).

We drove down to the homestead site through much taller trees – coolibahs? – and such soft green grass that it's very hard to believe in "the arid Pilbara". The cars were locked, trousers rolled up and/or removed (my camera in its waterproof bag) and off we strode across the Nullagine.

Well, I've learned something from my previous travels – to grit my teeth and leave my boots on when wading through fast-flowing water when the river bed is made up of stones, but there was only one section of real excitement for a short-legged person such as I, and I made sure that stalwart Steve and Brave Bob were very close by. The

water is warm enough to promise an excellent swim when it stops raining. We were carted back in style by PK and Chris, who were waiting for us – no need to walk 2 km back to camp with sloshing boots, for which I'm grateful.

Lunch consisted of pleasant food and somewhat glum watching the boot prints fill with water. When it stopped raining for a little while, there was a mad flurry of swags being moved (Steve to the cattle-holding yard, PK to the stockyards. I'm not sure why "don't roof me in doesn't also translate to "don't fence me in", but apparently the Pilbara has this effect on people.). Chainsaw and whippersnipper, 44 gallon drum full of water, a hangman's noose in the shower for buckets, washing hung to dry, boots stuffed with newspaper. All in all, home away from home. Oh, and a wonderful "pathway to heaven" – pieces of formwork removed from an old shed and laid over the muddy area from Community Hall to the loo. And it's raining again.

And that's not all ! Heard from the shower stall just now in the dark and rain – "whoever did the plumbing wouldn't even make an electrician!" (I think the hangman's scaffolding has just collapsed.)

Wednesday May 24 Rain, rain, rain. It seems to have hardly stopped. I have had to switch to pencil as biro won't work on damp paper. A scene of low even diffuse cloud and lots of puddles greeted us this morning. After a welcome breakfast of rice cakes, the weather forced a re-think of activities. Peter Kendrick took a group to check the pit traps opened yesterday but without great hope of finding a lot of animals venturing out in the wet. Steve took a group of us to the river where Steve and Richard dragged a fine mesh net in the river. The first haul was grunter and herring and the second, "rainbow fish". John caught a silver cobbler (catfish) on a line. The river was a magnificent scene with a wide shallow bed and the flow was fast in places. Banks out of the water yesterday were submerged today after last night's rain.

Steve, Richard and John headed across the river and used one of the vehicles to check the traps opened and set yesterday. The score was two frogs and three mammals which Peter will identify (hopefully!) later on. Jen and Cleve had a swim – very pleasant – and Sue and Val went birding – black tailed tree creepers, white plumed and yellow tinted honey eaters, red-browed pardalote, bee-eaters, jabiru, black duck were seen.

It is now after 12 midday and we are back in camp having a drink and listening to the rain on the roof of the shed. One of the mammals from the Elliot traps was the "Little red kaluta", *Dasykaluta rosamondae*, a voracious feeder which happily sank its teeth into Steve's fingers as he was showing it to us. Chris and Yvonne are looking after us extremely well. Chris has new innovations and constructions all the time – showers, toilet roofs, etc., etc. and lots of wood sawed up for the very necessary fires.

Afternoon session is animal identification – those found this morning were:

Frogs	<i>Cyclorana longipes</i> <i>Uperoleia russelli</i> <i>Uproleia russelli/glandulosa?</i> <i>Limnodynastes spenceri</i> <i>Litoria rubella</i>
Mammals	<i>Pseudomys desertor</i> <i>Pseudomys hermannbergensis</i> <i>Dasykaluta rosamondae</i>

After the animals had been dealt with, Steve brought some plants back and ran rapidly through the identification, showing how familiar he is with the local flora.

Thursday May 26 After an unbelievable night of no rain and a clear starlit evening, we awoke to a very doubtful looking day. However, the statements that it was only a morning mist proved correct and we experienced our first taste, or rather feel, of a promised Pilbara autumn day. After the allocation of the morning's work, we headed off in three different directions – one group out to the main road to deal with sites 1 to 5; another taken in the large truck and left to wade the river and check the two sites opened yesterday and open another; the third group consisting of Richard and myself with Steve as leader. Our first job was to open the previously installed pit traps and to put out ten Elliott traps. These were roughly in a line parallel to the river, across sandstone spinifex flats.

Our next stop was back past the camp site and trapping site 9 where again pits were opened and another ten Elliotts were put out. Here plants were collected from the area around the trap line over approximately a half-hour period. Then back past camp and up a very rough fairly steep track. Then we left the truck and again repeated the job of opening pits and setting out Elliotts, the latter up a rocky gully with stromatolite rock structure on the sides. This was my first sighting of stromatolites so I was most interested.

Again a plant collection was made but apart from spinifex, vegetation was very sparse, which was not surprising as the ground surface was quite devoid of soil, just covered with broken slate. One more plant collection was made at the first site visited earlier.

For me, the most interesting part of the day was the processing of the animals collected by all during the morning. Included in the collection were frogs, lizards, rodents and marsupials. Instruction and practice in using keys for all groups of animals occurred and results recorded. Numerous liver samples were taken and the animals from which such samples were taken were kept. To me, those of most interest were the marsupials – the *Ningau timealyi* and the *Dasykaluta rosamondae*. Among the reptiles was an attractive monitor *Varanus eremius*, a pygmy python *Morelia perthensis* and a beautifully marked skink *Ctenotus saxatilis*.

The day's activities ended for me with a walk along the river with Peter and David. Strangely, there was very little bird activity which was rather disappointing but all told it was a great day.

Friday May 25 Another warm night but a bright sunny morning, again with not a cloud in the sky. People are not quite so keen on sitting around the fire any more. Instead they are taking their chairs out into the sun. Checked the white board to find out the roster for the day – which leader and which volunteers go where and do what. Val, myself, Richard and David are scheduled to go east of the river with Peter (Kendrick) to the south end of the station to open up trap lines and set out the Elliot traps and then travel on down to the river to set out the cage traps in the hope that we will get rock wallabies, water rats, quolls, etc. Steve and John T also crossed the river to clear the trap lines opened on the first day and then join our group at the southern end.

The river has dropped a bit but is still flowing quite briskly. The drive down is through beautiful country and we saw emus and quite a number of red kangaroo. The bird life is a lot more prolific, with about 8 pairs of bustards (one pair were exceptionally large), firetail finches, budgerigars, grey crowned babblers, a number of yellow tinted honey eaters and a large flock of pink and grey galahs that apparently have been feeding on the same patch of ground for the last few weeks.

After opening up the trap lines and setting out the Elliot traps, Steve and John T joined us and informed PK they had a good number of specimens for processing later today. We arrived at the point where the vehicles could go no further and loaded ourselves up with the cage traps, divided into two groups, one to walk along the river bank and one to walk along the cliff face. Some spectacular scenery along this stretch of the Nullagine and we had a number of sightings of rock wallabies.

By the time our group had returned to the river crossing, it was about 2 pm and we were decidedly hurrying! The rest of the groups had already returned to camp and had lunched and greeted us on the other side – ready for a swim. The temptation was too great and we also stopped for some “porpoising” in the river – absolutely superb after quite a strenuous morning.

Back to base camp for lunch and then the work started with the processing of all the specimens collected today. Among the mammals, some very interesting finds were recorded, with a possible pebble mound mouse, a hairy footed dunnart, a delicate mouse, a rock rat and a number of desertor... mice but much to PK's surprise, virtually no hermannsberg mice. In the reptile area, some *Ctenotus pantherinuss* recorded. On the botanical side, the specimens collected were much as Stephen had expected and so far nothing out of the ordinary has been collected. The processing for both areas kept many of the group busy right up to dinner.

Once again, Yvonne produced a delicious dinner and the general consensus was that it has been a very enjoyable day and the weather was perfect. After dinner some went back to release some of today's specimens and then onto the main road for a bit of spotlighting – absolutely nothing, unfortunately; however, on the road back into camp we saw the two stone curlews (bush thick-knees). On return to camp, all was dark (the generator had been turned off and hence no lights), just the glow of the fire and a few

hardy souls sitting up, but within half an hour, there was not a sound to be heard!

