FIELD TRIP REPORT

SOUTHERN SKELETON COAST NATIONAL PARK

21-27 SEPTEMBER 2018

INTRODUCTION

A weeklong field trip was undertaken to the southern Skeleton Coast National Park, concentrating on the area along the C39 road between the coast and Springbokwasser, and the C34/D2302 road from the T-junction with the C39 to Terrace Bay. Soil and landform observations were also made along the C34/D2302 between the Ugab Gate and the T-junction. This trip was undertaken to record the insect fauna, detritus (plant litter), soil microorganisms, reptile population and soil characteristics of the area.

(Map of sampling sites on p.15)

The main objectives were to:

- Collect *Neuroptera* specimens for the PhD project of Gail Morland;
- Collect soil samples and related site information for the PhD project of Elise Nghalipo;
- Collect insect specimens and site information for the Masters project of Nekulilo Uunona;

- Collect data of plant litter on hummocks and site information for the Honours project of Vimbai Marufu;
- Investigate the relationships between geology, landforms and soils, determine the extent of various soils and collect information on desert geomorphological features;
- Investigate reptile (especially snake) diversity.

PARTICIPANTS

Marina	Coetzee	Senior Lecturer, NUST	MC
Gail	Morland	Junior Lecturer, NUST; PhD candidate	GM
Elise	Nghalipo	Junior Lecturer, NUST; PhD candidate	EN
Nekulilo	Uunona	Student, Masters candidate	NU
Vimbai	Marufu	Student, Honours candidate	VM
George	Lyanabu	Student; fieldwork, vehicle & camping support	GL
Kenneth	Morland	Associate: vehicle and camping support	KM
Francois	Theart	Associate; snake / reptile expert	FT

ITINERARY

DATE	ROUTE	ACTIVITIES
21/09/2018	Windhoek – Henties Bay – Ugab Gate – Springbokwasser	• Search for reptiles at Springbokwasser.
22/09/2018	Springbokwasser – C39 & D2302 – Terrace Bay – Springbokwasser; Koigab River	• Selection of sampling sites. • Placement of insect traps and search for reptiles at sites NU1-NU3. • Soil/landform scoping. • Search for reptiles at Koigab River
23/09/2018	Springbokwasser – C39 & D2302 sampling sites; Uniab River	• Placement of insect traps and search for reptiles at sites NU4- NU6. • Hummock data collection at site VM1. • Soil/landform info collection at site VM1. • Search for reptiles at Uniab River. • Set up light trap at camp to see if *Neuroptera* were flying.
24/09/2018	Springbokwasser – C39 & D2302 sampling sites; Torra Bay	• Collection of insect traps and search for reptiles at sites NU1- NU3. • Hummock data collection at site VM1 and EN1. • Soil/landform info collection from VM1 to Torra Bay. • Search for reptiles at Springbokwasser.
25/09/2018	Springbokwasser – C39 & D2302 sampling sites;	• Collection of insect traps and search for reptiles at sites NU4- NU6.

	Terrace Bay; Huab River	• Hummock data collection and search for reptiles at site EN1. • Soil/landform info collection from EN1 to Terrace Bay and to Huab River. • Search for reptiles at Springbokwasser. • Set up light trap at camp to see if Neuroptera were flying.
26/09/2018	Springbokwasser – C39 & D2302 sampling sites	• Hummock data collection at site VM2/EN2. • Soil/landform info collection and search for reptiles from Springbokwasser to VM2/EN2.
27/09/2018	Springbokwasser – Ugab Gate – Henties Bay – Windhoek	• Soil/landform info collection from Huab River to Ugab Gate.

Two NUST double cab bakkies were used, a 4x4 Nissan and 2x4 Toyota. The total distance covered was approximately 2200 km. The team camped at Springbokwasser campsite, at the eastern entrance to the park.

