IN THE ENVIRONMENT COURT

AT CHRISTCHURCH **ENV-2011-CHC-95, 97**

IN THE MATTER	of an appeal under section 120 of the Resource Management Act 1991
BETWEEN	**WEST COAST ENT INCORPORATED** *Appellant*
AND	**ROYAL FOREST AND BIRD PROTECTION SOCIETY OF NEW ZEALAND INCORPORATED** *Appellant*
AND	**BULLER DISTRICT COUNCIL AND WEST COAST REGIONAL COUNCIL** *Respondents*
AND	**BULLER COAL LIMITED** *Applicant*

EVIDENCE OF ROD MORRIS

Royal Forest and Bird Protection Society of New Zealand Inc.
PO Box 2516
Christchurch 8140
Ph 03 3659433
Solicitor acting: Peter Anderson

INTRODUCTION

1. My name is Rod Morris. I am a wildlife photographer from Dunedin.

SCOPE OF EVIDENCE

2. I have been asked to prepare evidence that provides a background to the Denniston Plateau. My evidence focuses on the extraordinary flora and fauna, and natural beauty, of the Denniston Plateau. I also provide some images and brief comments in relation to Stockton mine.

3. My evidence is based on:

   (a) information I have gathered over the past two years, including discussions with DoC personnel on the West Coast and further afield, discussions with university academics and government scientists, and personal observations made during six visits into the field on the Denniston Plateau. My trips to Denniston have lasted a minimum of four days and nights apiece. One of those trips was for the Forest and Bird Bioblitz in March 2012.

   (b) a field visit to Stockton Mine as a guest of Solid Energy in mid 2010, and discussions with MBC[1] field staff.

   (c) My understanding of New Zealand's indigenous biodiversity and ecosystem functioning, which derives from my experience set out below.

4. Through the seventies, I worked for the NZ Wildlife Service where I was trained in all aspects of wildlife and fisheries management before specialising in the conservation of protected fauna. During that time, I was a field technician on the plant-animal ecological study of factors limiting takahe in the Murchison mountains. I also searched for and located a number of the last kakapo in Fiordland, working under the late Don Merton, and was a member of Don's Black robin transfer team, which rescued the Chatham Islands black robin from extinction.

5. Then for the following twenty-five years I worked as a documentary maker (producer/director/researcher), for the Natural History Unit (now Natural History

[1] MBC is an environmental management consultancy that is contracted to carry out rehabilitation works at Stockton.

New Zealand) in Dunedin. Two[2] nature documentaries I made at the time are '*Lost World of the Poor Knights*' - which examines the ecological role of reptiles in pollinating plants and dispersing their seeds, and '*Ghosts of Gondwana*' which examines the ecosystem services our nocturnal fauna[3] provide, and how vulnerable these services are to interference from rats[4].

6. For the past ten years I have focussed on science communication. I have co-produced over thirty books with various writers, and provided the photography for most of them. Those most relevant to this evidence include *A Photographic Guide to Reptiles and Amphibians of New Zealand* with Tony Jewell, *A Photographic Guide to Mammals of New Zealand* with Dr Carolyn King, *Collins Field Guide to New Zealand Wildlife* with Terence Lindsey, *Kiwi: A Natural History* with Dr Isabel Castro, and *Rare Wildlife of New Zealand* with Alison Ballance. I am currently working on *A Photographic Guide to Freshwater Fish of New Zealand*, and *Collins Field Guide to the New Zealand Seashore*. I also run my own wildlife photograph library.

7. I am an occasional lecturer at the University of Otago. In the past I lectured on 'story telling' to post-graduate students on the University's Science Communication course. I now give only one lecture a year and that is to the second year Evolutionary Biology students, on the subject of Island Biodiversity.

8. In the last ten years I have led various small nature tours (12-30 people) to Madagascar, the Galapagos (twice), the Falklands and South Georgia (twice) and the Antarctic Peninsula (several times) for various tour operators.

9. I have given 30 talks around the country on the Denniston Plateau and its biodiversity values. I have listened to the comments of hundreds of New Zealanders concerned at what BCL proposes to do to the Denniston Plateau.