Saturday May 27 A very strong easterly wind woke most people to the sound of flapping canvas and flapping corrugated iron (the old shearing shed). Breakfast was punctuated by whirling gusts of wind which sent smoke, dust and ash through the shed/dining room/office/what have you. At least it shows no sign of raining and the ground is drying out really nicely.

A large party left for the river and trap lines on the other side, while two smaller groups made for the balance of the pit traps in fine but windy conditions. Sue, Val and Max accompanied PK, releasing some animals from yesterday and bagging others. Frogs were in plentiful supply in quantities ranging from “a couple”, “several” to “handsfull”.

On return to camp in time for elevenses, we processed the animals caught overnight which included a rock rat *Zyzyomys argurus*, western pebble mound mouse *Pseudomys chapmani* (deceased) and a Lakeland Downs mouse *Leggadina lakedownensis* (ID to be confirmed) much to PK's delight. Finally we made our way to King Rock Hole and a very pleasant walk upstream. The rock hole was full with plenty of large fish. A visit to some petroglyphs on the way home finished off a busy day. Helen had an involuntary dip when coming back from the far side of the river but suffered no harm and probably got some personal washing done earlier than planned!

There were some mystery tracks near the camp this morning which caused some head scratching and this evening there is a battery of traps scattered around to try and catch the over-curious interloper.

Sunday May 28 Spent the first half of today resting (and recovering!) from two days in a row visiting the southern end of the ‘run’ on the river where we set the larger traps. We did go this morning to check some traps close to the camp and obtained just a few animals. The importance of ribbon markings being close to Elliot traps was obvious as we could not find two of them – they may have been brought back yesterday or they may be hard to find.

Bob, John and myself went just before lunch to try to find a track just to the north of the camp that apparently goes from the road to the river. However, we were unable to find it and couldn't get through to the river due to some boggy ground.

I was interested this morning to learn that the ‘kapok’ bush (introduced species originally from North Africa according to Steve) was growing prolifically along an old airstrip. Apparently it has been spread by the previous owner's grader from roads to other areas where the grader worked – such as the airstrip. It is interesting to reflect on the fact that there is a native species known by a common name of ‘kapok tree’ across northern Australia – probably the name is given to the tree because of its fluffy white substance like the commercially produced ‘kapok’ that went into mattresses, etc.

The afternoon I went with Steve, John and Helen to the vicinity of King Rock Hole not far to the north-west

of the camp. We walked up along an adjacent rock face on a hill to a cave where Steve and John strung up a net across the mouth of the cave. (Helen and I came along behind, with Helen demonstrating terrific rock climbing skills!) Steve crawled into the back of the cave and scared out a bat which flew into the net. He later grabbed a second one off the cave wall. It then bit him and Steve showed considerable calmness, seeing as we currently have the possibility of these bats carrying a dangerous virus.

For me, the day has ended with a spirited discussion with Steve about the 12 000–15 000 species of flora in WA compared to 1200 or so in the UK. We've also discussed the morphological basis of classifying plants and the more advanced work on classification of animals based on genetic diversity.

Monday May 29 Monday morning, clear skies, damper for breakfast as the bread had gone mouldy at last. Peter, Verena, Sue and myself were on trap duty on sites 6, 9, 10 and 11. Frogs were no longer in evidence as it is drying up everywhere. Method changed to on-site diagnosis so we could release the animals straight away. Lots of varied mice. Found some more bilby holes around the river with lots of diggings. All the holes faced south and had a resident swarm of midges but no bilby and no fresh tracks. Peter collected the south of the river specimens and brought back the interesting ones. Due to good numbers of desert mice, several unlucky ones were to be immortalised in "the death pit". Went back to camp for some production line processing, all of us now just a cog in CALM's machine of death. Peter got them out of the bag, with his usual unattractive obsession with their genitals, I weighed them, Peter murdered them, I punched labels through their still kicking legs, Peter slit them and tore out their livers. Sue recorded the whole thing without a trace of emotion. Their tattered bodies were discarded into the pit.

"Another victim of the Pilbara Ripper" – "He froze their livers!"

Max, Val and Michael went to the other sites in the morning 2–5. The rest went south to close up the traps and pits in the southern sites. Horses spotted by the river and the airstrip. The small rapids were visited.

Afternoon – two visits to the fluorite mine, which it didn't deserve: an ugly gravel pit. However, the second group with Dad in tow came back with some fluorite, a purple quartz. Went for a swim at the long deep pool north of the crossing. The road to the swimming hole at "Death Adder Corner" leads down to a very nice spot. Very long straight section, about 7–8 feet deep in the middle and flowing fast. Shady and cool by 5.00 pm. Drifted down for a couple of hundred metres, then got too cold and hobbled back on the rocks. Debris up about 3–4 m in the branches.

Tuesday May 30 After last night's around-the-campfire discussion about a python in the sewerage tank under the camp toilet – if it was still there – or if it had escaped a horrible fate. David seemed to be the one most concerned! A late night for some night owls around the warmest camp fire yet.

This morning was another clear, cool and windy start to the day. After breakfast, everybody dispersed in different directions to close down pit traps and bring in the Elliot traps. But then, I nearly forgot the "Lizard Thrash"; in the area around the camp and the various heaps of old rubbish and sheets of iron. Any available reptile cover was turned over and produced a catch of one Stimsons python, one blind snake, numerous *Varanus acanthusus*, geckos, spiders, centipedes, *Ctenotus* – but no big snakes or anything else to scatter the onlookers – only an old piece of hose woke David up.

After lunch an exploration was organised to go and see the old "Twenty Ounce" gold mine at the north end of "Meentheena". A rough and bumpy track across wet creeks and granite rises was travelled over before the first old mine site was seen. Rocks were cracked open, old pieces of gear turned over and another "Lizard Thrash" produced some more small reptiles. The convoy travelled on to another old mine site with more deep shafts full of water and the remains of an old burnt out caravan. Kept on following the track and stopped some kilometres further on and everybody climbed a small hill for the usual group photo shoot. The trip is not complete without the visual memory aid. The track was followed for another three or four kilometres north before turning back south to the main road and back into camp again.

More traps were set again along the creek near camp in hope of catching the bilby that left the tracks in the mud. Tomorrow morning will tell. Last evening meal in camp for the trip was a beaut roast. Thanks, Yvonne!

Wednesday May 31 The sun rose on another perfect Pilbara winter day but there was an air of sadness in the camp as we packed our bags and tents in preparation for our journey home. After a quick breakfast, our bags were put in vehicles, then Peter showed us a bilby which had been caught in a cage overnight. We had seen its burrow and tracks around the camp site previously and it was exciting to catch our first glimpse of this elusive creature. It was a gentle animal with pointed snout, large ears and sharp digging claws. It sat calmly in Peter's hands while members of the group took photos.

Chris took the final group photos. We said our goodbyes and then we were off. We have many highlights of our stay on Meentheena Station to reflect on later – rain, mud and a flooded river to wade through, learning to empty and close down pit and Elliot traps, classifying animals and plants and recording the results. We found an interesting range of mammals, rodents, reptiles, frogs and plants to satisfy Peter and Steve. It was exciting that some species had not been recorded in the area before and perhaps we may have some new species as well.

After work, there were trips to old mines – rather sad abandoned places, spiritual places with aboriginal art and beautiful places like King Rock Pool and the Rock Wallaby cliffs. After each excursion we were always welcomed by Yvonne with her delicious camp fire cooking and in the evening we had many laughs together around the camp fire. Many thanks to Peter, Chris, Steve, Bob, Michael

and Yvonne for making these things possible and so enjoyable, and many thanks to the other members of our group who were always courteous, friendly, helpful and good company.