OUTCOMES

ELISE NGHALIPO

Project: Plant influences on soil biogeochemistry, taxonomic and functional diversity of soil microbial communities in a hyper-arid desert

At site EN1 (20.3726 ^{o}S, 13.3837 ^{o}E; 8.8 km E of C39/D2302 T-junction), 10 hummocks of *Arthraerua leubnitziae* (pencil bush) and 9 hummocks of *Ectadium rotundifolium* were sampled. Soil samples were collected at 0-5cm depth, and there were 7 replicates per hummock. This gives a total of 133 soil samples from site EN1. At site EN2 (20.3818 ^{o}S, 13.3017 ^{o}E; 1.1 km S of C39/D2302 T-junction), 8 hummocks of *Salsola nollothensis* (coastal saltbush / ganna) were sampled. This gives a total of 56 soil samples from site EN2. Other information collected during sampling included hummock position (latitude, longitude), species, length, width, height and distance to nearest hummock.

The soil samples will be used to measure soil carbon pools and the stability of these pools associated with plant hummocks. Additionally, the soil samples will be used to determine taxonomic and functional diversity of soil microbial communities associated with plant hummocks, in order to understand how ecological functions may be altered under climate change future projections in hyper-arid systems. DNA extraction will be done at the University of Pretoria, and the extracts will be shipped for sequencing in the USA.

Salsola nollothensis hummock

Ectadium rotundifolium hummock

Arthraerua leubnitziae hummock

The collected soil samples

NEKULILO UUNONA

<u>Project</u>: Insect diversity, richness, composition & abundance of the Skeleton Coast National Park, Namibia.

Site NU1	15 km from Terrace Bay	20.10737 °S	13.09149 °E
Site NU2	16.1 km from NU1	20.18060 °S	13.19331 °E
Site NU3	15 km from NU2	20.30041 °S	13.22950 °E
Site NU4	15 km from NU3	20.36615 °S	13.32854 °E
Site NU5	15 km from NU4	20.35685 °S	13.47016 °E
Site NU6	15 km from NU5	20.33016 °S	13.60032 °E

180 Pitfall traps containing a 50 % dilution of ethylene glycol and water were placed at 6 sites and collected 48 h later. 90 pan traps containing a 50% dilution of ethylene glycol and water, were also placed at these sites.

At each of the 6 sites, 30 pitfall traps (clear plastic buckets) and 30 pan traps (shallow plastic dishes: 10 blue, 10 yellow, 10 red) were deployed. The pitfall traps were placed 10 m apart in 3 transects, each starting 100 m from the road and 100 m long. Transects were 100 m apart. Groups of the 3 colours pan traps were placed every 10 m along one transect. At each of the 6 sites, 30+ sweeps were done using a sweep net, 3 soil samples were collected, vegetation cover was

measured with a line-point method, and a plastic rain gauge was left to be collected in January 2019. A little oil was placed in each rain gauge to prevent evaporation.



A preliminary look showed that the traps caught mostly beetles and ants.

Ten of the 180 pit traps were dug up by jackals and 2 were completely gone.

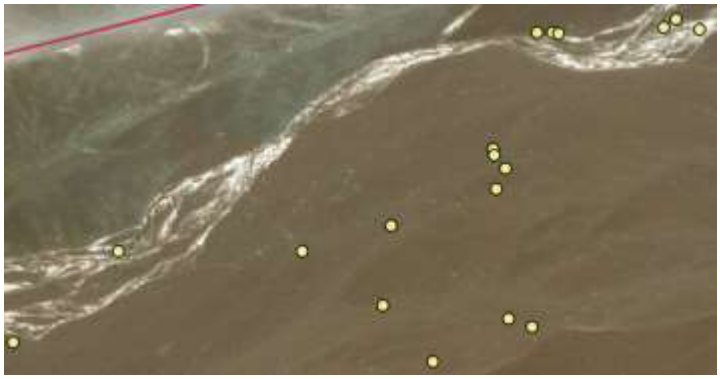
VIMBAI MARUFU

<u>Project</u>: Describing plant litter distribution in the southern parts of the Skeleton Coast National Park

At site VM1 (20.3694 ºS, 13.4145 ºE; 12 km E of C39/D2302 T-junction), 4 *Welwitschia mirabilis*, 35 *Arthraerua leubnitziae* (pencil bush), and 34 *Zygophyllum stapffii* (dollar bush) hummocks were sampled. Plant species, hummock position (latitude, longitude) length (S-N), width (E-W), and height were recorded. A line-point method at 0.5 m intervals was used to record presence and type (grass, root, stem, leaf, seed) of surface leaf litter in an N-S and E-W direction across each hummock, starting and ending 1 m from the edge of the hummock. Furthermore, 10 hummocks were sampled for surface and buried plant litter which method is explained below. These hummocks were small – generally not higher than 1.5 m. This site was chosen for comparing two species under the same variables, since the rest of the hummock fields had one species per landscape.