[2] Of more than thirty.
[3] Such as short-tailed bats, kiwi, weta.
[4] http://www.nzonscreen.com/title/ghosts-of-gondwana-2001

THE DENNISTON PLATEAU

Image 1: Denniston Plateau

10. Image 1 above shows a view of the entire Denniston Plateau, looking south from Stockton Plateau. The Denniston Plateau sits 600m above the coastal plains (right of frame). The plateau then gradually rises across gentle slopes, to fall away sharply in a steep escarpment (out of view) across the middle of frame. Mt Rochfort[5] (almost centre of frame) perches on this escarpment edge. Some sense of the escarpment itself might be ascertained from the cliffs running across the foreground, where the Waimangaroa River cuts a deep canyon. Perched on this edge (centre right foreground) is the historic Denniston township. The EMP footprint extends across approximately the upper half of the slope delineated by the 'v' shape formed by two gravel roads visible in the centre left middle ground.

Image 2: Denniston Plateau northwest view

[5] Approximately 1100m

11. Image 2 shows the view northwest across the public conservation land on Denniston Plateau on a sunny day. More typically the plateau is windswept, often under snow in winter, and frequently fog bound. This photograph, taken from the gravel road up to Mount Rochfort, shows compact, dense vegetation interspersed with exposed acidic sandstone rock pavements which are a feature of much of the Denniston Plateau. In the far left distance is Stockton Plateau, more than half of which is mined by Solid Energy. In the far centre distance is Happy Valley, where a ten year environmental battle ended with consent being granted to extend mining operations. In the far right distance is Mt William. Solid Energy has recently been granted consent to extend mining operations onto Mt William North.

Image 3: View of the Tasman Ranges from Mt Rochfort

12. The scenic values of the Denniston are accessible, because of an already existing gravel road up on to the summit of Mount Rochfort. From the summit, the land unfolds northward across coal- bearing spurs to the snow-capped Tasman Mountains of Kahurangi National Park (Image 3).

Image 4: Sandstone outcrops

13. Along the escarpment edge, where the EMP is proposed, and up around Mt Rochfort, there are sandstone outcrops and formations that are visually unlike anything found elsewhere in New Zealand (Image 4). These natural sculptures are accessible to any visitor, and reminiscent of the granitic outcrops sought by tourists visiting parts of Australia. They will be destroyed by the EMP.

Image 5: Sandstone pavements

14. Unusual geological formations lie at the heart of the Denniston Plateau's nationally outstanding 'coal measure ecosystem'. Since its formation, millions of years of weathering have scoured soft sediments from the Denniston Plateau, leaving an 'historically rare ecosystem'[6] of bare sandstone pavements (Image 5), with scant pockets of soil where vegetation can gain a foothold. Winter snow adds to the rigors of wind and rain that plants and animals endure in this challenging environment.

15. Where the pavements are not exposed, they may be buried only a few centimetres beneath shallow stony soils, where they form a rock pan - an impermeable barrier - hindering drainage and resulting in saturated soils.

16. As a result, much of the Denniston Plateau functions as a wetland.

[6] Overmars et al. 1998

Extraordinary vegetation

Image 6: unique vegetation of the Denniston Plateau

17. There are no awe inspiring forest giants on the Denniston, no great kauri, no soaring redwoods striving to reach the light. Here the environment encourages plants to do the opposite, to hunker down and hug the ground out of the wind and elements. In Image 6, a bush which elsewhere might reach a height of 3-4 metres is lucky to reach 50 centimetres on the more exposed areas of the plateau. A 3-4 metre long trunk may develop but across the ground, producing a 'carpet canopy' little more than ankle height at the end of thin and twisted, decumbent branches.

Image 7: Forest & Bird Bioblitz in March 2012

18. Publics interest in Denniston was sufficiently high during Forest and Bird's Bioblitz - which aimed to document the biodiversity of the area - in March 2012, that volunteers were turned away once the number of participants reached 150. Initial expectations were that perhaps 20-30 people would attend. In fact that number of

academics alone turned up, and New Zealanders from as far afield as Auckland and Invercargill took part, together with several interested overseas visitors.