An Ode at Meentheena

O' my boots you've taken me far
Especially when I haven't had a motor car.
These dear old boots have never given me tinea.
I should really preserve them forever in vinegar.
It's a pity my feet were deformed at birth
And I had to wear them with an orthotic insert.

These boots have taken me far, I know.
It's just a pity I'm always slow.

Although they let me down
When I was jumping over rocks,
It was definitely better than doing it in socks.

My feet are deformed,
My legs are slow.
I've a brain to match – that's all I know.

Humans have one,
But not a quoll
But David must allow his shoes to have a soul
Dear old boots

If your tongues could speak
We would be at Meentheena for another week.

Dear boots, I'll leave you by the loo
So you can play with the python too!

And so my boots I leave behind.
To me they've been so very kind,
With deep regret I see them go.
I'll never see them again you know.

The saddest thing about those boots
Is just, who gives two hoots.

TRAPPING SITES

Twenty trapping sites were located on Meentheena, along the Ripon Hills road or near old station access tracks. Unfortunately for us, the glorious rain we experienced meant that a number of the sites (Sites 7, 8, 12 and 16, indicated by * in the table below) remained inaccessible for the duration of our visit. However, their locations are given in the table below, in recognition of our good intentions. Of course, if we had run those sites as well, the numbers of animals captured would have been even higher.

Site No.	Habitat Type	Location
1	Stony ridge above colluvial plain	South of Ripon Hills Road
2	Drainage wash, colluvial plain	South of Ripon Hills Road
3	Spinifex flat, colluvial plain	South of Ripon Hills Road
4	Granite rockpile, base of basalt hills	North of Ripon Hills Road
5	Crest of basalt hills	North of Ripon Hills Road
6	Shale flat near basalt hills	North of Ripon Hills Road
7*	Basalt slope with spinifex	North of Ripon Hills Road
8*	Spinifex colluvial flat	North of Ripon Hills Road
9	Spinifex colluvial flat	Entry track, near camp
10	Red sandplain near river	West side of river, near camp
11	Rocky carbonate hills, near camp	West side of river, near camp
12*	Stony colluvial slope	West of camp
13	Red sandplain near river	East of river, near old homestead
14	Stony colluvial flat	Close to airstrip
15	Low stony hills	North east of airstrip
16*	Stony basalt ridge	South of old homestead
17	Clayey drainage flat	South of old homestead
18	Stony low basalt hills	South west of old homestead
19	Rocky carbonate hills	South west of old homestead
20	Stony colluvial flat	Near rock-wallaby turnoff

MAMMALS

We were very lucky to have captured such large numbers of mammals. The table below shows where all the species we trapped came from. The list below that gives some additional information, as well as listing those species that we saw but did not actually catch.

In the listing below, the numbers of each animal species trapped or observed is given in parentheses after the relevant site number.

TACHYGLOSSIDAE

MONOTREMES

Tachyglossus aculeata

Echidna

Sign was sometimes observed in hilly and rocky areas, usually as diggings or scats. No animals were seen, but they are often shy and in any case, they look a lot like a spinifex clump.

DASYURIDAE CARNIVOROUS MARSUPIALS

Dasykaluta rosamondae

Little red antechinus (alias little red finger-biter)

3(4) 6(2) 9(3) 14(6) 15(7)

17 males (average 34 g, n = 7); 4 females (23 g, n = 2). These gutsy little predators seemed to prefer sites with good spinifex cover, rather than rocks or other shelter. Although not the most common mammal we trapped, they were the most abundant predator. This species is intermediate in size between the tiny *Ningau* and the larger *Pseudantechinus*. It is widespread and common throughout the Pilbara. The males of this species never live long enough to see (or eat!) their offspring. Soon after mating, all the males suffer a simultaneous and catastrophic collapse of their immune systems, leading to a lingering and apparently unpleasant death.

Dasyurus hallucatus

Northern quoll

Rock-wallaby cliffs

1 male, 800 g.

The northern quoll, while much smaller than its southern cousin, is the largest marsupial carnivore in the Pilbara. They are unlikely to be trapped in pit traps, but cage traps seemed to work well (removing them from traps can be a perilous exercise). The cliffs and rocky ramparts along the river at this location are ideal for these creatures.

Ningau timealeyi

Pilbara *Ningau*

4(2) 9(3) 11(1) 13(1) 14(2) 15(10) 18(2)

12 males (mean 6 g, n = 6); 9 females (mean 4 g, n = 6). These tiny creatures were not particularly common, but they were found in a wide range of habitats (from sandplain to rocky hills and ridges). They are fearless predators, and will tackle a grasshopper or some such twice their size. They are however relatively placid, and despite fearsome teeth they will sit quietly in your hand. They live anywhere there is good spinifex cover.

Planigale ingrami (?)

Planigale

4(1) 11(1) 19(1)

3 males (mean 9.0 g, n = 2)

The Planigales are among the scientific mysteries of the north west. The taxonomy of these tiny carnivores is still poorly known, so we are unsure which species our *Planigale* belongs. Their very flattened heads and bodies appear to be especially adapted to pushing into cracks and crevices, and this could be why they were found on sites with lots of rockpiles.

Pseudantechinus roryi

Rory's Antechinus

4(1) 10(1) 19(1)

3 males (mean 27.0 g, n = 3)

These animals were all members species that staff from the WA Museum have only this year described. It is known only from the Pilbara, and is usually found in rocky sites. These are intermediate sized predators, and are not usually very common.

Sminthopsis youngsoni

Lesser hairy-footed Dunnart

2(1) 3(4) 4(1)

4 males (mean 9.0 g, n = 3); 2 females (mean 7 g, n = 2)

The hairy-footed dunnarts are specialists on sandy surfaces. The long, curled hairs on the soles of their feet seem to give them good purchase on surfaces, where they may travel up to two or three kilometres each night. All the hairy-footed dunnarts we found were in the western 'sand-plain' sites. We may have expected some on the sandy sites near the river, but these may be too isolated and small to support these specialised animals.

MACROPODIDAE

KANGAROOS AND WALLABIES

Macropus rufus

Red kangaroo

'Big reds' were often seen in open country and plains on Meentheena, particularly in the late afternoon or evening. We often saw them on the plains on the western part of the station, and in the large open areas along the river to the south. They are common elsewhere and widespread.

Macropus robustus

Euro or Hill kangaroo

Euros occur throughout the Meentheena area, but particularly near hills and rocky outcrops where they can shelter in small caves and overhangs during the day. Many euros are killed along the Ripon Hills road each year in this area, as they often feed along the road verge at night. They are common and widespread.

Petrogale rothschildii

Rothschild's rock-wallaby

One female wallaby was captured in a cage trap at the cliffs near the river, baited with apples and peanut paste. She had a small joey in the pouch. However, she was very cold when we got to the traps, and needed some work to revive her. Eventually, after being sat in the sun on warm rocks, she recovered enough to hop off (an event videoed by Sue). This species is widespread in the Pilbara, and quite common. We also saw signs of rock wallabies at King Rockhole.

PERAMELIDAE

BANDICOOTS

*Macrotis lagotis*Rabbit-eared bandicoot
or Greater Bilby

1 male, 835 g.

Active and inactive bilby burrows were found at various locations close to camp. However, the cheeky little things were found to be sneaking right through camp, after the soft ground was found to be covered in tracks one wet and cold morning. A young male bilby proved to be the last animal captured during the survey, in the last trap to be set and checked. They are known to grow to about double the size of our animal. Last seen, he was vanishing back down his burrow, at speed.

EMBALLONURIDAE

SHEATH-TAIL BATS

Taphozous georgianus

Common sheath-tail bat

Common sheath-tails are one of the most common bats in the Pilbara. While many bats live in tree hollows or under loose bark, the sheath-tails are obligate cave dwellers. The small caves at King Rockhole are ideal for this species. They are distinguished from their very similar relative, *T. hillii*, by having a relatively wider jaw. Our measurements confirmed this, and we released them un-harmed.