At site VM2 = EN2 (20.3818 ºS, 13.3017 ºE; 1.1 km S of C39/D2302 T-junction), 10 large *Salsola nollothensis* (coastal saltbush / ganna) hummocks were sampled for litter distribution using the line-point method as explained for site VM1. The hummocks were also sampled for surface and buried plant litter on the upwind and lee sides of each hummock. A 15 cm diameter metal cylinder was inserted 10 cm deep into the soil. Surface litter within the ring was collected and bagged. Soil to a depth of 10 cm was dug out and passed through a 1 mm sieve. Stones and gravel were removed manually, and the remaining plant litter bagged to be dried and weighed back at NUST.

VM1 – line-point sampling



VM1 – excavation sampling

VM2 – excavation sampling

Surface & sub-surface plant litter collection

Line-point measurements

Salsola hummock

Sample before sieving

Larger gravel fragments have to be removed manually

Zygophyllum stapffii
(dollar bush)

Arthraerua leubnitziae
(pencil bush)

Salsola nollothensis
(coastal saltbush / ganna)

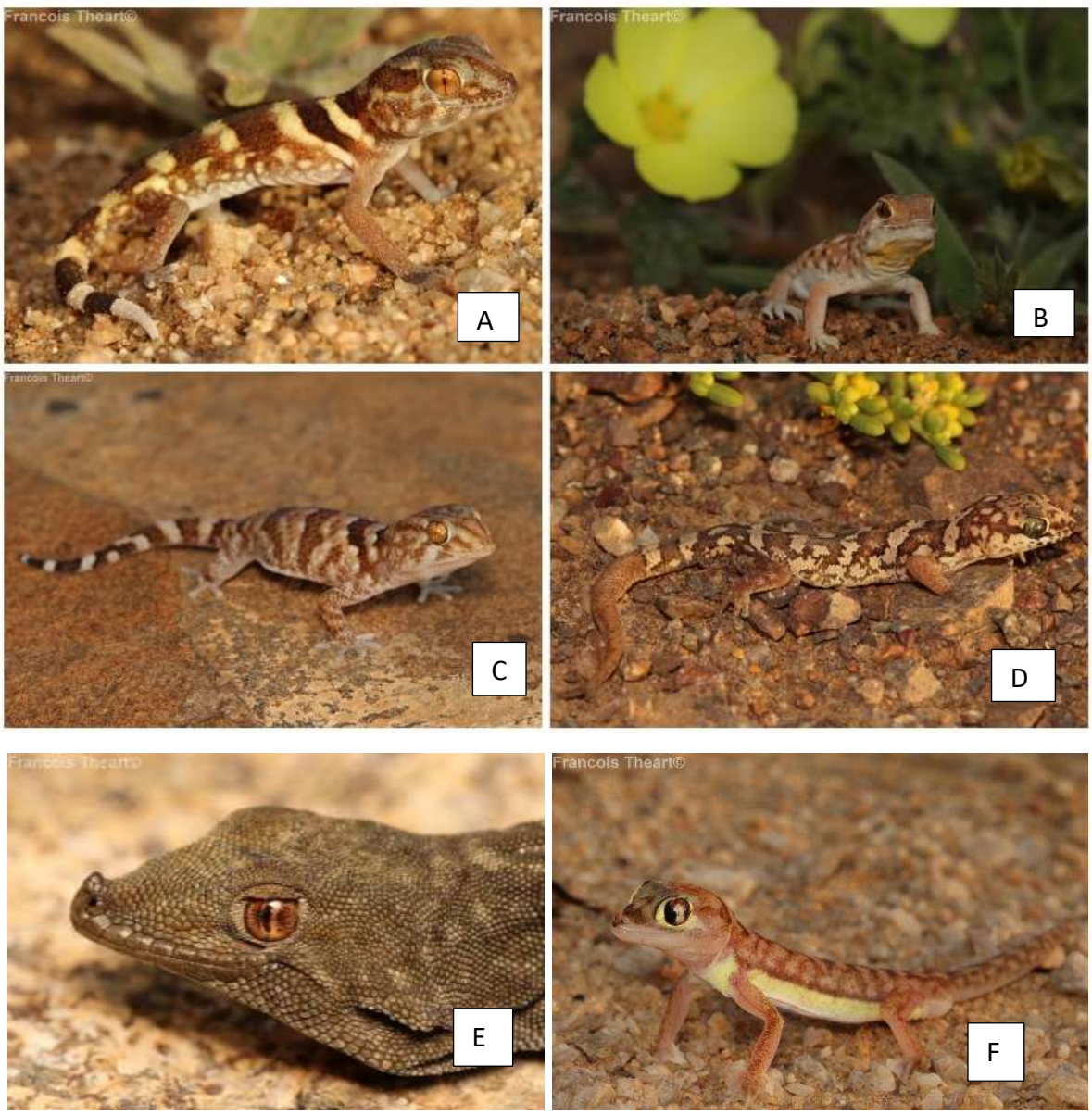
FRANCOIS THEART

A reptile survey was conducted by active searching, both at night and during the day. Active searching included flipping rocks, covering likely areas, searching in rock cracks and by torch light at night. Species encountered were captured and photographed before being released.

Although only a relatively small portion of the total area was covered during the five-day period, most of the different habitat types were targeted to record the species expected to occur in the Skeleton Coast National Park. A total of 6 gecko, 5 lizard and 4 snake species were recorded. Compared to records from localities further north, one may expect several more species. The SCNP has been relatively poorly sampled. The cold weather and limited time in the field contributed to the small sample size. Therefore, there is the possibility of recording more species than expected and possible range extensions with future surveys.

