

# Reptiles and Amphibians of the Addo Elephant National Park

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The results of a survey of the reptiles and amphibians of the Addo Elephant National Park (AENP) are presented. A total of 49 species, comprising 16 amphibians, 14 lizards, 15 snakes and 4 chelonians, occur in the AENP. Observations on the biology and distribution of these species in the AENP are given, and the relative composition and diversity is compared with the herpetofauna of the surrounding eastern Cape and the more distant Kruger National Park.

The zoogeographic affinities of the AENP herpetofauna are similar to those of the surrounding eastern Cape (i.e. Cape Temperate 46,9%, Temperate – Transitional 16,3%, Eastern Tropical Transitional 10,2%, Western Tropical Transitional 8,2%, Tropical East Coast Littoral 2,0% and Temperate Wide-ranging 16,3%). Resource partitioning among the AENP herpetofauna is discussed and the conservation status of the species summarised. A list of species that may still be collected within the AENP is included.

Key words: Reptiles, amphibians, ecology, zoogeography, conservation, check list.

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## Introduction

In 1981 a detailed survey was initiated of the reptiles and amphibians inhabiting the Addo Elephant National Park (AENP). Prior to this, specimens had been collected incidentally during routine maintenance and general survey work within the AENP. These specimens were well-preserved but carried minimal documentation. They were stored in the park collection. Upon this base the present survey began. Emphasis was placed on obtaining both biological data to aid in understanding the inter-relationships of the AENP's herpetofauna, as well as compiling a species check list. A preliminary check list and introduction to the common species was presented in the AENP Guide (Branch 1982).

Since its proclamation in July 1931 various aspects of the AENP's fauna and flora have been studied. Reviews of the vegetation (Penzhorn & Olivier 1974), geology (Toerien 1972), small mammals (Swanepoel 1975; Swanepoel & Branch

1982), and birds (Liversidge 1965; Penzhorn & Morris 1969) have appeared. This data and the events leading to the proclamation of the AENP are summarised in the recent AENP Guide (Grobler & Hall-Martin 1982).

The reviews listed above should be consulted for details. A short summary of the park's main features follows.

*Situation:* The park is located approximately 55 km NNE of Port Elizabeth in the Sunday's River Valley (33° 30' S, 25° 45' E).

*Topography:* A long flat-topped ridge (Suurkop – 341 m) dominates the eastern boundary, and is the major prominence in the park. From this the country drops in gently-rolling hills to Caesar's Dam (76 m) in the SW corner. The total area is 7 735 ha (1981).

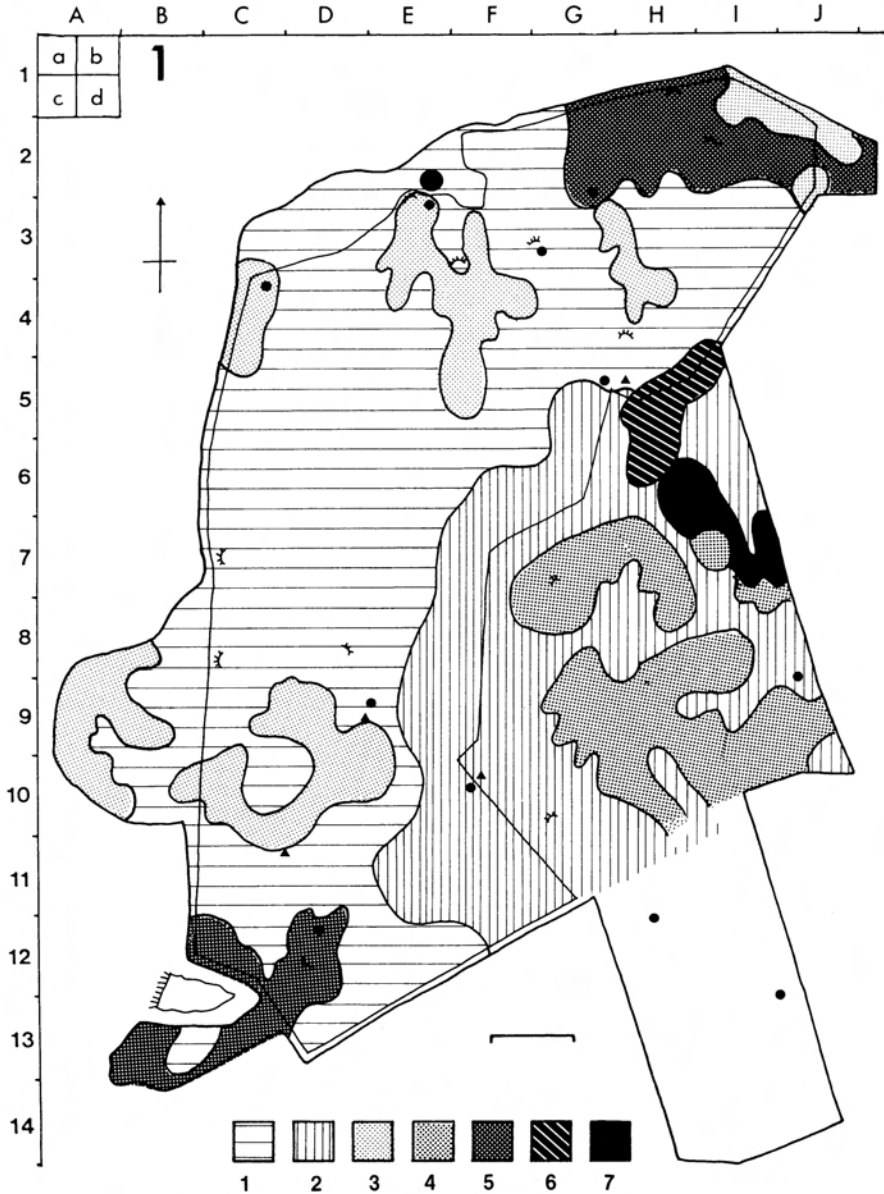
*Climate:* Rainfall (long-term mean 479 mm p.a.) occurs throughout the year, with a major peak in autumn (March–May) and a minor peak in spring (August). Thunderstorms are rare, although heavy rains with occasional floods, are not uncommon. The average daily temperatures are: maximum, 29 °C in January and 21 °C in July; minimum, 16 °C in January and 5 °C in July. Berg winds may push the temperature up to 42 °C, and frost is rare.

*Geology:* The Algoa Basin has been subject to periodic inundations from marine transgressions that date back to the Cretaceous. The latest was at the end of the Tertiary, some 2 million years ago. Most sediments from this period have been eroded away, leaving remnants as outcrops of limestone and pebble beds on the plateau edges of Suurkop. These deposits are still unexposed on the eastern boundary and are covered by wind-blown sands, probably of coastal origin. The greater area of the park is covered in sandy soils derived from sandstone and mudstone.

*Vegetation:* The “Addo Bush” is situated in the Valley Bushveld (Acocks 1953), and can be described as a short, dense, dry forest composed of evergreen, semi-succulent shrub thickets. Archibald (1955) has divided the park into five main plant communities; i.e. Spekboomveld, Karoo Bushveld, Mixed shrubs and grassveld, Bonteveld and Coastal Bush. Spekboomveld can be further subdivided into dry, moist and open categories. The distribution of these plant communities in the AENP is shown in Map 1.