Image 8: *Euphrasia wettsteiniana* (Nationally Vulnerable) and *Forstera makayii*

19. The Bioblitz proved an excellent time to spot several of the Denniston's small and otherwise easily overlooked plants because they were in full bloom, their showy flowers often larger than the tiny plants supporting them!

20. The nationally vulnerable 'eyebright' *Euphrasia wettsteiniana*, is a tiny root-parasite of carpet grass[7]. Another gem was Mackay's large-flowered Forstera, *Forstera makayii*. These flowers (shown in Image 8) display complex multi-coloured patterns overlying simple white flowers – the patterns thought to guide insect pollinators to nectar rewards.

21. Shrubland and tussock grassland plant associations on these elevated plateaux are highly distinctive and not found elsewhere in New Zealand[8]. They are a significant part of the 'complex mosaic of 14 different vegetation/habitat types' found on these coal measures[9].

[7] Alastair Robertson pers com
[8] Overmars et al. 1998
[9] Overmars et al 1998

Image 9: “Dwarf” vegetation

22. While we think of venerable trees as growing *large* with age, we perhaps overlook small ones, but size is no indicator of age on the Denniston Plateau. Here such an extreme environment can encourage even a potential forest giant to remain a ‘dwarf’. Across the plateau, tiny Southern rata trees, (which elsewhere may grow 15 metres tall), are no higher than 30 centimetres (Image 9). Such dwarfs may well be over 100 years old[10].

Image 10: “Dwarf” forests

23. A distinctive component of heathland, rushland and grassland vegetation on Denniston includes the slow growing podocarps. Often small, some are of great age – a yellow-silver pine examined on the Denniston Plateau was aged at more than 400 years old.

[10] Sir Alan Mark, pers com

24. Another podocarp is Pygmy pine[11] (Image 10), which often hybridises with the yellow-silver pine. Pygmy pine is the smallest pine in New Zealand, indeed in the world, with some 'pine forests' on Denniston scarcely reaching ankle height.

Image 11: Remnant forests in gullies

25. Although still low, taller forest with conifers (eg rimu, yellow silver pine, pink pine and Westland celery pine), mountain beech and Southern rata is found in sheltered gullies (Image 11).

Image 12: Rata species

26. Although these forest pockets may be small, they contain a high diversity of vulnerable plants; such as rata (Image 12), which is normally vulnerable to possum-browsing. We found six species of rata on the Denniston Plateau during the Bioblitz – Southern rata (*Metrosideros umbellata*), Northern rata (*M. robusta*), a

[11] *Lepidothamnus intermedius*

local endemic, Parkinsons rata (*M. parkinsonii*), Orange climbing rata (*M. fulgens*), and two white climbing ratas (*M. diffusa, and M. perforata*).

Image 13: Streambank sheltering bryophyte 'stalactites' and our rarest liverwort

27. *Telaranea inaequalis* is a Nationally Vulnerable liverwort which occurs on 'bryophyte stalactites' (Image 13) that are special to the coal plateaux, particularly along stream and river banks. While stalactites like this sometimes grow at cave entrances where there is seepage from cliffs above, the bryophyte composition of cave entrance stalactites is quite different because of the difference in pH of the seepage water[12].

28. Most of New Zealand's most threatened liverworts are at Stockton and Denniston; their high threat ranking is a result of the progressive loss of habitat. This habitat is often measured only in tens of centimetres of area[13].

[12] Shanks pers com
[13] Glenny pers com.

Image 14: Indigenous liverworts

29. The botanist shown in Image 14 is David Glenny - one of the scientists who participated in the Forest & Bird Bioblitz in March. Top centre is *Neogrollea notabilis* (Nationally Endangered), a very rare liverwort found in small amounts on the heathlands of the Plateau including around Trent Stream. Bottom centre is *Pleurophascum ovalifolium,* which has the largest capsules of any NZ moss - 'Guinness book of records' stuff. Dr Glenny has only found this moss three times in twenty years[14] – he found it on the Bioblitz and proudly showed it to his team.