The following species were recorded:

<u>6 x Geckos:</u>



A - Giant Ground Gecko (*Chondroactylus angulifer namibensis*)
B - *Chondrodactylus laevigatus*
C - Sherz's thick-toed gecko (*Pachydactylus scherzi)*
D - Bradfield's day gecko Day Gecko (*Rhoptropus bradfieldi)*
E - Barking Gecko (*Ptenopus garrulus maculatus*)
F - Namib web footed Gecko (*Pachydactylus rangei*)

5 x Lizards

A - Plain Sand Lizard (*Pedioplanis inornata*)
B - Namaqua Sand Lizard (*Pedioplanis namaquensis*)
C - Three Striped Skink (*Trachylepis occidentalis*)
D - Variegated Skink (*Trachylepis variegata*)
E- Reticulated Desert Lizard (*Meroles reticulatus*)

4 x Snakes

A - Horned Adder (*Bitis caudalis*)
B - Western sand snake (*Psammophis trigramanus)*)
C - Peringuey's adder (*Bitis peringueyi*)
D - Western Keeled Snake (*Pythonodipsas carinata*)

MARINA COETZEE

Relationships between the geology, landforms and soils were investigated. It was confirmed that gypsisols are widespread along the entire coastline from the Ugab River to Terrace Bay and from just beyond beaches to approximately 30 km inland. At that distance, calcium carbonate becomes more dominant than calcium sulphate, thus Calcisols, and petrocalcic horizons (calcretes) take over from petrogypsic horizons (gypcretes).

Indurated gypsic crust

Gypsisol

Saltpans were relatively dry and only Solonchaks were found therefore no Solonetz. The remainder are Arenosols of the sand dunes; Fluvisols, unconsolidated Arenosols and Regosols along river courses; Leptosols, where only a thin layer of soil covers bedrock and there is not enough gypsum or calcium carbonate to key out as Gypsisols or Calcisols; and small pockets of Regosols wherever colluvial material accumulated at time, as at the foot of mountain or hill slopes. Hummocks are mainly composed of fine sand (thus Arenosols) or silt, thus Regosols (if there is no clear horizon development) or Cambisols (if there is incipient horizon development).