### Check List of the Herpetofauna of the Addo Elephant National Park

- |  |                        |                 |
|--|------------------------|-----------------|
|  | Class Amphibia         |                 |
|  | Order Anura            |                 |
|  | Suborder Ophisthocoela |                 |
|  | Family Pipidae         |                 |
|  | Subfamily Xenopodinae  |                 |
| 1. <i>Xenopus laevis laevis</i> (Daudin, 1802) |                        | Common platanna |
|  | Suborder Procoela      |                 |
|  | Family Bufonidae       |                 |
| 2. <i>Bufo rangeri</i> Hewitt, 1935            |                        | Raucous toad    |



Map 1 Major vegetation types in the AENP (after Grobler & Hall-Martin 1982). 1. Dry Spekboomveld; 2. Moist Spekboomveld; 3. Open Spekboomveld; 4. Bonteveld; 5. Karoo Bushveld; 6. Mixed shrub and grassveld; 7. Coastal Bush

3. *Bufo pardalis* Hewitt, 1935 Leopard toad

Suborder Diplasiocoela

Family Ranidae

Subfamily Raninae

4. *Pyxicephalus adspersus adspersus* Tschudi, 1838 Bull frog  
5. *Tomopterna delalandii* (Tschudi, 1838) Cape sand frog  
6. *Strongylopus grayii grayii* (A. Smith, 1849) Clicking stream frog  
7. *Strongylopus fasciata fasciata* (A. Smith, 1849) Striped stream frog  
8. *Rana angolensis* Bocage, 1866 Common river frog  
9. *Rana fuscigula* Duméril and Bibron, 1841 Cape river frog

Subfamily Petropedetinae

10. *Phrynobatrachus natalensis* (A. Smith, 1849) Snoring puddle frog  
11. *Cacosternum boettgeri* (Boulenger, 1882) Common caco  
12. *Cacosternum nanum* Boulenger, 1887 Bronze caco

Family Hyperoliidae

Subfamily Kassiniinae

13. *Kassina wealii* (Boulenger, 1882) Rattling kassina  
14. *Kassina senegalensis* (Duméril and Bibron, 1841) Bubbling kassina

Subfamily Hyperoliinae

15. *Hyperolius marmoratus verrucosus* A. Smith, 1849 Painted reed frog

Family Microhylidae

Subfamily Brevicipitinae

16. *Breviceps adspersus pentheri* Werner, 1899 Bushveld rain frog

Class Reptilia

Order Squamata

Suborder Sauria

Family Gekkonidae

17. *Pachydactylus maculatus* Gray, 1845 Spotted gecko  
18. *Pachydactylus mariquensis mariquensis* A. Smith, 1849 Marico gecko

Family Chamaeleonidae

19. *Bradypodion ventrale ventrale* (Gray, 1845) Eastern dwarf chamaeleon

Family Varanidae

20. *Varanus niloticus niloticus* (Linnaeus, 1762) Water monitor

Family Lacertidae

21. *Pedioplanis lineocellata pulchella* (Gray, 1845) Ocellated sand lizard  
22. *Nucras taeniolata taeniolata* (A. Smith, 1838) Southern ornate sandveld lizard

Family Scincidae

Subfamily Lygosominae

23. *Mabuya capensis* (Gray, 1830) Cape skink  
24. *Mabuya homalocephala smithii* (Gray, 1845) Smith's skink  
25. *Mabuya variegata variegata* (Peters, 1869) Variegated skink

Subfamily Scincinae

26. *Scelotes anguina* (Boulenger, 1887) Anguine skink

- Subfamily Acontinae
27. *Acontias meleagris orientalis* Hewitt, 1938 Eastern striped legless skink  
 28. *Acontias percivalli tasmani* Hewitt, 1937 Tasman's legless skink  
 29. *Acontias gracilicauda gracilicauda* Essex, 1925 Slender-tailed legless skink
- Family Cordylidae  
 Subfamily Cordylinae
30. *Cordylus tasmani* (Power, 1930) Tasman's girdled lizard
- Suborder Serpentes  
 Family Typhlopidae
31. *Typhlops lalandei* Schlegel, 1844 Delalande's blind snake
- Family Colubridae  
 Subfamily Boaodontinae  
 Tribe Boaodontini
32. *Lamprophis fuliginosus* (Boie, 1827) Brown house snake  
 33. *Lamprophis inornatus* Duméril and Bibron, 1854 Olive house snake  
 34. *Lamprophis aurora* (Linnaeus, 1754) Aurora house snake
- Tribe Pseudaspidini
35. *Duberria lutrix lutrix* (Linnaeus, 1758) Common slug-eater
- Tribe Psammophiini
36. *Psammophis crucifer* (Daudin, 1803) Cross-barred sand snake  
 37. *Psammophis notostictus* Peters, 1867 Karoo whip snake  
 38. *Psammophis rhombeatus rhombeatus* (Linnaeus, 1754) Spotted skaapsteker
- Subfamily Atractaspiinae
39. *Homoroselaps lacteus* (Linnaeus, 1754) Spotted harlequin snake
- Subfamily Incertae sedis
40. *Prosymna sundevallii sundevallii* (A. Smith, 1849) Sundevall's shield-nose snake
- Subfamily Colubrinae
41. *Crotaphopeltis hotamboeia* (Laurenti, 1768) Herald snake  
 42. *Dasypeltis scabra* (Linnaeus, 1758) Common egg-eater  
 43. *Diŋpholidus typus typus* (A. Smith, 1829) Boomslang
- Family Elapidae
44. *Naja nivea* (Linnaeus, 1758) Cape cobra
- Family Viperidae
45. *Bitis arietans arietans* (Merrem, 1820) Puff adder
- Order Chelonii  
 Suborder Cryptodira  
 Family Testudinidae
46. *Homopus areolatus* (Thunberg, 1787) Parrot-beaked tortoise  
 47. *Chersina angulata* (Schweigger, 1812) Angulate tortoise  
 48. *Geochelone pardalis* (Bell, 1828) Leopard tortoise

## Materials and Methods

Between November 1979 and May 1985 the senior author (WRB) visited the park 43 times. Trips were spaced at irregular intervals, but covered every month. Every main vegetation community and habitat type was visited, and microhabitats sampled. Specimens were collected by hand or recorded on the basis of visual sightings if no doubt existed as to the species identity. The junior author (HB) was the resident Park Warden (1978 – 1982) for much of this period, and supplemented observations at times other than during the specific visits.

A number of specimens were marked and released to obtain subsequent biological data. Lizards were toe-clipped and the ventral scutes of snakes clipped using standard techniques (Ferner 1979). Standardised measurements were taken from tortoises (Branch 1984). Identification of frog vocalisations were based on the recording in Passmore & Carruthers (1978), and upon our own experience (HB).

The capture points and field observations of the herpetofauna were plotted on individual maps with a 500 m × 500 m grid (Maps 3 – 30). Map 2 plots all grids from which specimens were collected. Association between the distribution of the common species and the different plant communities was tested (Chi-square test).

## Species Accounts

CLASS Amphibia  
ORDER Anura

Suborder Ophisthocoela  
Family Pipidae  
Subfamily Xenopodinae

1. *Xenopus laevis laevis* (Daudin, 1802)