Image 15: Aquatic moss beds

30. I am not an expert on bryophytes (the mosses and liverworts) but in many of the streams on the Denniston Plateau there are extensive bryophyte beds that are so noticeable that they are a very distinctive character of the waterways (Image 15). Based upon their colour and form, there are obviously several different species.

Extraordinary fauna

[14] Glenny pers. com.

Image 16: “Giant” invertebrates of the Denniston Plateau

31. Just as ‘dwarf’ forests are a feature of the Denniston, so are ‘giant’ invertebrates.

32. There are several giant autumn emerging moth species on the Denniston Plateau. The Genus *Aoraia* (Image 16) is ‘of striking size and appearance’[15]. Aoraia is a ‘terminal taxon’ - isolated taxonomically and unique to New Zealand[16]. Its caterpillars are extremely long-lived, hiding in deep underground burrows for up to 3 years, usually in moist soils in upland bogs, tussock grasslands, or on forested ridges. Yet the adult is extremely short-lived, usually surviving in this form for only a matter of days (adults have no functional mouthparts and so cannot feed). These moths usually emerge on ‘flight nights’ – often en masse and typically in rain or mist. Their flight activity period is over in less than an hour.

33. Aoraia shun light and love humidity, and the same holds true for many of Denniston’s other giant invertebrates - the giant forest weta, the giant landsnails, the giant earthworms, the giant leaf vein slugs and the giant flatworms. All prefer to come out on dark, damp or wet nights… precisely the time when most of us prefer not to be about. As a result, these giant invertebrates can be surprisingly difficult to find.

Image 17: West Coast Forest Weta

34. To get a better sense of the ‘hidden wealth’ of the Denniston Plateau, it is better to go out on warm, wet, nights. Two large tree weta species are more active on damp humid nights - the common ‘Wellington’ tree weta, and the Giant ‘West Coast’

[15] Dugdale 1994
[16] Dugdale, 1994

forest weta (seen in Image 17 for scale and in Image 18 below) and for some reason are surprisingly common up on Denniston.

35. The West Coast forest weta is about the same size as a giant weta. Giant weta are extremely uncommon on the mainland of NZ today due to rat predation. Big weta like the Giant weta and West Coast forest weta make rat-sized holes in the trees: if there are rats about, they will walk in and eat the weta. On the Denniston Plateau, these big forest weta are so common in places that I have found them living in holes on the ground, and every stunted mountain beech trunk seems to have its own occupied hole.

Image 18: West Coast Forest Weta on Dracophyllum

36. Normally these weta browse up in the foliage at night but I have seen them on the ground, and even out in the tussock on damp nights.

Image 19: Big insects in little forests...

37. Image 19 sums up the unique nature of the Denniston Plateau for me: slow growing 'dwarf' trees with oversized 'giant' invertebrates. In this case, a male West Coast giant forest weta – normally a tree climber - is shown out in the open up on Mount Rochfort, following a female weta through the tussocky ground cover beneath a stunted yellow-silver pine.

Image 20: Velvet worm

38. So far three different species of peripatus, or 'velvet worm' have been documented from the Denniston Plateau[17]. This diversity may be unrivaled elsewhere in this country[18] . Image 20 shows *Pepiatoides novaezealandiae*, a live-bearer (the other two are egg layers - one of them undescribed).

39. Peripatus' 'pedigree' goes back 540 million years, to when its ancestors first left the oceans during the 'Cambrian Explosion'. In a sense it is a living fossil far older than tuatara. The individual shown in Image 20 is walking across a perfectly preserved leaf fossil embedded in a slab of mudstone from Conglomerate Stream on the Denniston Plateau. The leaf fossil is from the Eocene, 40 million years ago - a period when the plateau was much warmer than now, indeed 40 million years is around the time the plateau itself was formed. The leaf fossil is extremely well preserved: its cuticle remains intact allowing accurate identification (yet to be performed). The quality of the leaf fossils is an indication that these mudstones

[17] George Gibbs pers. com
[18] Dianne Gleeson pers com

may contain rare and valuable insect fossils from our past as well[19]. As far as I am aware, the Denniston Plateau is yet to be visited by any paleontologist.