MURIDAE

'OLD ENDEMIC' RATS AND MICE

Leggadina lakedownensis

Pilbara short-tailed mouse

5(2) 11(1) 17(1)

3 males (mean 13.5 g, n = 3), 1 female (12 g)

This species is another of the mysteries of the Pilbara. Until recently, very few records were available from anywhere on the Pilbara mainland, and repeated searches had not managed to confirm their presence. However, a giant form of the mouse is relatively common on Thevenard Island. Several years ago, and probably related to some good seasons, *Leggadina* started to pop up around the Pilbara, almost always in cracking clays. This is what makes our mice so interesting; two of the sites were from the crests of rocky hilltops. This is of great interest, and may indicate that *Leggadina* is more widespread than previously thought. In particular, finding *Leggadina* on Site 11, which was almost entirely bare rock, was very unexpected.

Pseudomys chapmani Northern pebble-mound mouse

6(2) 9(1) 11(2)

4 males (mean 10.5 g, n = 4), 1 female (9.5 g).

Pebble mound mice are not common at Meentheena. We saw only a handful of active mounds, although dead mounds were more common. However, the five animals we caught were all from the sort of sites where one might expect such a creature; sites with enough pebbles scattered around to form a mound. While we did not find the mounds that these animals might have come from, it is possible that they may range over quite long distances each night. Meentheena is close to the edge of this species' range in the Pilbara.

Pseudomys delicatulus

Delicate mouse

3(1) 10(1) 13(9) 14(3) 15(1) 20(1)

3 males (mean 5.5 g, n = 3); 5 females (mean 6.5 g, n = 4); 2 juveniles.

These are probably the cutest of our Pilbara native mice. The Meentheena *P. delicatulus* are close to the inland limits of their range. They seem to like sites with lots of spinifex, in areas that have run-on drainage (although Site 15 is an exception there). The juvenile mice, which were too small to reliably determine sex, were probably born late in the previous summer season.

Pseudomys desertor

Desert mouse

2(2) 3(5) 4(1) 5(2) 6(1) 9(14) 10(12) 13(8) 14(5) 15(10) 17(5) 18(2) 20(1)

33 males (mean 21 g, n = 22); 30 females (mean 22 g, n = 20); 3 juveniles.

Until recently, the desert mouse was not known from the Pilbara. However, in the last few years, it has been found at a variety of sites in the east and central Pilbara. These animals were our most common mammal, and were widely distributed across most habitats. Their absence from some sites appears to be more to do with the vagaries of sampling rather than an unsuitability of habitat.

Pseudomys hermannsburgensis

Sandy inland mouse

3(9) 6(2) 13(1) 14(1) 15(8) 17(1)

11 males (mean 11.5 g, n = 11); 3 females (11.5 g, n = 1)

This is a species with an enormous geographical range, occurring throughout the arid zone and deserts across Australia. They can occur at high densities following good seasons, and are often the most abundant native mammal trapped. In this case however, they were totally eclipsed by *P. desertor*.

Notomys alexis

Northern hopping-mouse

10(15) 13(29)

15 males (mean 22 g, n = 5, 1 juvenile of 11 g); 22 females (mean 24 g, n = 8)

Northern hopping mice were very common, but only on sites with sandy substrates. This conforms with their well known preference for sandy habitats. Two size classes of animals were apparent, with some juveniles only half the size of the large animals.

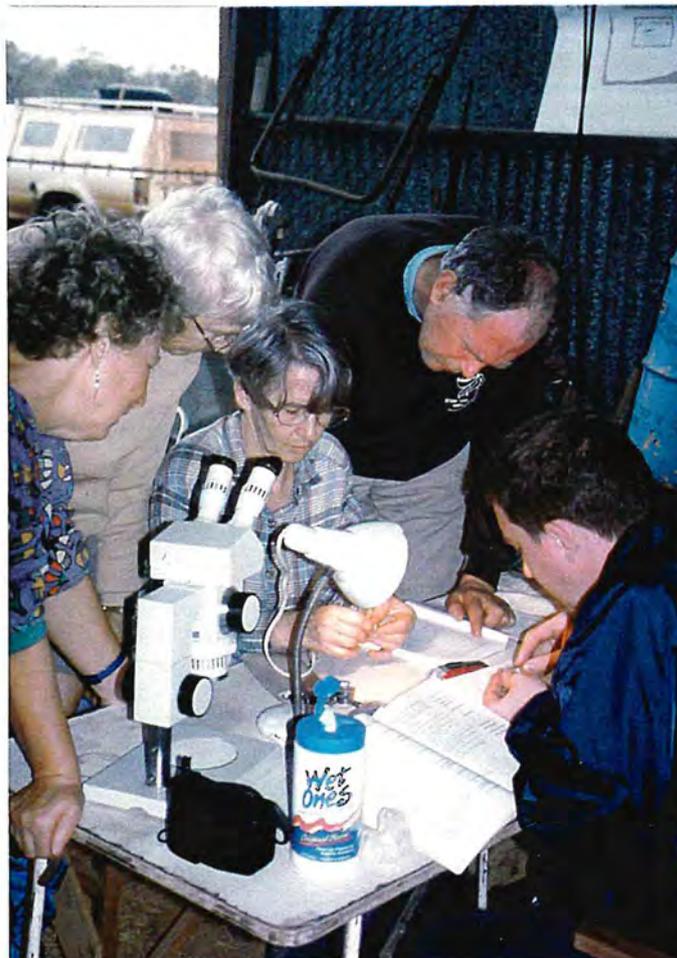
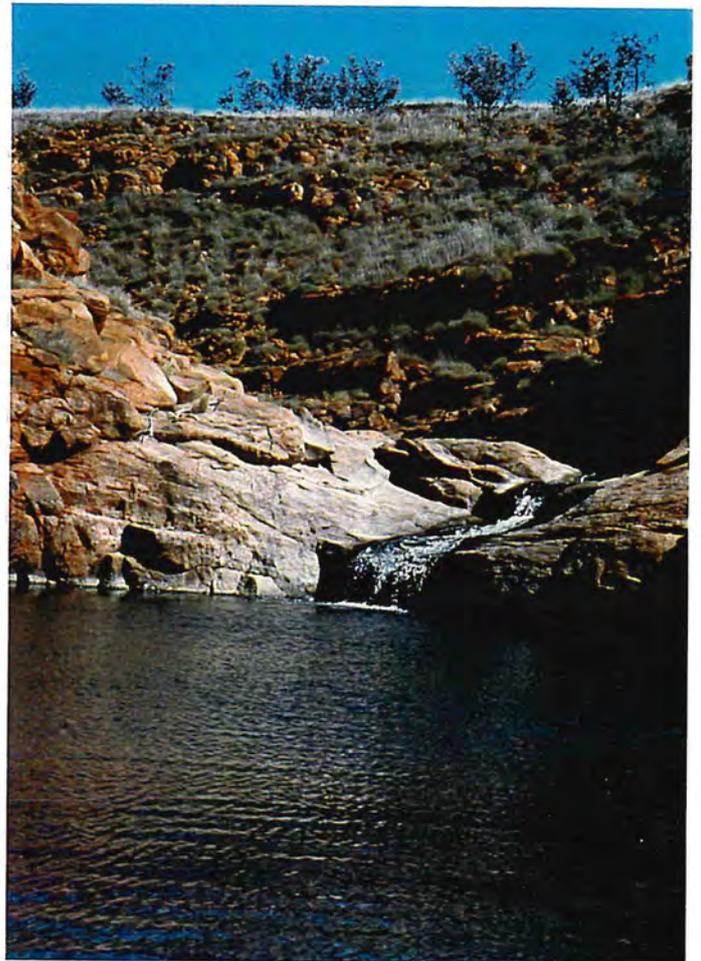
Zyzomys argurus

Common rock rat

11(5)

No surprises that all out rock rats came from the rocky carbonate hills at site 11. We should have caught more on other rocky sites, but I am sure they will turn up in the future. Rock rats appear to be a favourite food of northern quolls, and they would certainly be found along the rock wallaby cliffs. With quolls in residence, they would be very wary rats.