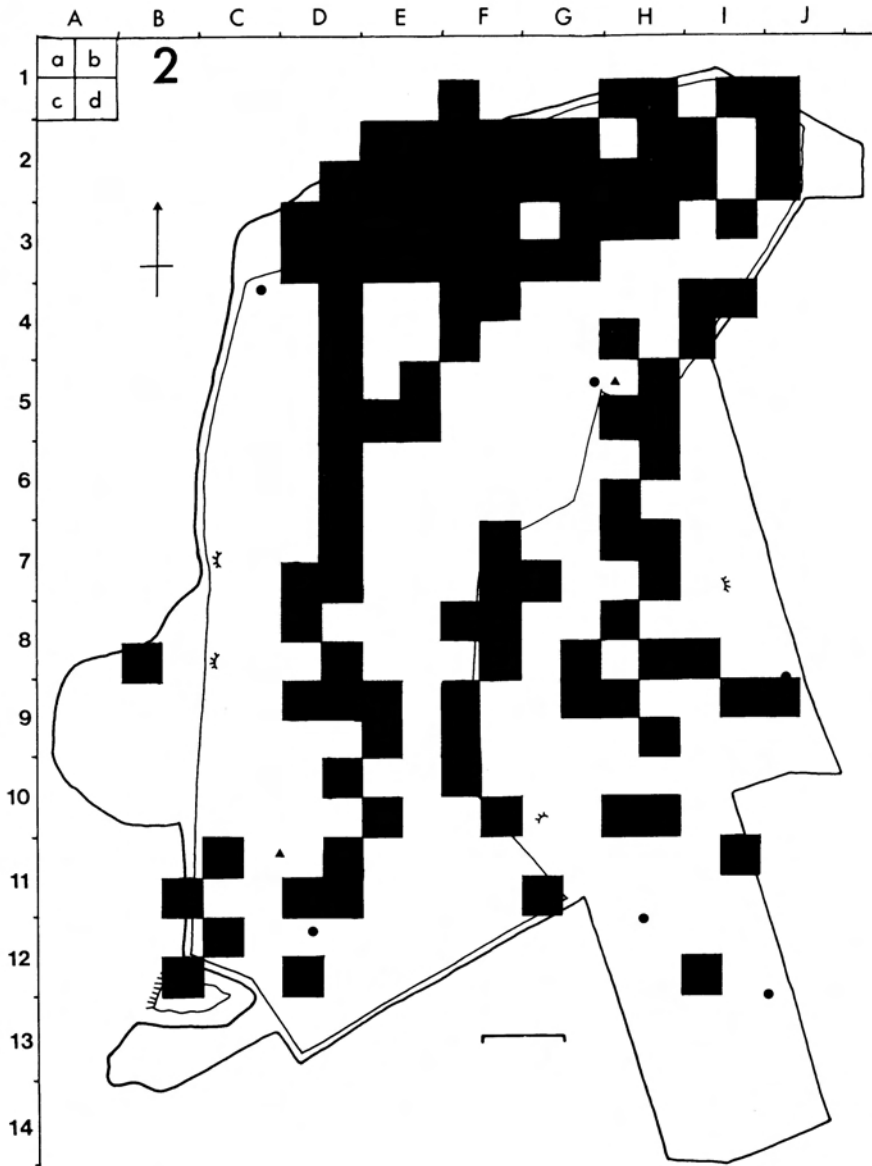
Common Platanna

Temperate – Transitional

With the possible exception of the extreme north-west, the common platanna is found throughout the Cape Province. The genus is the most aquatic of South African frogs.

In the park the frog has been found in both permanent (Caesar's Dam – B12d, Pardali's Dam – E2d, and Bird Hide Dam – E2d) and temporary dams (Woodland's Dam – H1d), and hopping across the veld (E2d) on a drizzly night. The characteristic transparent tadpoles have also been collected in Domkrag Dam (I2a), and it is probable that the frog occurs in all the permanent water points in the park.

A Blackcrowned Night Heron *Nycticorax nycticorax* (Linn., 1758) was observed in the early morning (11 January 1982) catching adult platannas in the margin of Bird Hide Dam.



Map 2 Collecting sites for all reptiles and amphibians in the AENP during the survey

AENP Specimens examined: PEM A301, Bird Hide Dam.

Suborder Procoela  
Family Bufonidae

2. *Bufo rangeri* Hewitt, 1935  
Raucous Toad

Fig. 1 and Map 3  
Temperate – Transitional

This is the commonest toad in the park. Juveniles are very difficult to distinguish from the closely-related leopard toad *Bufo pardalis* Hewitt 1935. Adults have a more slender build and less vivid colour pattern than *B. pardalis*. They also breed in summer (not winter like *B. pardalis*) and have a distinctive mating call.



Fig. 1 Raucous toad *Bufo rangeri*, the commonest toad in the AENP.

They have been observed at night foraging around the margins of the major dams (Caesar's Dam – B12d, Domkrag Dam – I2a, Woodlands Dam – H1d), and collected under cover some distance from these waters. Occasional adults have been observed foraging in leaf litter during the day when weather conditions have been overcast. This toad has a much more distasteful skin secretion than that of *Bufo pardalis*, which is almost 'sweet' tasting (personal experience). It was also rejected when experimentally offered as food to a number of small carnivores i.e. *Canis mesomelas* Schreber, 1775; *Vulpes chama* (A. Smith, 1833); *Felis caracal* Schreber, 1776; and *Suricata suricatta* Schreber, 1777. (Stuart 1981). Diurnal activity by this species may thus reflect the relative immunity of adults to predation.

AENP Specimens examined: PEM A307 – 8, A293, Caesar's Dam; A294, A298, Domkrag Dam.



3. *Bufo pardalis* Hewitt, 1935

Leopard Toad

Cape Temperate

The leopard toad has a curiously disjunct distribution, with a western population extending within a distance of some 50 km – 70 km from Cape Town, and an eastern coastal population extending from East London to the Wilderness (Branch & Braack 1987).

It is uncommon in the park. A large adult was collected at Caesar's Dam (B12d), and a juvenile toad from Woodlands Dam (H1d) was identified by taste, but possibly confused with *Bufo rangeri*. Five amplexant pairs (from Walmer, Port Elizabeth) were released into a small, fenced dam (E2d) in September 1981, but have not subsequently been observed.

AENP Specimen examined: PEM A299, Caesar's Dam.

Suborder Diplasiocoela

Family Ranidae

Subfamily Raninae

4. *Pyxicephalus adspersus adspersus* Tschudi, 1838

Bullfrog

Temperate – Transitional

The bullfrog ranges throughout almost the whole of sub-Saharan Africa (extending as far west and north as Nigeria and Somalia), and reaches the southern limit of its extensive range just west of Port Elizabeth. Recently Parry (1982) has revised the southern African forms and recognises three sub-species, the nominate race being represented in the eastern Cape.

No breeding has been observed in the park. An adult (H3a) and juvenile (H1d) have been observed foraging on drizzly nights in late summer (March – April). In April 1979 a Fish Eagle *Haliaeetus vocifer* (Daudin, 1800) was observed to take a large amphibian, possibly a bullfrog, from the trough at Woodlands windmill.

5. *Tomopterna delalandii* (Tschudi, 1838)

Cape Sand Frog

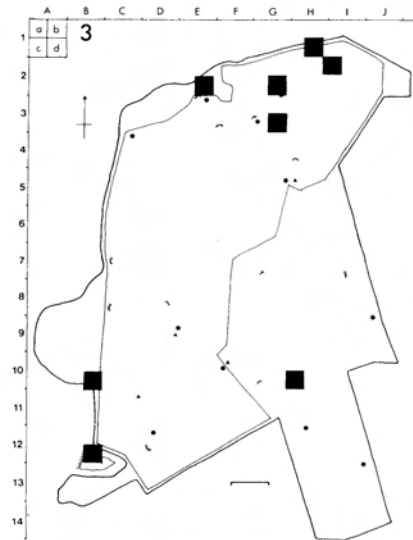
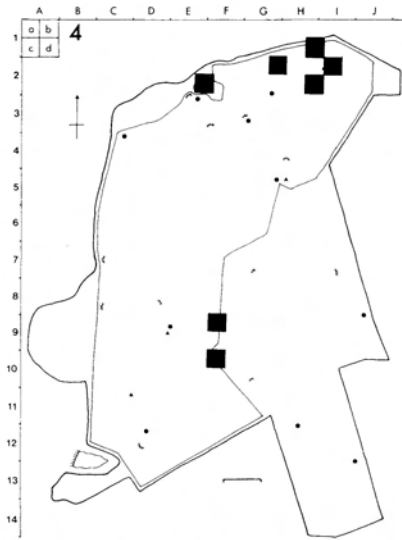
Map 4

Cape Temperate

This small burrowing relative of the bullfrog occurs throughout the southern Cape coastal region, from East London to Langebaan. It also extends inland into the central Karoo.

Breeding occurs in summer in the flooded margins of vleis and dams. Metamorphosis is rapid, taking about five weeks (Wager 1965). They occur widely in the park, and have been collected at Woodlands Dam (H1d), Domkrag Dam (I2a), and those at the rest camp (E2d) as well as a number of smaller vleis and water points (F10a, G2b, and D12c). In winter they retreat to cover, and in June an adult was exposed in loose soil during clearance at the main camp, and a juvenile found under a limestone slab on soil in a borrow pit (F9a). Males have a very characteristic call, and form deafening choruses. Vocalisation has been recorded in spring (September – November) and autumn (February – April).

AENP Specimens examined: PEM A45 – 9, A186, Bird Hide Dam.