Image 21: *Powelliphanta patrickensis*

40. More than four dozen localised types of *Powelliphanta*, a genus of large predatory land snails, are endemic to NZ. These giant molluscs may live for twenty years or more[20]. Almost all taxa of *Powelliphanta* occupy small ranges, usually the tops of small peaks and along ridge lines where humidity is higher than at lower altitudes. The shells of most are strongly patterned and brightly coloured. One of these, *Powelliphanta patrickensis* (shown in Image 21 above) lives on the upland plateaux of Denniston and nearby Stockton. A second species - *Powelliphanta augusta*, was only scientifically described in 2008[21] and was displaced from its small range on Mt Augustus by Solid Energy's mining operations.

Image 22: *Powelliphanta patrickensis* eating an earthworm

[19] Uee Caulfuss pers com
[20] Kath Walker pers. comm.
[21] Walker et al 2008

41. *Powelliphanta* appear to be obligate carnivores[22]. Where I have observed prey animals being eaten in the wild, these were always unidentified species of native earthworm, often engulfed whole.

Image 23: *Powelliphanta patrickensis* with eggs

42. *Powelliphanta augusta* is distinct from *Powelliphanta patrickensis*, with a unique combination of shell banding pattern, colour,size and shape. Both *Powelliphanta* taxa lay on average 2-5 large hard-shelled eggs (Image 23) in a 'nest' over a period of days, mainly in spring, though some eggs may be laid throughout summer[23].

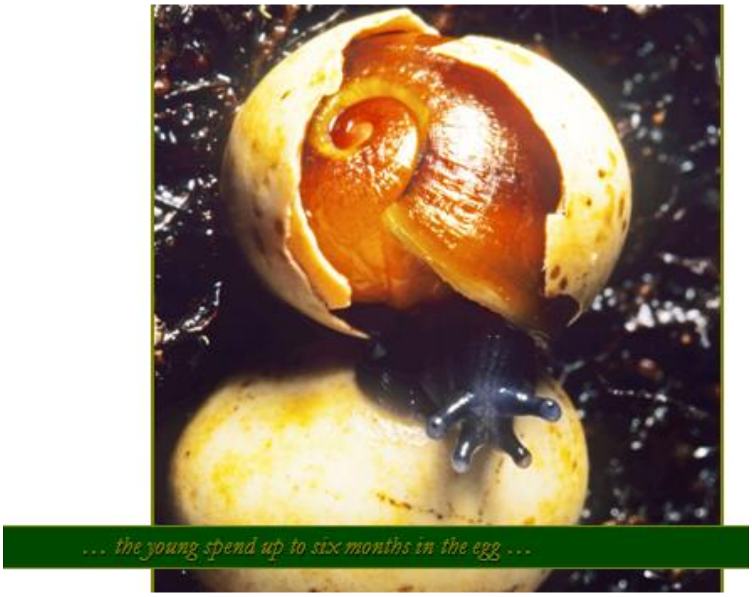

Image 24: Young *Powelliphanta patrickensis* hatching.

[22] Carnivores which depend on the nutrients only found in animal flesh for their survival.
[23] Walker et al 2008.

43. In Image 24, a hatchling *Powelliphanta* finally emerges from the hard-shelled egg in which it has developed for eight months. By rasping a line around the 'waist' of the shell from the inside over many nights it has succeeded in weakening the shell, causing it to break open, but it will be several weeks more before it leaves. 'Camped' within the collapsed shell it will continue to consume the valuable limy eggshell in order to strengthen its own tiny shell, before heading off from the nest.

44. The solid eggshell, unusual in most modern snails which have gelatinous eggs, may be a defense against predatory flatworms (Image 25).