Sites	1	2	3	4	5	6	7*	8*	9	10	11	12*	13	14	15	16*	17	18	19	20	other	
<i>Dasykaluta rosamondae</i> Little red antechinus			+			+			+						+	+						
<i>Dasyurus hallucatus</i> Northern quoll																						+
<i>Ningauai timealeyi</i> Pilbara Ningauai				+					+		+			+	+	+					+	
<i>Planigale ingrami</i> Planigale				+								+										+
<i>Pseudantechinus roryi</i> Rory's antechinus				+							+											+
<i>Sminthopsis youngsoni</i> Little hairy-footed dunnart		+	+	+																		
<i>Macrotis lagotis</i> Bilby																						+
<i>Petrogale rothschildii</i> Rothschild's rock wallaby																						+
<i>Leggadina lakedownsensis</i> Lakeland Downs mouse						+								+								+
<i>Mus musculus</i> House mouse		+	+	+					+	+				+	+	+			+		+	+
<i>Pseudomys chapmani</i> Northern pebble-mound mouse							+		+		+											
<i>Pseudomys delicatulus</i> Delicate mouse				+								+		+	+							+
<i>Pseudomys desertor</i> Desert mouse		+	+	+	+	+			+	+				+	+	+			+	+		+
<i>Pseudomys hermannsburgensis</i> Sandy inland mouse				+				+						+	+							+
<i>Notomys alexis</i> Northern hopping-mouse											+			+								
<i>Zyzomys argurus</i> Common rock rat												+		+								



Clockwise from top left:
Stephen van Leeuwen
and David Trigger with
quoll; waterfall at King
Rockhole; Verena Reich,
Jenny, Cleve and Richard
Hassell identifying frogs



From top:
Coolibahs (*Eucalyptus
victrix*) on bank of river
near King Rockhole;
Helen Philpotts, Sue
Clarkson, David Trigger
and Bob Bromilow at
base camp on first day
after heavy rain; bilby
caught at base camp



MURINAE**'NEW' RATS AND MICE***Mus musculus***House mouse**

2(8) 3(1) 4(4) 9(3) 10(1) 13(7) 14(2) 15(3) 17(2) 19(1) 20(1)

16 males (mean 9.5 g, n = 9); 16 females (mean 9 g, n = 12)

The humble house mouse is one of the most successful invaders of our continent. It now lives in all parts of Australia, including the deserts. However, in the arid areas, it is often found to concentrate on those areas in the landscape where productivity is highest. It is no surprise that they are most common around people and houses. We could expect house mice anywhere in the Meentheena area, although they may not fare so well during a long dry spell.

CANIDAE**DOGS***Canis lupus dingo***Dingo**

Australia's native wolf is common in the remote parts of the Pilbara, although it is difficult to know how much domestic dogs have contaminated the genetic integrity of the dingo. Dingos have been in Australia about 4000 years, originally coming from Asia. We saw tracks at many locations, particularly along the river.

FELIDAE**CATS***Felis catus***Cat**

Again, a very successful invader. Cats now live throughout the continent, and are not dependent upon free water to survive. We saw their tracks and scats, but otherwise saw none.

EQUIDAE**HORSE AND DONKEY***Equus caballus***Horse**

A small group of horse were living just up the river from our camp. They are station horses, and will probably be reclaimed for stock work during the final muster on Meentheena, in late 2000. Brumbies (wild horses) are a destructive pest, and are generally not useful working horses after they lose their breeding. Wild horses are controlled by aerial shooting in the Pilbara.

*Equus asinus***Donkey**

Donkey are present throughout Meentheena, although we saw more tracks than animals. They are subject to intensive shooting, and numbers are much lower now than they have been in past years. Again, wild donkey are a pest. Aerial shooting is the only economical means of controlling their numbers.

CAMELIDAE**CAMEL***Camelus dromedarius***One-humped camel**

Camel are very common in the deserts to the north and east of Meentheena. However, contrary to popular belief, camel are quite happy living in more rugged country, and are widespread in the Pilbara. We saw tracks on roads in

the south of the station, and on the flat plains to the west. A large group of camel can drink a tank dry, and bulls have been known to destroy tanks, fences and even windmills. They are consequently destroyed as vermin. Their impacts on natural values are not so great in country like Meentheena, but in the desert large numbers have a very bad impact on natural waters.

BOVIDAE**CATTLE***Bos taurus***Cattle**

Meentheena was an operating cattle station until a year before our expedition, and stock are still on the property. We didn't see a lot of them, but we could see where they had been. Once stock are removed by the past owners, CALM will try to keep the area free of cattle if possible.

AMPHIBIANS AND REPTILES

Our overall list for reptiles is quite respectable. However, partly because of the cool time of year, and also the heavy rain we experienced at the beginning of the expedition, some groups of reptiles were not so well represented as they could be. Many reptiles are much more active in the warm months of the year, so it is not surprising that they were not found.

In terms of frogs, however, we were very lucky with the rain. Many arid zone frogs can stay underground for years if need be, waiting for the rains to come. The *Cyclorana* and *Uperoleia* in particular respond very quickly to rain, and even light showers bring them to the surface. I am not sure whether the rains we experienced were sufficient to trigger breeding; these species usually breed following warm summer rain, usually from cyclones. However, we certainly had enough to allow them to feed and re-hydrate for another long spell below ground.

Reptiles are a difficult group to comprehensively survey. They often hide away out of sight, and many species occur at low densities, which means we only encounter them occasionally. Such species may only be detected after many repeated survey efforts. This is by no means a failure – it is a feature of the reptile fauna of the Australian arid zone. The example of the frogs is a good one – if we experienced dry weather, our survey would never have detected them. We were lucky, and caught nearly 200! This is why surveys are repeated over a period of years, in different seasons.

There are some obvious holes in the reptile data. For instance, we caught no geckos of the genus *Diplodactylus*, which is a large and generally abundant group. Similarly, species like the dragons *Ctenophorus isolepis* and *Pogona minor* were not seen. These are both usually very conspicuous. However, some measure of what a generally hopeless time we had with the reptiles can be gained from looking at where we caught *Ctenotus saxatilis*. This is a species that is very common throughout the Pilbara, and is easily trapped in both pit and Elliott traps. Of the 22 animals we captured, all but two were found while foraging under rubbish in the dump. Only two were trapped on the sites. This indicates that the conditions during our survey were quite unsatisfactory for getting a good look at the reptiles.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	other
MYOBATRACHIDAE –																					
‘Burrowing’ frogs																					
<i>Limnodynastes spenceri</i>	+		+																		
<i>Uperoleia russelli</i>		+	+	+		+			+	+			+	+	+		+	+	+	+	+
HYLIDAE – ‘Tree’ frogs																					
<i>Litoria rubella</i>			+	+	+	+				+		+	+	+				+			+
<i>Cyclorana longipes</i>		+		+	+										+						
<i>Cyclorana maini</i>				+						+		+									+
GEKKONIDAE – Geckos																					
<i>Gehyra purpurascens</i>														+							
<i>Gehyra variegata</i>																					+
<i>Heteronotia binoei</i>													+								+
<i>Rhynchoedura ornata</i>				+																	
PYGOPODIDAE – Legless lizards																					
<i>Delma</i> sp.																					+
<i>Pygopus nigriceps</i>																				+	
<i>Lialis burtonis</i>																				+	+
AGAMIDAE – Dragon lizards																					
<i>Ctenophorus caudicinctus</i>		+	+	+																	
<i>Diporiphora</i> sp.			+																		
SCINCIDAE – Skink lizards																					
<i>Ctenotus grandis</i>										+											
<i>Ctenotus pantherinus</i>			+							+					+		+				
<i>Ctenotus saxatilis</i>									+												+
<i>Lerista bipes</i>										+											
<i>Lerista muelleri</i>																					+
<i>Morethia ruficauda</i>											+			+							
<i>Teliqua multifasciata</i>														+							+
VARANIDAE – Monitor lizards																					
<i>Varanus acanthurus</i>																					+
<i>Varanus eremius</i>										+											
<i>Varanus tristis</i>																					
RAMPHOTYPHLOPIDAE –																					
Blind snakes																					
<i>Ramphotyphlops grypus</i>																					+
<i>Ramphotyphlops pilbaraensis</i>									+												
BOIDAE – Pythons																					
<i>Antaresia perthensis</i>																					+
<i>Antaresia stimsoni</i>																					+
ELAPIDAE – Front fanged																					
venomous snakes																					
<i>Acanthophis wellsi</i>							+														
<i>Demansia psammophila</i>																					+

Table 4. Known plant species richness of study areas within the Pilbara (Halpern Glick Maunsell 2000).