Map 3 Collecting sites for the raucous toad *Bufo rangeri* in the AENP

Map 4 Collecting sites for the Cape sand frog *Tomopterna delalandii* in the AENP

6. *Strongylopus grayii grayii* (A. Smith, 1849)  
Clicking Stream Frog

Temperate – Transitional

This small, ubiquitous frog is found throughout most of the Cape Province, although in the central karroid regions it is restricted to disjunct populations, occupying the drainage systems flowing from the old escarpment. Channing (1979) has presented arguments for treating the complex of small South African ranids, previously placed in the large, cosmopolitan genus *Rana* (i.e. *wageri*, *hymenopus*, *grayii*, *fasciata* and *montanus*) in the separate genus *Strongylopus* Tschudi 1838.

In the park the clicking stream frog is found in all damp situations. It does not lay its eggs in deep water, but utilises seepage zones and flooded dam margins, and can thus utilise temporary situations. Males call mainly during the winter months (April – July), and October.

7. *Strongylopus fasciata* (A. Smith, 1849)  
Striped Stream Frog

Fig. 2  
Temperate – Transitional

The striped stream frog has a similar distribution to that of the clicking stream frog, but it does not extend further inland than the Cape fold mountains, and is replaced in the western Cape by the closely-related species *S. bonaspei* (Greig, Boycott & De Villiers 1979).

In the park this species has only been found in the margins of the permanent or semi-permanent dams (i.e. Woodlands Dam – H1d, Bird Hide Dam – E3b, and Caesar's Dam – B13b). It lays its eggs in water rather than in seepage zones



Fig. 2 Striped stream frog *Strongylopus fasciata*, frequenting margins of permanent or semi-permanent dams in the AENP.

or flooded margins like *S. grayii*. Males call mainly during the winter months (March – July, and October).

AENP Specimens Examined: PEM A124, A726, Bird Hide Dam.

8. *Rana angolensis* Bocage, 1866  
Common River Frog

Map 5  
Eastern Tropical Transitional

The common river frog is widely distributed in the northern regions of southern Africa, reaching its southern limit near George.

This large ranid is found only around permanent or semi-permanent dams as the large tadpoles take at least 9 months to develop, and in cold, non-nutritional water may take up to two years to metamorphose (Wager 1965). It has been recorded from Woodlands Dam (H1d), Domkrag Dam (I2a) and the Bird Hide Dam (E3b), and heard calling in March and October.

AENP Specimens examined: PEM A1429 – 31, Bird Hide Dam.

9. *Rana fuscigula* Duméril and Bibron, 1841  
Cape River Frog

Cape Temperate

This large frog is easily confused with the previous species (see Poynton (1964) and Passmore & Carruthers (1978) for a discussion of the distinguishing features) but has a distinctive call. It is a Cape species, replacing *R. angolensis* in the western Cape, but they occur sympatrically on the highveld.

Again its tadpoles are large and may take up to three years to develop (Wager

1965) and so it is restricted to the major dams. It has been heard calling in March at Caesar's Dam (B12d) and the Bird Hide Dam (E3b).

#### Subfamily Petropedetinae

10. *Phrynobatrachus natalensis* (A. Smith, 1849)  
Snoring Puddle Frog Eastern Tropical Transitional

The snoring puddle frog is found throughout much of the savanna regions of sub-Saharan Africa, reaching its southern limit in the Addo Elephant National Park.

In the park it has only been found in the northern areas, particularly in the shallow flooded margins of Woodlands Dam (H1d) and the Bird Hide Dam (E3b). Breeding occurs in summer, and calling has been heard in October–November and February–March. Tadpoles take approximately four weeks to develop (Wager 1965), and the discovery of emerging metamorphosing young in late October indicates that breeding may occur in late September.

AENP Specimens examined: PEM A674, A726–7, Bird Hide Dam and small dam in vicinity of rest camp.

11. *Cacosternum boettgeri* (Boulenger, 1882)  
Common Caco Eastern Tropical Transitional

The cacos, or dainty frogs, are the smallest frogs in the park, and among some of Africa's smallest amphibians. The common caco is found throughout the southern Cape, and extends north through the highveld to Zimbabwe and thence to the uplands of East Africa. It is found throughout the park, and emerges in large numbers following good rains to breed in all the temporary ponds and puddles. Calling is extensive, with autumn (March–April) and spring (July–November) phases. Metamorphosing froglets were observed in small roadside ditches (G2c) in October, and adults sheltering at non-breeding times under stones in dongas adjacent to the major dams (I2d), and in cracks in the mud of dry dams.

AENP Specimens examined: PEM A195–6, A309, Caesar's Dam; A207–15, Woodlands Dam.

12. *Cacosternum nanum* Boulenger, 1887  
Bronze Caco Temperate–Transitional

The bronze caco can easily be confused morphologically with the common caco, but has a distinctive call. Like *C. boettgeri* it appears to be distributed throughout the park, but is not as common. Calling is again centred in autumn (March–April) and spring (August–October), and similar temporary habitats are utilised. Development in both species is very rapid and small froglets may emerge 17–20 days after spawning (Wager 1965).

Family Hyperoliidae  
Subfamily Kassiniinae

13. *Kassina wealii* (Boulenger, 1882)  
Rattling Kassina

Fig. 3  
Cape Temperate

The rattling kassina, or long-toed running frog, has a similar distribution to *Rana fuscigula*, extending along the Cape fold mountains and then north onto the highveld. The African kassinoid genera have recently been revised by Drewes (1985), and on the basis of morphological, biochemical, reproductive and behavioural criteria he has placed this species in a new monotypic genus. However, Dubois (1986) queries the generic status of this species and points out that *Semnodactylus* Hoffman, 1939 has priority.



Fig. 3 Rattling kassina *Kassina wealii* is restricted to the northern areas of the AENP.

In the AENP it is restricted to the northern areas, and has been collected in the margins of Woodlands Dam (Hld), and heard calling in October there and at the Bird Hide Dam (E3b).

AENP Specimens examined: PEM A271, Woodlands Dam.

14. *Kassina senegalensis* (Duméril and Bibron, 1841)  
Bubbling Kassina Eastern Tropical Transitional

The bubbling kassina has a similar distribution to the snoring puddle frog *Phrynobatrachus natalensis*, ranging through most of the savanna regions of sub-Saharan Africa and reaching its southern limit at Port Elizabeth.

It breeds at the same times (calling September – November) and in the same dams (i.e. Woodlands Dam (H1d) and Bird Hide Dam (E3b) ) as *Kassina wealii*, but has also been collected foraging some distance from other major water points (i.e. F7b and G3d).

AENP Specimens examined: PEM A676 – 683, Bird Hide Dam.

Subfamily Hyperoliinae

15. *Hyperolius marmoratus verrucosus* A. Smith, 1849

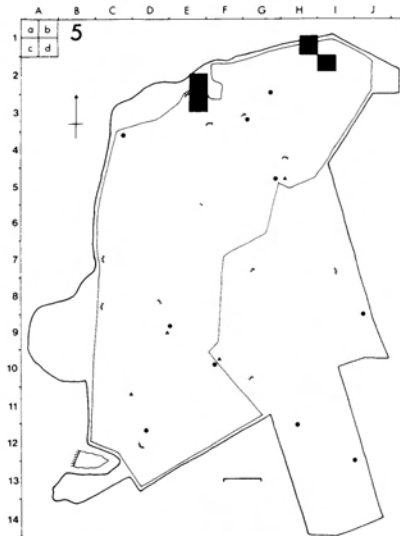
Painted Reed Frog

Tropical East Coast Littoral

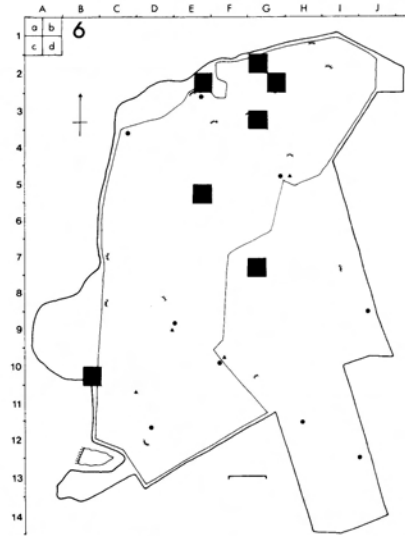
The reed frogs *Hyperolius* are a very speciose genus, whose taxonomy is confused by wide polymorphism within many of its members. Found throughout sub-Saharan Africa, the genus is represented in South Africa by at least eight species, only one of which occurs in the park. Currently the southern populations of the painted reed frog are placed in the subspecies *H. marmoratus verrucosus*.