Image 25: Flatworm and *Powelliphanta*

Image 26: Flatworm preying on *Powelliphanta*

45. There are many earthworm predators on the Denniston Plateau. Some even attack each other. When these two invertebrate predators go head to head there is only one winner, and so the Denniston giant land snail ducks for cover. Flatworms can outpace their cumbersome competitors and have a range of strategies for attacking them, including coiling around them like a snake and smothering them

(Image 26), or flipping them over and pouring digestive juices into the shell aperture.

Image 27: Native earthworms

46. With more than 30 earthworm species recorded from Denniston[24] (three shown in Image 27), there is a 'smorgasbord' of earthworms available as a food source for both vertebrates and invertebrates.

Image 28: Forest ringlet butterfly

47. The beautiful, yet normally uncommon forest ringlet butterfly (Image 28) was regularly seen in small forested pockets on the Denniston Plateau during the Bioblitz. Introduced Vespula wasps are in very low numbers on the Denniston Plateau and the immediate surrounding forests, despite being major ecological

[24] Boyer et al 2012

pests throughout beech forests over much of the rest of the northern South Island. The very low numbers of introduced wasps may be contributing to the survival of forest ringlets up there[25].

Image 29: Giant dragonfly nymph

48. The Plateau is home to an abundance of large flightless terrestrial invertebrates, many of which I've seen and photographed, such as the previously mentioned giant West Coast tree weta, a large flightless stag beetle[26], and large and widespread terrestrial nymphs of the giant dragonfly[27] (Image 29).

Image 30: Harvestman

49. In addition to the many named and described invertebrate species known to be vulnerable to rats, there are a number of undescribed invertebrate species which we would undoubtedly have lost before they were even discovered, were rat

[25] Evidence of Richard Toft.
[26] *Geodorcus helmsi*
[27] *Uropetala spp* - possibly both *U. carovei* and *U. chiltoni:* The nymphs are identical, both habitats are occupied by nymphs and the Denniston Plateau lies within the altitudinal range range of both species: Rowe et al, 1987

numbers higher. The large opilionid (leg span 120mm) shown in Image 30 was unknown to science when I photographed it[28]. It belongs in the new Genus *Forsteropsalis*, but its discovery came too late to make it into the revision of this Genus by Taylor in 2011.

50. A particularly aggressive Uliodon species on the Denniston is undescribed[29], yet it is widespread across the plateau and known to many visitors because of its distinctive threat display. When mishandled these spiders inflict a very painful bite.

Image 31: Streambed

51. Surprisingly while the ground is rich in large invertebrates, the streams are impoverished with no freshwater fish –not even eels, comparatively few stream invertebrates and no aquatic water weeds. Because of the nature of the acidic sandstones overlying the plateau the water is slightly too acidic perhaps for many stream invertebrates.

[28] Taylor pers com.
[29] Raven pers com

Image 32: Koura preying on native earthworm

52. The exception is koura, or freshwater crayfish, which are quite abundant. I have observed surprisingly large individuals in the deeper forest pools of Trent Stream. These animals are omnivorous scavengers, feeding on small invertebrates, pieces of organic detritus and probably mainly on plants[30], but I have also observed them feeding on earthworms in the bottom of pools at night.

Image 33: Great spotted kiwi

Image 34: Great spotted kiwi chick

53. Large invertebrates such as weta, snails, leaf vein slugs, Aoraia moths, and earthworms are important foods for Great spotted kiwi. On Mount Rochfort, I have consistently heard Great Spotted kiwi calling at night in the area quite high up between Rochfort and Conglomerate Stream. I have also heard them calling in the

[30] Chapman et al 1976

forest up in Trent Stream. Great spotted kiwi are Nationally Vulnerable, and are said to be declining by about a rate of 2% per year[31].

Image 35: Regionally distinct form of great spotted kiwi

54. This image shows the typically much darker plumage colouration of the regionally distinct form of Great spotted kiwi found only in the Buller Region.

Image 36: Forest birds of the Denniston Plateau

55. A range of forest birds which I would not normally have expected to see are present in forested pockets on the Plateau (Image 36). I have encountered fernbirds, South Island kaka and robins within the forested Trent Stream catchment.