STUDY AREA	SIZE (sq. km)	FLORA SPECIES
Yandi Stage I	13	200
Weeli Wooli Creek	40	251
Yandi Stage II	50	345
Hope Downs Mining area	110	426
Weeli Wooli Area	150	302
Marandoo Mining Lease	200	462
West Angelas Study Area	420	625
Mining Area C	560	422
<u>Meentheena Conservation Reserve</u>	<u>2 387</u>	<u>89</u>
Karijini National Park	6 060	850

FLORA OF THE MEENTHEENA CONSERVATION RESERVE

The Meentheena Conservation Reserve is located in the Pilbara Biogeographical Region of north-western Australia. The bioregion conforms to the boundaries of Beard's (1975) Fortescue Botanical District. This natural region is characterised by extensive plains and mountainous rugged ranges with generally shallow, skeletal stony soils which supports a vegetation dominated by tree and shrub communities that chiefly comprise eucalypts and acacias over spinifex (*Triodia*) grasses. As a rule the flora of Meentheena conforms with Pilbara expectations.

The flora of Meentheena is poorly known, a feature typical of the east Pilbara. Prior to the Expedition only 31 plant vouchers from the Reserve were present in the WA Herbarium collection. These specimens represented only 23 species, most of which are ubiquitous plants throughout the Pilbara, if not the entire Western Australian arid zone. In addition to these vouchered specimens, Agriculture WA had recorded another 66 species on the Reserve during its rangeland inventory and condition assessment. Therefore prior to the Expedition 89 species were known to occur on Meentheena. This number is considerably less than expectations given the species richness of other study areas in the Pilbara, as depicted in Table 4. Clearly the Expedition will make a significant contribution to our floristic knowledge and appreciation of Meentheena and the east Pilbara.

Methods

During the Expedition, plant species present on Meentheena were recorded using two opportunistic sampling regimes. Firstly, while undertaking routine fauna sampling activities expeditioners randomly collected plants present in the vicinity of each fauna-trapping grid. Typically this random sampling was confined to within a few hundred metres of the trapping grid, was restricted to the habitat type that characterised the trapping grid and lasted for a duration of up to ninety minutes.

Characteristically the sampling effort for a trapping grid approached 5 person hours although this varied considerably with weather conditions, accessibility to the trapping grid and the productiveness of the traps. Fourteen of the 20 fauna trapping grids on Meentheena were sampled in the manner described.

The second type of flora sampling was entirely opportunistic and comprised expeditioners collecting plant samples as they explored the Reserve. Many of these opportunistic collections were made from the King Rockhole area, along the verge of the Rippon Hills Road, along the Nullagine River in the vicinity of the camp and the abandoned Meentheena homestead and at 'Rock Wallaby Cliff' on the Nullagine River.

To facilitate the development of a comprehensive flora list a locality and name search was also conducted of the Western Australian Herbarium's database (FloraBase) for voucher specimens collected from Meentheena. A brief literature search was also undertaken to determine whether any botanists had previously visited Meentheena and prepared a report detailing the plants observed. Liaison was also undertaken with the Rangeland Survey Branch of Agriculture WA who had visited Meentheena in June 1997 as part of the Pilbara Ranges Project. During this project, which was an inventory and condition survey of the Pilbara's rangelands, five inventory sites were established on Meentheena and records were made of the plant species present at each site.

The classification of plants presented in this report conforms to that currently employed by the Western Australia Herbarium as portrayed in Paczkowska and Chapman (2000).

Results and Discussion

Two hundred and seventy nine plant species were recorded during the Expedition (Table 5). These species were representative of 117 genera from 47 families. One hundred and fifteen herbarium vouchers were collected representing 103 species. These voucher specimens will be lodged in the Pilbara Regional Herbarium (KARR), Western Australian Herbarium (PERTH) and with the

institutions of specialist plant taxonomists in eastern Australia.

Combining the contemporary records obtained during the Expedition with historical records from the Western Australian Herbarium and Agriculture WA indicate that 286 species are now known from Meentheena (Table 5). These species are representative of 118 genera from 47 families. Only seven species (underlined in Table 5) previously recorded from Meentheena were not recorded during the Expedition. Four of these species possess an ephemeral life history and may not have been vegetatively evident during the Expedition or perhaps suitable habitats for these species were not visited. Interestingly, Daphne Edinger and Gilbert Marsh, two well known CALM Volunteers and *LANDSCOPE* Expeditioners, collected all four of these plants in August 1997.

A total of 197 species recorded during the Expedition were new records for Meentheena. It is anticipated that many more species are present and still need to be documented as large areas of the reserve were not visited during the Expedition and many habitats not thoroughly searched. During the Expedition less than 15% of the reserve was visited with localities like the Rippon Hills, Yilgalong Creek and Walgunya Creek being completely overlooked. The expectation of a flora for Meentheena in the vicinity of 450 species is not unrealistic given the reserve size, diversity of habitats and geological complexity. Increasing the current floristic record will be achieved through ongoing surveys, especially of new habitats and areas not already visited and through repeated visits to already surveyed areas at different times of the year when ephemeral and annual plants may be present.

Most of the plants recorded on Meentheena are typical, ubiquitous species found throughout the Pilbara. The grass family (Poaceae) with 44 species was the richest group recorded during the Expedition, which is typical of most Pilbara study areas. Other common elements of the Reserve's flora were peas (Papilionacea), wattles (Mimosaceae), mulla mullas (Amaranthaceae) and daisies (Asteraceae) with 33, 21, 18 and 16 species respectively. By far the most visually obvious plants on Meentheena were spinifex, of which there were six different species. The wattles (*Acacia* species) were also very conspicuous in all habitats with 20 species. Other obvious plants were the eucalypts, especially the River Red gums (*Eucalyptus*

camaldulensis) which fringed the Nullagine River, and the white-barked Snappy gums (*Eucalyptus leucophloia*) which stylishly graced the slope of most hills. The tall majestic paperbarks (*Melaleuca argentea*) bordering most of the pools along the Nullagine River were also an obvious component of the flora of Meentheena.

Given the ubiquitous nature of most plants the flora of Meentheena has limited conservation interest in terms of rarity or endangerment. However, two of the identified species were of scientific, botanical or conservation interest and undoubtedly many of the unidentified taxa will also be of interest once their taxonomic identity can be determined. The two identified species of interest were:

Josephinia sp. 'Mt Edgar Station' (N.T. Burbidge 1194): This undescribed species is known from four collections all obtained from the Mt Edgar–Meentheena area. The species is currently not listed on CALM's Priority Flora List. The species was collected from two localities during the Expedition. One locality was the King Rockhole creekline and the other was adjacent to the Rippon Hill Road at the turn-off to camp.