It is common in the park, but presently recorded only from the major dams in the northern area (i.e. Woodlands Dam, H1d; Domkrag Dam, I2a; and those around the rest camp, E2d and E3d). Breeding occurs in summer and calling has been recorded in September – November. In winter reed frogs migrate from the dam margins and overwinter in dead trees. An adult was collected in April sheltering in a building (E2d).

AENP Specimens examined: PEM A672 – 3, Bird Hide Dam.



Map 5 Collecting sites for the common river frog *Rana angolensis* in the AENP



Map 6 Collecting sites for the bushveld rain frog *Breviceps adspersus pentheri* in the AENP

Family Microhylidae  
Subfamily Brevicipitinae

16. *Breviceps adpersus pentheri* Werner, 1899  
Bushveld Rain Frog

Map 6  
Eastern Tropical Transitional

Rain frogs are independent of water. They lay their eggs in a small cavity in damp soil and the embryos metamorphose within the egg membranes emerging as fully functional froglets. The adults burrow in soft soil and are rarely seen, surfacing only on damp summer nights. The typical race is found in bushveld situations in the northern regions of South Africa. The subspecies *B. a. pentheri* is restricted to Valley Bushveld vegetation in the eastern Cape, from Humansdorp to just west of East London.

It is common throughout the park. A specimen was uncovered during road building (E5d), and others were found at night foraging on the road near JanWal Pan (G7c) during light drizzle. Light drizzle in summer stimulates extensive vocalisation during both the day and night, and at these times the abundance and wide distribution of the rainfrog becomes evident.

AENP Specimens examined: PEM A363, A370, A383, localities as above.

CLASS Reptilia  
ORDER Squamata

Suborder Sauria  
Family Gekkonidae

Geckos are the most speciose family in southern Africa, and have undergone an extensive adaptive radiation in the western arid regions. Few species occur in the eastern Cape, however, and the park is relatively depauperate in these nocturnal lizards. Both species belong to the large genus *Pachydactylus*, which is represented by at least 16 species in the Cape Province alone.

17. *Pachydactylus maculatus* Gray, 1845  
Spotted Gecko

Fig. 4 and Map 7  
Cape Temperate

The spotted gecko is found throughout the eastern Cape, reaching as far west as Sutherland and extending through the Transkei into Natal.

It is one of the commonest lizards in the park, but due to its nocturnal habits is rarely seen. It has been uncovered under roadside stones (F9c, E5c); under limestone slabs on and around old borrow pits (C12a, J2c, F3a, D9b, H7b, H10d) or on the slopes of Suurkop (I4c); in rotting spekboom *Portulacaria afra* stumps (E9c); and in the empty shells of the giant land snail *Achatina zebrina*. The latter are regular retreats for *Pachydactylus maculatus* in the eastern Cape, particularly in winter, and they may be used by a number of individuals (up to 10 depending upon the size of the shell) (Branch 1987b). Old termite nests are also used as retreats and three adults and a subadult were collected from the same weathered termite nest on the slopes of Suurkop in August.

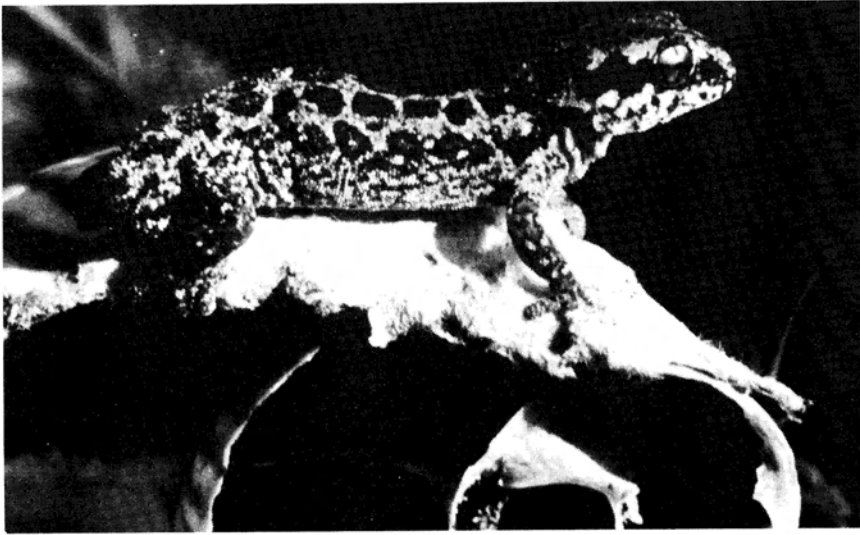


Fig. 4 Spotted gecko *Pachydactylus maculatus* in an old zebra land snail shell (*Achatina zebrina*), which is used as a retreat. A common lizard in the AENP.

Females generally lay two large, hard-shelled eggs, and lay a number of clutches each summer (Branch 1987b). A large female (46 mm snout-vent; 26 mm regenerated tail; 3,4 g) was gravid when collected in mid-November, and another female buried two eggs in sandy soil during the night (7 February). A medium-sized skaaapsteker *Psammophylax rhombeatus*, collected (5 July 1984) whilst basking in spekboom beside the rest camp, contained a partially-digested adult spotted gecko and the autotomised tail of another adult gecko.

AENP Specimens examined: PEM R271, R267.

18. *Pachydactylus mariquensis mariquensis* A. Smith, 1849  
Marico Gecko

Map 8  
Cape Temperate

The Marico gecko is usually associated with the central karroid areas, extending across to southern Namibia and the southern Orange Free State. Its presence in the park was thus unexpected, as was the manner of its discovery, i.e. in the stomach contents of a small brown house snake *Lamprophis fuliginosus*. Subsequent specimens have all been collected under limestone pavement in borrow pits from various parts of the park (C12a, I2c, D9b).

AENP Specimens examined; PEM R1978, R2975.

#### Family Chamaeleonidae

19. *Bradypodion ventrale* (Gray, 1845)  
Eastern Dwarf Chamaeleon

Fig. 5 and Map 9  
Cape Temperate



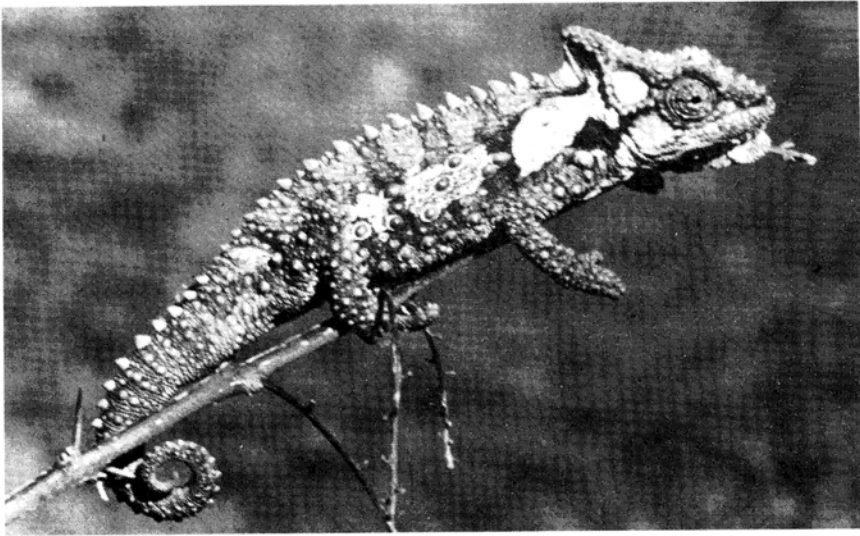


Fig. 5 Gray's dwarf chameleon *Bradypodion ventrale*, often found on *Portulacaria* and *Schotia* bushes in the AENP.