[31] Holzapfel et al 2008

Image 37: 'Denniston' skink

56. We know next to nothing about the habitat requirements and the life history of the 'Denniston' skink (Image 37). It is the least understood of three reptiles living on the Denniston Plateau. Only five individuals have ever been found. Currently taxonomists regard it as a form of the Speckled skink (*Oligosoma infrapunctatum*), which is a skink from central New Zealand that has radiated into a series of distinctive forms around the central North and South Islands. We need to do more homework on the Denniston skink, but from glimpses of it across the Plateau it seems widespread.

Image 38: Skink-hunting

57. Lizards are, however, an important part of the character of New Zealand's fauna - particularly geckos. Two reptile scientists who attended the Bioblitz were extremely interested in forming a clearer picture of reptile presence and abundance on the Denniston. One of them, Dr Marieke Lettink brought along her 'lizard' dog Manu, who has been trained in the finding of lizards (Image 38).

Image 39: Skink discovery

58. Manu doesn't disappoint, and nosed out two green geckos on the ground amongst the dwarf and stunted plateau vegetation - an unusual habitat for a green 'tree' gecko. This particular species, the West Coast green gecko, or 'mossy' gecko, is beautifully camouflaged and a notoriously difficult species to locate without appropriate techniques. The Denniston Plateau has the best known example of a population of this species[32].

Image 40: Green gecko

59. New Zealand and Madagascar share the distinction of having the only day active green geckos in the world. By far the majority of the world's species are typically nocturnal, and coloured a dull brown or gray (this is why New Zealand has such a problem with reptile poachers – they seek out our colourful geckos).

[32] Evidence of Mandy Tocher.

60. On the ground, this female green gecko (Image 40) relies on her camouflage to escape predators, but avoiding detection has become more difficult for reptiles on the ground since introduced mammals have arrived in NZ. Found by Manu during the Bioblitz, this female is heavily gravid: probably with twins. NZ geckos are utterly unique in this respect, as the rest of the world's geckos all lay eggs.

Image 41: Forest gecko ('blotched' morph)

61. The forest gecko (Image 41 above), is relatively common on Denniston. Unlike the green gecko, it is nocturnal. Despite their name, forest geckos on Denniston are common under rock slabs on the distinctive sandstone rock pavements, and on the sandstone rock outcrops, as well as in their more usual habitat in manuka (and presumably forest). Both forest and green geckos take nectar and fruit as well as eating insects. In areas where reptile numbers are high (and introduced predator numbers low) New Zealand reptiles perform important ecosystem functions, which we normally think of as being performed by the 'birds and bees': pollinating flowers while feeding upon nectar, and dispersing seeds after feeding on the fruits. These two important gecko species will undoubtedly be providing important ecosystem services to fruiting and flowering plant species on the Plateau.

Image 42: “Striped” morph

Image 43: “Striped” morph

62. The Denniston Plateau is the only known home to a polymorphic population of the forest gecko. There is both the typical ‘blotched’ morph (Image 41), widespread on the West Coast and extending through much of the North Island, and an unusual ‘striped’ morph (Images 42 and 43) peculiar to the Denniston Plateau - something not even reported from nearby Stockton. The striped morph has never been encountered anywhere else in New Zealand.

63. Two individuals of the ‘striped’ morph of forest gecko were found during the Bioblitz, along with several examples of the ‘blotched’ morph, causing great excitement. This is because true polymorphism, as is demonstrated in the Denniston forest geckos, is an exciting illustration of natural selection at work. Where there is (as on the Denniston Plateau) a complex mosaic of different vegetation types in close proximity (eight vegetation types amongst pakahi and scrub), polymorphism permits the forest geckos to maintain a variety of forms, some of which will survive better in one habitat than in another nearby habitat.

64. The forest gecko morphs demonstrate what ecologists like Emeritus Professor Sir Alan Mark have been saying for a very long time – and what Overmars et al stated so simply back in 1998; ‘there are unique ecological patterns in this area that are not repeated elsewhere…’[33].