Salt pan, filled by seepage and overtopping of sea water during spring tides

Wind-exposed salic horizon of Solonchak on surface of salt pan

Excellent examples of various soil and geomorphological features were found, confirming interpretation of satellite images and the rather sparse information found in literature. A few examples are shown below:

Palaeo marine terrace, indicative of previous higher sea level

Granitic bedrock exposed by aeolian action

Silty vesicular crust under desert pavement

Accumulation of heavy minerals in sand ripples and along the base of a rock, due to gravitational sorting

Salt weathering

Salt Weathering

Ventifacts – wind-shaped and/or polished rocks and stones

GAIL MORLAND

<u>Project</u>: The diversity and geographic distribution of *Neuroptera* in the Iona-Skeleton Coast-Kaokoveld Transfrontier Conservation Area, Namibia

The very strong and cold wind precluded any collection of *Neuroptera*. The light trap was deployed two evenings when the wind was not so strong, but only two moths and a wasp were trapped.

OTHER BIODIVERSITY OBSERVATIONS

MAMMALS

Mammal occurrences were recorded with the EpiCollect app. These included numerous springbok, two oryx, one brown hyaena, several black-backed jackals, one hare (Cape hare?), one elephant shrew. At night we heard lion, jackal and spotted hyaena. Jackal and brown hyaena tracks were found at all sampling and observation sites, on the pediplains, in washes, at wetlands and around saltpans. Lion tracks were found to the east of site EN1 and between our campsite and the Koigab River.

BIRDS

The team did not include experienced birders, but noted in passing the following birds: Ostrich (only one female), Rüppel's korhaan, Namaqua sand grouse (kelkiewyn), pied crows, Ludwig's bustard, and blacksmith lapwings.

Cormorants and gulls were common along the coast. Flamingos, cormorants, gannets and ducks were seen at the Huab Lagoon. Two Cape Teal ducks were found at open water in one of the Uniab River's channels.

A few barn swallows were seen and a spotted eagle owl was heard at the campsite.

INSECTS

Just from active sampling in the area, we trapped two tenebrionid species, a Pyrrhocoridae (*Dysdercus nigrofasciatus*), a Formicidae, Carabidae and a Libellulidae (*Truthemis annulata*).

ARACHNIDS

Spiders: Venomous six-eyed sand spiders are common.

3 x Scorpions:

A – *Lisposoma elegans*

An uncommon scorpion that is rarely seen.

B – Black Hairy Thick-tailed Scorpion (*Parabuthus villosus)*

A common scorpion in Namibia, may have yellow legs. Stings should be treated at a hospital. This species lives under rocks and can be found moving around during the day.

C – Rock Scorpion (*Hadogenes zumti*)

A large, but harmless scorpion that is widespread across Namibia into Angola. Males have elongated tails. This genus lives in rock cracks and is seldom seen.

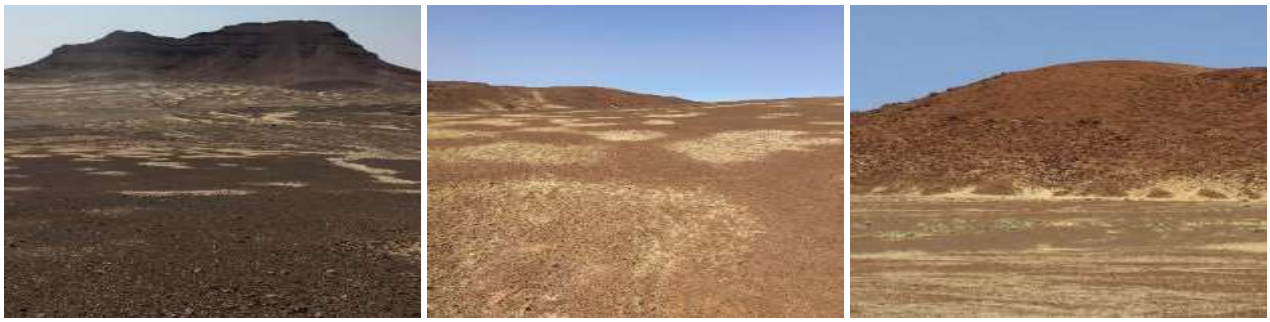
PLANTS

Welwitschia were found from Springbokwasser to about 13 km from the coast.