Dwarf chameleons are endemic to South Africa, extending only peripherally into adjacent territories. The taxonomy of the group is confused; some authors recognise up to 12 species (Raw 1976); whilst others recognise only 7 (FitzSimons 1943); and other only a single species (Hillenius 1959). In the most liberal view (Raw 1976) no regional races are recognised and *Bradypodion ventrale* is restricted to the eastern Cape coastal regions, from East London to Humansdorp. More conservative views recognise a variable number of inland races, ranging through the karroid areas (*B. v. karroicum*) to Namaqualand (*B. v. occidentale*). The subject is under investigation.

The species is probably distributed throughout the park although all known records are from the northern areas (including E2d, G2c, F2c). Specimens have been observed on *Portulacaria* and *Schotia* bushes.

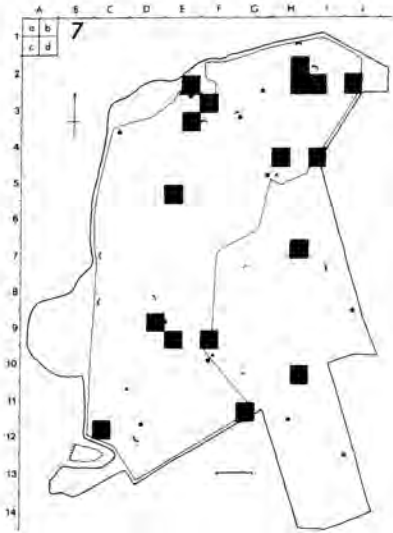
AENP Specimens examined: PEM R1974, R2976, Rest camp.

#### Family Varanidae

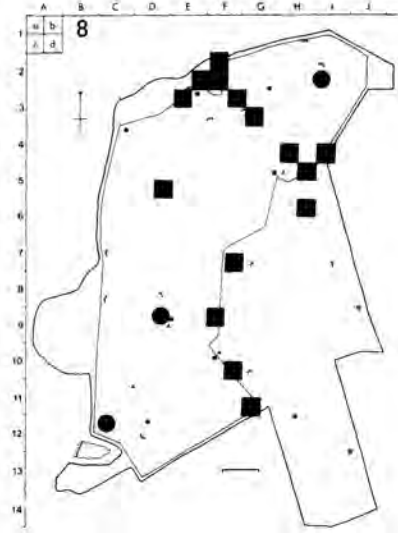
20. *Varanus niloticus niloticus* (Linnaeus, 1762)  
Water Monitor

Map 10  
Tropical Wide-ranging

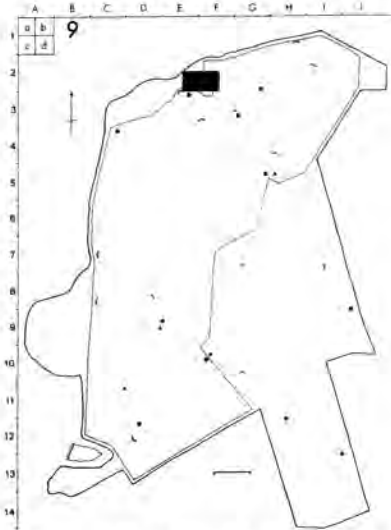
The water monitor or leguaan is Africa's largest lizard, and adults may exceptionally exceed 2 metres. The species is found throughout the continent, being absent only from the arid regions. In the Cape it extends along the Orange River to the Atlantic. Along the southern Cape coastal regions it is not found west of the Gamtoos River valley. The typical race is replaced by *V. n. ornatus* in West Africa.



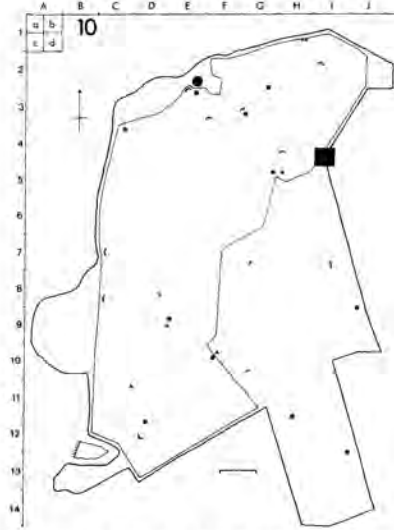
Map 7 Collecting sites for the spotted gecko *Pachydactylus maculatus* in the AENP



Map 8 Collecting sites for the Marico gecko *Pachydactylus m. mariquensis* (circles), and Tasman's girdled lizard *Cordylus tasmani* in the AENP



Map 9 Collecting sites for Gray's dwarf chameleon *Bradypodion ventrale* in the AENP



Map 10 Collection sites for the water monitor *Varanus n. niloticus* in the AENP

The species is an uncommon vagrant in the park. A subadult was observed in May at Woodlands Dam (H1c), and an old nest of 36 eggs was discovered in an old termite nest on the NW-facing, upper slopes of Suurkop. The young had all hatched, except for one in which bones referable to *Varanus* were found (Branch & Erasmus 1982). The use of live termite nests as brood chambers for their eggs is well-documented for water monitors. Adults feed mainly on freshwater crabs, and the lack of extensive water in the park limits the population. The nearest colony inhabits the Sundays River and the associated irrigation canals (15 km SW). Occasional adults probably reside, at least temporarily, at Caesar's Dam. This is still 9 km from the nest found on Suurkop.

#### Family Lacertidae

##### 21. *Pedioplanis lineocellata pulchella* (Gray, 1845)

Map 11

Ocellated Sand Lizard

Western Tropical Transitional

The taxonomy of the lizards previously placed in the Afro-Asian genus *Eremias* is confused. Broadley (1983a) has discussed the problem, and referred a number of southern African lacertids, including *lineocellata*, to *Pedioplanis*. The subspecies *P. l. pulchella* extends in a wide band across the southern coastal and inland karroid regions of the Cape Province. It is replaced in the northern regions of southern Africa by the typical subspecies.

In the AENP this is one of the commonest and most visible lizards, being found wherever suitable conditions occur. Active and diurnal, they forage in clearings with low scrub cover, particularly old borrow pits and the grassy upper slopes and plateau of Suurkop. They retreat at night into a small burrow, usually excavated under a stone. Due to their prevalence opportunity was taken to collect incidental biological data. Specimens were captured by hand, usually early in the morning or on cold days whilst sheltering in their retreats. Snout/vent and tail measurements were taken, and the sex, weight, and reproductive condition noted. To identify recaptures the lizards were toe-clipped in a coded sequence. Table 1 lists the data recorded for 24 specimens. Plots of the relationship between snout/vent length and tail length, and snout/vent length and weight are shown in Fig. 6. Four individuals (12%) had obviously regenerating tail segments.

On 4 February 1982 five eggs were discovered in a small vertical tunnel (10 cm long) that was dug into sandy soil beneath a large limestone boulder in the centre of an old borrow pit (D11d). They were collected and incubated in captivity. The eggs were turgid and soft-shelled; their lengths were 12,2 mm – 13,1 mm ( $x = 12,7$  mm), widths 9,3 mm – 10,1 mm ( $x = 9,7$  mm), and weights 0,55 g – 0,63 g ( $x = 0,59$  g). One egg hatched on 9 February 1982, the remaining four the next day. Data for the hatchlings; snout-vent length, 20 mm – 21 mm ( $x = 20,4$  mm); tail length 33 mm – 36 mm ( $x = 34,2$  mm); and weight, 0,25 g – 0,28 g ( $x = 0,26$  g). Three wild hatchlings collected at the same time as the eggs had similar measurements (see Table 1). Hatchlings were only observed in February and gravid females in November. This suggests that females lay only a single clutch of eggs each year and that incubation takes about 70 – 80 days.