Stylidium sp. (SVL 4576): This species was only represented by basal leaf rosettes during the Expedition. Subsequent collections obtained by Michael Hughes and Peter Kendrick in September were in very late flower and fruit. Tentatively the species resembles *Stylidium desertorum*, however, until more flowering material is available this cannot be confirmed. The species was recorded from the broad wash area adjacent to fauna grid 20 (near Rock Wallaby Cliff) and represents the fifth collection of this tropical desert species in the Pilbara.

Five non-native plant species were recorded on Meentheena during the Expedition. These species were Buffel Grass (*Cenchrus ciliaris*), Birdwood Grass (*Cenchrus setigerus*), Kapok Bush (*Aerva javanica*), Thornapple (*Datura leichhardtii*) and Wild Gooseberry (*Physalis minima*). A few plants with cosmopolitan distributions throughout the Southern Hemisphere were also recorded on Meentheena like Prickly Saltwort (*Salsola tragus*), Purslane (*Portulaca oleracea*) and Mimosa Bush (*Acacia farnesiana*).

Stephen van Leeuwen & Bob Bromilow

Table 5. Plants recorded from the Meentheena Conservation Reserve (underlined plant names are those previously recorded at Meentheena but not recorded during the May 2000 Expedition).

ADIANTACEAE

Cheilanthes sieberi
Cheilanthes brownii

POACEAE

Amphipogon strictus
Aristida contorta
Aristida holathera
Aristida sp. (SVL 4533)
Cenchrus ciliaris
Cenchrus setigerus
Chrysopogon fallax
Cymbopogon ambiguus
Dactyloctenium radulans
Digitaria sp.
Enneapogon caeruleus
Enneapogon polyphyllus
Enneapogon sp.
Eragrostis cunningii
Eragrostis pergracilis
Eragrostis setifolia
Eragrostis tenellula
Eragrostis sp.
Eriachne aristidea
Eriachne benthamii
Eriachne helmsii
Eriachne ovata
Eriachne pulchella subsp. *dominii*
Eriachne sp. (SVL 4484)
Eriachne sp. (SVL 4580)
Iseilema membranaceum
Paspalidium rarum
Perotis rara
Sorghum sp. (SVL 4528a)
Sporobolus australasicus
Themeda triandra
Themeda sp. (SVL 4536)
Triodia angusta
Triodia epactia
Triodia lanigera
Triodia longiceps
Triodia pungens
Triodia wiseana
Yakirra australiensis
 Genus sp. (SVL 4504)
 Genus sp. (SVL 4507)
 Genus sp. (SVL 4567)
 Genus sp. (SVL 4571)
 Genus sp.

CYPERACEAE

Bulbostylis burbridgeae
Cyperus cunninghamii
Cyperus vaginatus
Cyperus sp. (SVL 4511)
Cyperus sp. (SVL 4575)
Cyperus sp. (SVL 4564)
Cyperus sp.
Cyperus sp.

MORACEAE

Ficus opposita
Ficus platypoda

PROTEACEAE

Grevillea pyramidalis
Grevillea wickhamii subsp. *aprica*
Hakea lorea

SANTALACEAE

Santalum lanceolatum

CHENOPODIACEAE

Dysphania kalpari
Dysphania rhadinostachya
Enchylaena tomentosa
Salsola tragus
Sclerolaena sp. (SVL 4569)

AMARANTHACEAE

Aerva javanica
Alternanthera nana
Alternanthera nodiflora
Amaranthus mitchellii
Gomphrena affinis
Gomphrena canescens
Gomphrena cunninghamii
Ptilotus aevroides
Ptilotus appendiculatus
Ptilotus astrolasius
Ptilotus auriculifolius
Ptilotus axillaris
Ptilotus calostachyus
Ptilotus carinatus
Ptilotus exaltatus
Ptilotus fusiformis
Ptilotus helipteroides
Ptilotus sp. (SVL 4542)

NYCTAGINACEAE

Boerhavia coccinea
Boerhavia gardneri
Boerhavia schomburgkiana

AIZOACEAE

Trianthema cussackiana
Trianthema glossostigma
Trianthema oxycalyptra
Trianthema pilosa
Trianthema portulacastrum
Trianthema turgidifolia
Trianthema sp.

MOLLUGINACEAE

Mollugo molluginis

PORTULACACEAE

Portulaca oleracea

CARYOPHYLLACEAE

Polycarpaea breviflora
Polycarpaea corymbosa
Polycarpaea holtzei
Polycarpaea longiflora

PAPAVERACEAE

Argemone ochroleuca

CAPPARACEAE

Cleome viscosa

DROSERACEAE

Drosera indica

MIMOSACEAE

Acacia ampliceps

Acacia ancistrocarpa

Acacia arida

Acacia bivenosa

Acacia coriacea subsp. *pendens*

Acacia cowleana

Acacia eriopoda

Acacia exilis

Acacia farnesiana

Acacia gregorii

Acacia inaequilatera

Acacia maitlandii

Acacia ptychophylla

Acacia pyrifolia

Acacia retivenea subsp. *clandestina*

Acacia spondylophylla

Acacia sclerosperma

Acacia tetragonophylla

Acacia trachycarpa

Acacia tumida

Acacia victoriae

Dichrostachys spicata

CAESALPINIACEAE

Petalostylis labicheoides

Senna artemisioides subsp. *helmsii*

Senna artemisioides subsp. *oligophylla*

Senna glutinosa subsp. *glutinosa*

Senna glutinosa subsp. *x luerssenii*

Senna glutinosa subsp. *pruinosa*

Senna notabilis

PAPILIONACEAE

Alysicarpus rugosus

Cajanus pubescens

Crotalaria crispata

Crotalaria cunninghamii

Crotalaria medicaginea

Cullen leucochaites

Cullen leucanthum

Cullen martinii

Cullen pogonocarpum

Cullen stipulaceum

Cullen sp.

Desmodium filiforme

Glycine tabacina

Indigofera colutea

Indigofera linifolia

Indigofera linnaei

Indigofera monophylla

Indigofera rugosa

Indigofera trita

Rhynchosia minima

Sesbania cannabina

Sesbania formosa

Swainsona decurrens

Swainsona formosa

Swainsona kingii

Swainsona pterostylis

Swainsona stenodonta

Tephrosia bidwillii

Tephrosia sp. Bungaroo Creek (Met 11601)

Tephrosia sp. 1

Tephrosia sp. 2

Vigna lanceolata

Zornia albiflora

ZYGOPHYLLACEAE

Tribullus hirsutus

Tribullus macrocarpus

Tribulus occidentalis

Tribulus platypterus

Tribulus suberosus

POLYGALACEAE

Polygala isingii

EUPHORBIACEAE

Euphorbia australis

Euphorbia coghlanii

Leptopus decaisnei

Phyllanthus lacunellus

Phyllanthus maderaspatensis

SAPINDACEAE

Atalaya hemiglauca

TILIACEAE

Corchorus aestuans

Corchorus fascicularis

Corchorus laniflorus

Corchorus tridens

Corchorus walcottii

Corchorus sp. (SVL 4512)

Corchorus sp. (SVL 4525)

Corchorus sp. (SVL 4537)

Triumfetta chaetocarpa

Triumfetta micrantha

MALVACEAE

Abutilon fraseri

Abutilon lepidum

Gossypium australe

Hibiscus brachychlaenus

Hibiscus burtonii

Hibiscus coatesii

Hibiscus leptocladus

Hibiscus panduriformis

Hibiscus sturtii

Sida echinocarpa

Sida rohlenae

Sida sp. (SVL 4502)

Sida sp. (SVL 4517)

Sida sp. (SVL 4518)

Sida sp. (SVL 4520)

Sida sp. (SVL 4545)

Sida sp. (SVL 4550)