Image 44: Gecko, weta and slug

65. It is actually possible to find several ‘rat vulnerable’ species roosting together at times on Denniston. I have often found several tree weta and giant leaf vein slugs together, and once a forest gecko too - all sharing the same crevice in a fallen manuka log crevice (Image 44).

Image 45: Fungus-covered weta

[33] ‘These environmental factors together with the biogeographical relationships of this area (e.g. affinities with northwest Nelson) have led to the development of the unique ecological pattern present within this area, ecological patterns that are not repeated elsewhere in New Zealand. (Ngakawau Ecological District NZPNA Programme Survey Report No 11, Overmars et al 1998, page 177)

66. During the Bioblitz I paid scant attention to fungi. When I found this dead Giant West Coast forest weta (Image 45) killed by a white Muscardine fungus, I simply took its photo and moved on. Later in the Bioblitz, I showed the photo to Dr Trevor Jackson. He is a Science programme leader at AgResearch, and he suggested that as it was probably undescribed we should go back and collect it. When I said it was just a fungus, he pointed out that it may very well possess qualities useful for science, agriculture or health one day. So we went and collected it.

67. I recently learned of the discovery of a plastic eating fungus, found in the Amazon last year by American University students, a discovery which is claimed to have profound implications for society and science.

68. I look at fungi a little differently these days.

Image 46: View looking south west along the Escarpment edge of the Plateau.

69. After collecting the fungus, Emeritus Professor Sir Alan Mark, Dr Trevor Jackson, and I each found our own quiet places to sit alone and contemplate the end of the Bioblitz, and the end of a stunning sunny day.

70. As I sat right here on the weathered sandstone tors that jut from the escarpment edge, falling away to the old growth forests of the Orikaka far below I took the photograph above (Image 46) to try and capture the essence of the Denniston Plateau that day.

STOCKTON MINE

Image 47: Stockton mine

71. Image 47 shows part of the operating Stockton mine. The ecology of Stockton Plateau is now virtually unrecognisable. It has been stripped of much of its wildlife and natural beauty.

Image 48: ”Vegetation Direct Transfer” vegetation at Stockton

72. The image above shows an area of VDT on the Stockton Plateau four years after VDT had taken place - long enough for any ‘success’ to become apparent. The area shows dead shrubs and small trees with few living plants. Of those plants that do survive, many are flax seedlings which thrive in disturbed soils, and other weedy species such as the introduced pest *Juncus squarrosus*, and gorse.

Image 49: Undescribed giant flatworm

73. This undescribed giant flatworm (Image 49) was discovered within the Cypress mine footprint on the Stockton Plateau in February 2009 – before consent was granted. It has never been found again. I first became aware of this photo when I saw it pinned to the MBC office wall when I visited Stockton in June 2010. Solid Energy told me that creature had been identified as a new species of terrestrial flatworm in the genus Zealandia. This animal may typify the patchy ecological diversity of high altitude coal plateaux, and is an example of how little we know about the ecology of the plateaux.

74. There have also been reports of a large white 'thumb-sized' weta seen by employees of MBC on Stockton several times, but not photographed. Solid Energy and DoC regard the reports as common tree weta, even though no animals have been collected, and creamy or white weta are unknown to science in this country.

CONCLUSION

75. As New Zealanders most of us probably know more about coal than we do about biodiversity, and in a sense the scientific values of the Denniston Plateau have come as something of a surprise to many of us. Recent searches including the Forest & Bird Bioblitz have uncovered a diversity of extraordinary flora and fauna, but also suggest that there is much more yet to be discovered.

76. Expanding mining activity on Stockton has meant the Denniston Plateau is now the last large, relatively unmodified example left to us of the naturally outstanding ecosystems of the Brunner coal measures.

77. If we are to protect our biodiversity nationally, we must preserve the integrity of this remaining area with its distinctive communities and species, and allow the ecosystem functions to continue in an undisturbed manner. In doing so we will have succeeded in protecting what has always been a unique part of New Zealand.

Rod Morris

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