Table 1  
*Biological data of Pedioplanis lineocellata pulchella in the  
 Addo Elephant National Park*

No.	Locality	Sex	Date	Snout/Vent	Tail	Regenerate	Weight (g)
1	H10d	F	8/6/81	46	74		3,8
2	H10d	M	8/6/81	50	110		0,5
3	D9b	F	9/6/81	44	93		2,8
4	D9b	M	9/6/81	40	82		2,3
5	D9b	F	9/6/81	45	87		2,7
6	D9b	F	9/6/81	41	84		2,2
7	D9b	F	14/8/81	42	73		0,2
8	D9b	F	14/8/81	43	28	2	2,3
9	D9b	M	14/8/81	52	89		4,4
3 <sup>a</sup>	D9b	F	19/11/81	51	94		4,6
10	D9b	F	19/11/81	52	86		5,1
11	D11d	H	4/2/82	24	48		0,3
12	D11d	H	4/2/82	25	55		0,5
13	D11d	H	4/2/82	22	39		
14 <sup>b</sup>	D11d	H	10/2/82	20	33		0,25
15 <sup>b</sup>	D11d	H	10/2/82	21	35		0,27
16 <sup>b</sup>	D11d	H	10/2/82	21	36		0,28
17	D11d	F	4/2/82	51	63	22	3,7
18	D11d	F	4/2/82	52	94		3,8
19	D11d	F	4/2/82	50	62	32	3,2
20	D9b	M	7/4/82	50	104		4,5
21	D9b	M	7/4/82	57	93		4,3
22	D9b	F	7/4/82	39	66		1,1
3 <sup>a</sup>	D9b	F	3/2/83	53	100		3,6
23	D9b	F	3/2/83	49	101		2,9
24	D9b	H	3/2/83	21	39		0,2
3 <sup>a</sup>	D9b	F	5/7/84	56	69	42	0,4

<sup>a</sup>Recaptures

<sup>b</sup>Eggs hatched in captivity

Table 2  
*Recapture data for female Pedioplanis lineocellata pulchella  
 in the Addo Elephant National Park*

Date	Position	Snout/Vent	Tail	Weight	Gravid
9 June 81	1	44	93	2,8	No
14 Aug 81	5	—	—	—	No
19 Nov 81	1	51	94	4,6	Yes
3 Feb 83	5	53	100	3,6	No
5 July 84	1	56	69 <sup>a</sup>	4,0	No

<sup>a</sup>Last 42 mm regenerated

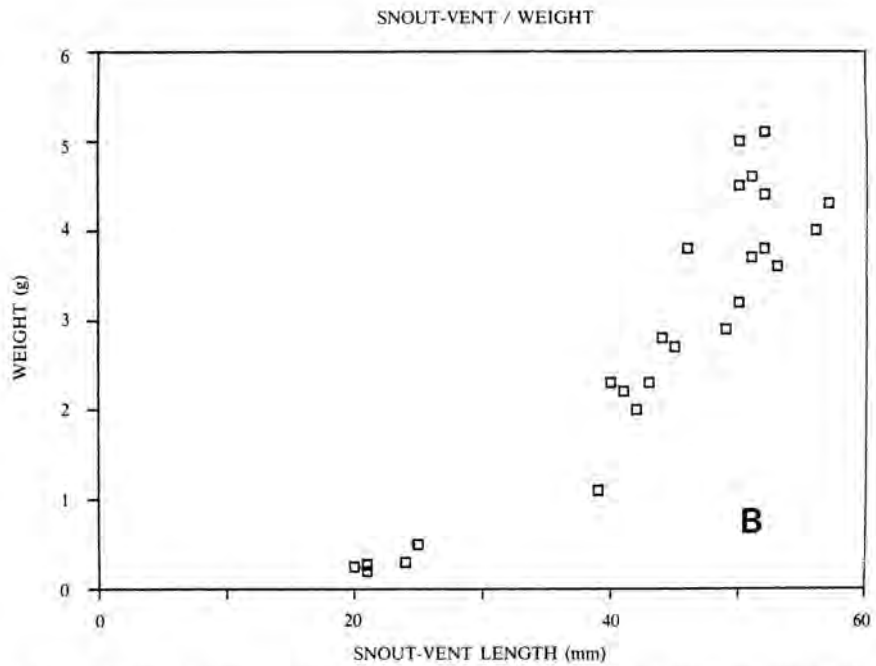
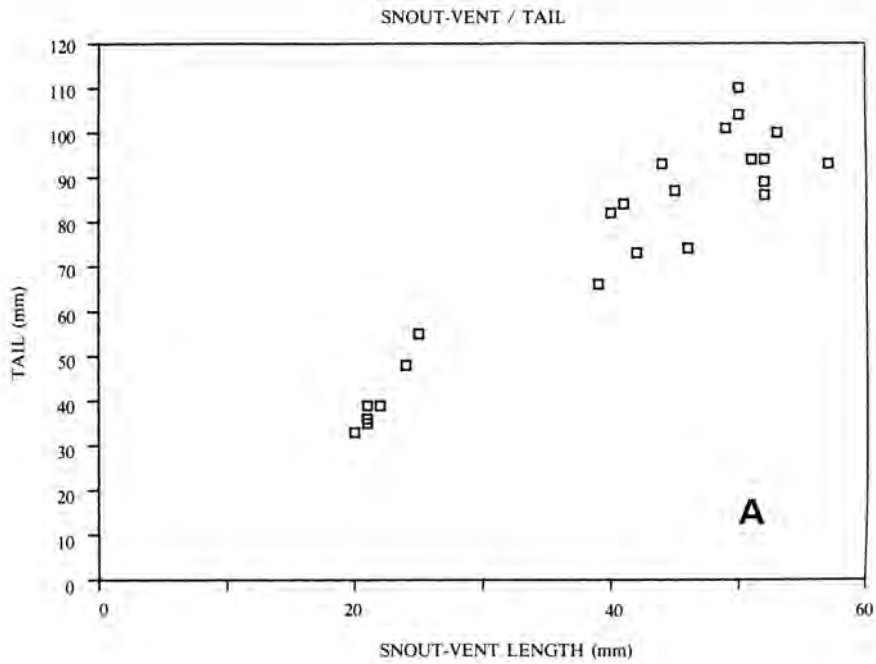


Fig.6 Relationship between snout-vent length and tail length (A), and snout-vent length and weight (B) in *Pedioplanis lineocellata pulchella* in the AENP.

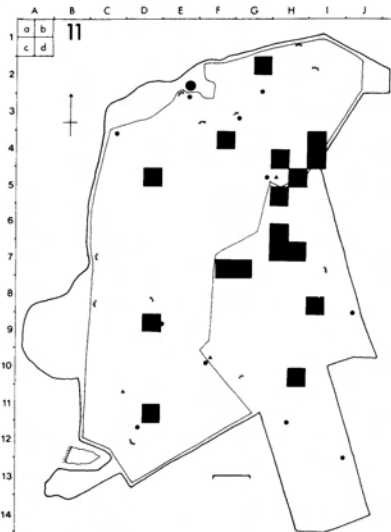
Clutch sizes are low; FitzSimons (1943) notes “about six in number”; and the clutch discovered here contained five eggs. This suggests that the species is relatively long-lived. An adult female, first captured in early June 1981, was recaptured four times over the next four years (see Table 2). Her measurements showed a gradual increase over the period, whilst her greatest weight was when gravid in November 1981. At some time between 3 February 1983 and 5 July 1984 she lost a substantial part of her tail (73 mm, 73%), but had subsequently regenerated 42 millimetres. Recaptures alternated between two flat limestone slabs, 17 m apart, in an old borrow pit. In an area inhabited by elephants, sheltering under stones in exposed positions can be hazardous; an adult was found crushed beneath its ‘shelter’ in an old burrow pit (D11d).

AENP Specimens examined: PEM R2511, R3196.

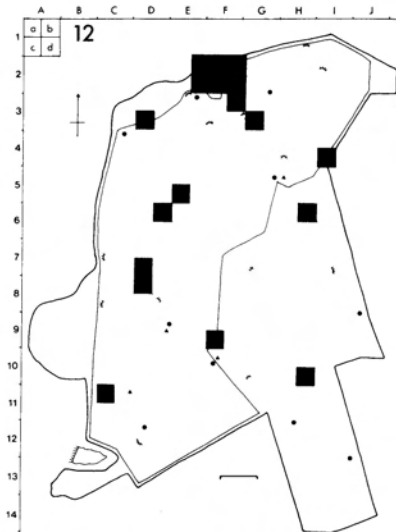
22. *Nucras taeniolata taeniolata* (A. Smith, 1838)  
Southern Ornate Sandveld Lizard

Map 12  
Cape Temperate

The lacertid genus *Nucras* has always posed taxonomic problems, as the lizards are secretive and usually poorly represented in museum collections. Broadley (1972) revised the *N. tessellata* group, to which the sole species found in the park belongs. The ornate sandveld lizard occurs from southern Zambia and Malawi southwards into South Africa. Throughout most of this range it is represented by the subspecies *ornata*. A small, possibly relict population, is found in the Albany region of the eastern Cape. At the time of Broadley’s revision (*op. cit.*) specimens were only known from Grahamstown and Bushman’s River.