STERCULIACEAE

Waltheria indica

Waltheria virgata

LYTHRACEAE

Ammannia baccifera

COMBRETACEAE

Terminalia canescens

MYRTACEAE

Eucalyptus aspera

Eucalyptus camaldulensis

Eucalyptus gamophylla

Eucalyptus hamersleyana

Eucalyptus ferriticola

Eucalyptus leucophloia

Eucalyptus victrix

Melaleuca argentea
Melaleuca glomerata

APIACEAE
Trachymene oleracea

OLEACEAE
Jasminum didymum

ASCLEPIADACEAE
Cynanchum floribundum

CONVOLVULACEAE
Bonamia pannosa
Bonamia rosea
Convolvulus erubescens
Evolvulus alsinoides
Jacquemontia pannosa
Ipomoea lonchophylla
Ipomoea muelleri
Polymeria calycina
Polymeria sp. (SVL 4491)
Polymeria sp. (SVL 4560)

BORAGINACEAE
Heliotropium aff. crispatum
Heliotropium heteranthum
Heliotropium inexplicitum
Heliotropium murinum
Heliotropium ovalifolium
Trichodesma zeylanicum

VERBENACEAE
Clerodendrum floribundum

SOLANACEAE
Datura leichhardtii
Nicotiana benthamiana
Nicotiana occidentalis
Nicotiana rosulata
Physalis minima
Solanum diversiflorum
Solanum horridum
Solanum lasiophyllum
Solanum sp. (SVL 4568)

SCROPHULARIACEAE
Peplidium sp. (SVL 4572)
Stemodia grossa
Stemodia viscosa

BIGNONIACEAE
Genus sp. (SVL 4538)

PEDALIACEAE
Josephinia sp. Mt Edgar Stn (NT Burbidge 1194)

MYOPORACEAE
Eremophila latrobei
Eremophila longifolia
Eremophila sp.

RUBIACEAE
Oldenlandia crouchiana
Synaptantha tillaeacea

CUCURBITACEAE
Cucumis melo
Mukia maderaspatana

CAMPANULACEAE
Wahlenbergia tumidifructa

LOBELIACEAE
Lobelia quadrangularis

GOODENIACEAE
Dampiera candidans
Goodenia heterochila
Goodenia lamprosperma
Goodenia micrantha
Goodenia microptera
Goodenia stobbsiana
Goodenia triodiophila
Scaevola amblyanthera
Scaevola sp.

STYLIDIACEAE
Stylidium fluminense
Stylidium sp. (SVL 4576)

ASTERACEAE
Centipeda sp. (SVL 4559)
Chrysogonum trichodesmoides
Ixiochlamys cuneifolia
Ixiochlamys sp. (SVL 4523)
Olearia sp.
Pentalepis trichodesmoides
Pluchea tetranthera
Pterocaulon sphacelatum
Senecio aff. *leucoglossus*
Streptoglossa adscendens
Streptoglossa bubakii
Streptoglossa odora
Genus sp. (SVL 4483)
Genus sp. (SVL 4522)
Genus sp. (SVL 4565)
Genus sp.

VOLUNTEER PROFILES

Susan Clarkson is still a keen participant after several *LANDSCOPE* expeditions. She has travelled widely in pursuit of her other interests, scuba diving and photography but feels this expedition has much to offer in the way of new and interesting scenery, flora and fauna. Another hobby is painting and she hopes to get an opportunity to indulge this interest as well if there are any quiet moments.



Verena Reich describes herself as a rabid gardener of Australian native plants and is a member of the Society of Australian Plants. She is a keen though quite amateur photographer and a member of the Sydney Philharmonic Symphonic Choir.



Cleve Hassell visited the Gibson Desert with us in 1997 and has decided to join this expedition because it sounds interesting – and we hope it lives up to his expectations.



Val Talbot's interest in the natural world has brought her back several times to *LANDSCOPE* expeditions, especially those to the arid regions of Western Australia. She has a busy life running a small agistment centre in Perth and is looking forward to relaxing and being able to pick up the binoculars again for some interesting birding not to mention botanising. Val also paints when she can find the time.

Jennifer Hassell has decided to join her husband and son on this expedition and is looking forward to visiting this remote area and enjoying the solitude and beauty of the bush with not only her family but with people who share a similar interest. She studied zoology and botany many years ago and is interested in the flora and fauna of the bush and is very aware of the fragility of the environment. Because of this she would like to feel that she has contributed to research in this field.



David Trigger is an Anthropologist at UWA and his professional work involves the study of other cultures. He has researched Australian Aboriginal cultures for the past twenty years.



Richard Hassell lives in Singapore and the Nullagine will certainly be a good contrast! Richard works as an architect in the big city and is skilled at sketching and painting. He is interested in biology, natural history and especially evolution. His father Cleve is of course on this expedition as well.



John Tucker participated in the *LANDSCOPE* expedition to the Little Sandy Desert in 1999. John has been travelling in remote desert areas of WA for the last 15 years and first visited the Pilbara area in 1983.

Helen Philpotts has been on two *LANDSCOPE* expeditions – the latest one to the Osmond Ranges and the Bungle Bungles in 1999. Helen has always been interested in camping in isolated areas and the Nullagine River is a place she has not been to before. Her particular interests are birds and wildlife in general and this expedition seems to cover these particularly well.



REFERENCES

The references listed below will provide further information on the geology, fauna and flora of the north-west of Western Australia. This is by no means exhaustive. However, many of these books were used during our time at Meentheena while identifying animals.

Allen, G.R. (1982). *A field guide to inland fishes of Western Australia*. Western Australian Museum, Perth, Western Australia.

Beard, J.S. (1975). Vegetation Survey of Western Australia. Pilbara. 1:1 000 000 Vegetation series. Explanatory notes to Sheet 5. The Vegetation of the Pilbara Area. University of Western Australia Press, Perth, Western Australia.

Bettenay, E., Churchward, H.M., McArthur, W.M. and Northcote, K. H. (1967). Atlas of Australian Soils. Explanatory data for Sheet 6, Meekatharra - Hamersley Range area. Commonwealth Scientific and Industrial Research Organisation, and Melbourne University Press; Cambridge University Press, London and New York.

Cogger, H.G. (1996). *Reptiles and amphibians of Australia*. Reed Books Australia.

Halpern, Glick Maunsell (2000). Hope Downs Rail Corridor Biological Surveys. Unpublished Report ES9779C for Hope Downs Management Services.

Hickman, A.H. (1978). Nullagine, Western Australia. Geological Survey of Western Australia, 1:250 000 Geological Series - Map Sheet SF 51-5 and Explanatory Notes. Geological Survey, Department of Mines, Perth, WA.

Paczkowska, Grazyna and Chapman, A.R. (2000). The Western Australian Flora: A Descriptive Catalogue. Wildflower Society of WA Inc. The WA Herbarium CALM & the Botanic Gardens & Parks Authority, Nedlands.

Storr, G.M., Smith, L.A. and Johnson R.E. (1981). *Lizards of Western Australia*. Volume I, Skinks. University of Western Australia with Western Australian Museum, Perth.

Storr, G.M., Smith, L.A. and Johnson R.E. (1983). *Lizards of Western Australia*. Volume II, Dragons and Monitors. Western Australian Museum, Perth.

Storr, G.M., Smith, L.A. and Johnson R. E. (1986). *Snakes of Western Australia*. Western Australian Museum, Perth.

Storr, G.M., Smith, L.A. and Johnson R.E. (1990). *Lizards of Western Australia*. Volume III, Geckos and Pygopods. Western Australian Museum, Perth.

Strahan, R. (ed.). (1995). *The mammals of Australia*. Australian Museum and Reed Books.

Triggs, B. (1997). *Tracks, scats and other traces: A field guide to Australian mammals*. Oxford University Press, Melbourne.

Tyler, M.J., Smith, L.A. and Johnstone, R.E. (1984). *Frogs of Western Australia*. Western Australian Museum, Perth.

Wilson, S.K. and Knowles, D.G. (1988). *Australia's Reptiles: A photographic reference of terrestrial reptiles of Australia*. Collins, Sydney.