Welwitschia mirabilis

A surprising amount of dry grass is present quite close (< 17 km) to the coast.

Grass circles occur near 20.3568 ^{o}S, 13.5068 ^{o}E, $\pm$ 26 km from the coast. The soil of these circles is softer with less structure than surrounding soil – containing gypsum that is more powdered and less gypsum-cemented clods. It seems to be a consequence of the presence of grass roots, not the other way around.



It is clear that grass concentrates wherever soil is somewhat deeper, as at the foot of hills and in shallow depressions.

Salsola sp. were only found quite close to the coast – within the first 10 km. Apart from the coastal hummocks that occur just beyond beaches, hummock fields are associated with current or palaeo water courses. The large *Salsola* hummocks (brown polygon) just south of the C39-D2302 T-junction, for instance, must tap deep into groundwater from an old water course that had terminated in the salt pan to the west of the hummock field (orange polygon).

Only one large !Nara (*Acanthosicyos horridus*) hummock was found at a sampling site, with some small offspring in its vicinity – all dead.

Salvadora persica occur in the Koigab River bed, but not at our sampling sites. They only start appearing further inland.

Tamarix usneoides were only observed in the Ugab River, not in any of the other rivers; at least not within view of the D2302.

Nicotiana glauca were seen from the road in the Ugab River. None were observed at any of the sampling sites.

Numerous flowering forbs and succulents were observed along the entire stretch of road from Springbokwasser to close to the coast. (See photos on pp.16-18).

Among the grasses, *Stipagrostis uniplumis* and *Aristida* species were abundant.

CHALLENGES

All objectives were met, with the exception of *Neuroptera* collection. Insect collection is highly dependent on the weather. It was too cold and windy on this trip to collect any *Neuroptera*, and even the pitfall and pan traps did not collect many insects.

The Nissan bakkie had two slow punctures that had to be fixed in Okahandja, and one tyre was lost close to Torra Bay. A sharp stone on the newly-graded road cut the sidewall. One running board broke off. There were signs of rust at the break. The air conditioner stopped working on the way back to Windhoek. One diesel can's seal was leaking.

It was a real challenge to fit all the fieldwork and camping equipment, food, bedding and personal luggage of eight people into the canopies of the two bakkies. There was a small roof rack on the Nissan, that could be used in conjunction with bungee cords, straps and a cargo net, but no way to secure anything on the roof of the Toyota. Returning from the trip, we had to find extra space for the liquid-containing insect traps, soil samples and leaf litter samples. It may be advisable, if we have to rely on NUST vehicles in future, to take no more than three people per car.

The participants would like to express our gratitude to the SCIONA Project for granting us this outstanding opportunity for research and gaining experience.


Terrace Bay
Dune Point
Decca Bay
Steenbras Rif
NU1
Sementblok
NU2
Uniab River Mouth
Uniab
NU3
Torra Bay
T-junction C39 C34
EN2 /VM2
NU4
EN1
VM1
NU5
NU6
Springbokwasser

Pentzia (*hereroensis*? *tomentosa*?)

Heliotropium tubulosum

Helichrysum roseo-niveum

Helichrysum roseo-niveum

Merremia guerichii

Monechma cleomoides

Hermbstaedtia spathulifolia

Hermbstaedtia spathulifolia

Euphorbia phylloclada

Euphorbia phylloclada

Citrullus ecirrhosus (tsamma)

Mesembryanthemum cryptanthum

Larryleachia marlothii ?

Hoodia (ex *Trichocaulon*) *pedicellata*

Kleinia longiflora

Zygophyllum simplex

Phragmites sp.

Monsonia umbellata

Aloe sp.

Scirpoides dioecus?
Cyperus sp.?

Acrotome inflata

Tetraena (ex *Zygophyllum*) *clavatum*

Author: Marina Coetzee, with contributions from Gail Morland, Elise Nghalipo, Nekulilo Uunona, Vimbai Marufu and Francois Theart.