Map 11 Collecting sites for the ocellated sand lizard *Pedioplanis linioocellata pulchella* in the AENP



Map 12 Collecting sites for the southern ornate sandveld lizard *Nucras taeniolata taeniolata* in the AENP

This attractive lacertid is surprisingly common in the park, although only occasionally seen. The swarming of termite alates following summer rains can stimulate activity, and during such conditions in early February 1983 over 20 individuals were observed at nine different localities. Specimens have been found throughout the park, and are usually observed foraging for insects at the edge of thick cover and attracted to elephant dung. Retreats are usually dug into loose soil at the base of a bush, but some specimens have been collected underneath limestone slabs. The population in the AENP represents the southern limit of the species.

AENP Specimens examined: PEM R3436, R3466.

### Family Scincidae

Skinks comprise the largest component of the AENP's lizards. Three of the four sub-families recognised by Greer (1970) are found. Four legless, burrowing skinks (*Scelotes* and *Acontias*) are present, each utilising a different soil substrate. Three species of 'typical' skink (*Mabuya*) are also found.

### Subfamily Lygosominae

23. *Mabuya capensis* (Gray, 1830)  
Cape Skink

Map 13  
Cape Temperate

This large, thick-bodied skink is one of the few lizards distributed throughout the Cape Province, although it is rarer in the western arid regions, being replaced by the closely-related species *Mabuya occidentalis*. It is known to extend north of the Limpopo into Zimbabwe and Zambia, but is there restricted to disjunct populations.

Specimens have been found throughout the AENP, usually in association with surface cover, including; limestone slabs, either on the slopes of Suurkop (14c, H4c, H5b), around old borrow pits (H10d, D9b), or beside roads (E5c, F3b, E10c, F9c); dead logs or rotting spekboom stumps (F7d, F9a); and rubble or manmade constructions (E9a, J2a, F3b, H9a). A squashed adult was found under a sheet of iron in the Elephant Camp (F3a). Local specimens are viviparous, giving birth to six to ten babies in late summer, and new-born babies have been observed in early February, sheltering under small stones in a burrow pit (D9b).

24. *Mabuya homalocephala smithii* (Gray, 1845)  
Smith's Skink

Map 18  
Cape Temperate

A small to medium-sized terrestrial skink that extends in a wide belt through the coastal regions of South Africa. It is represented by a number of races; the typical race, *M. h. homalocephala*, occurs along the Cape Fold mountains from Knysna to Little Namaqualand; a poorly-known race, *M. h. peringueyi*, is restricted to Little Namaqualand; *M. h. smithii* occurs from Swellendam to southern Natal, and is now known to extend inland to Graaff Reinet (Branch 1981) and the north-eastern and south-eastern Orange Free State (De Waal 1978); *M. h. depressa* occurs in the coastal dunes of Natal and southern Moçambique.

Only observed once in the park. An adult male, in bright red breeding colouration, was seen in spring (October) running on a pile of dead logs by the edge of an old borrow pit (F3b). A clutch of six *M. h. smithii* eggs were collected beneath a limestone slab on sandy soil in coastal dune thicket approximately 50 km from the Addo Elephant National Park. This conflicts with FitzSimon's (1943) claim that all South African *Mabuya* are viviparous, and supports the findings of De Waal (1978) and Visser (1975).

25. *Mabuya variegata variegata* (Peters, 1869)  
Variegated Skink

Map 14  
Western Tropical – Transitional

Found throughout the inland areas of the Cape, extending north into Namibia, and being replaced in the far northern Cape, Botswana and adjacent regions by the race *M. v. punctulata* (Broadley 1975).

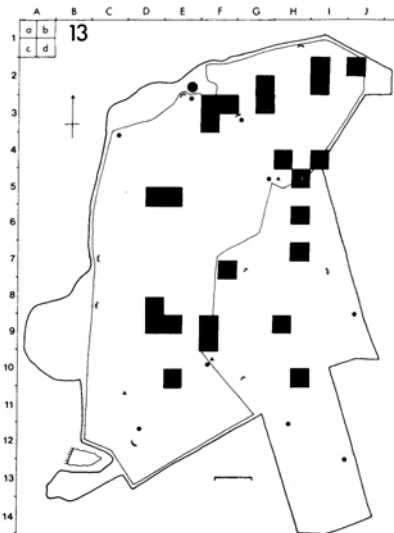
It is common throughout the park, being found on rocks in borrow pits (F7d, I2a) or dongas (H5c); on old, weathered termite nests (I4c); and particularly piles of rotting logs (H5c, F3a, F9c, H7b and F10d). Males develop rust-red coloured flanks and hind legs in spring, and females give birth to 3–4 babies in summer (new-born babies observed in February and April).

AENP Specimens examined: PEM R4255.

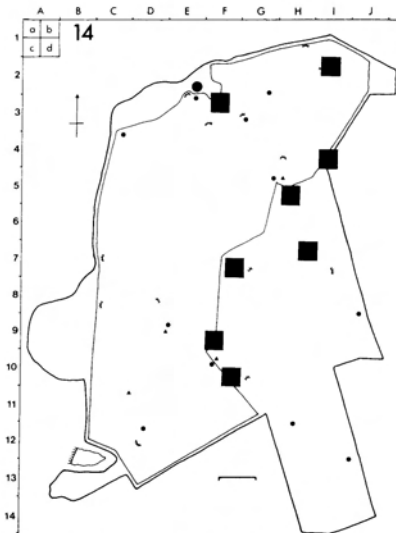
Subfamily Scincinae

26. *Scelotes anguina* (Boulenger, 1887)  
Anguine Skink

Map 15  
Cape Temperate



Map 13 Collecting sites for the Cape skink *Mabuya capensis* in the AENP



Map 14 Collecting sites for the variegated skink *Mabuya v. variegata* in the AENP



This small, legless skink is endemic to the sandy coastal soils of the Algoa Bay region.

Because of its burrowing life, this species is rarely found. Specimens have been discovered under stones in the leaf litter beneath spekboom (D5d, G2c), and on sandy soil beside the road (H7b).

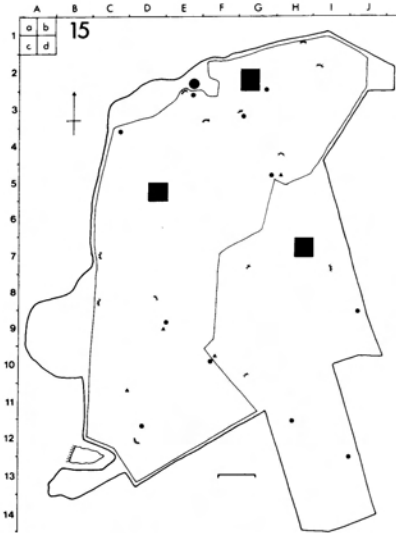
AENP Specimens examined: PEM R1487, R2987.

### Subfamily Acontinae

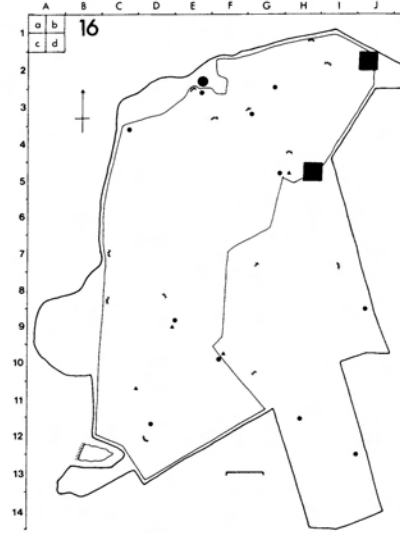
Southern Africa is the centre of an adaptive radiation of burrowing skinks that show a progressive adaptation to fossorial life. The three closely-related genera, *Acontias* (seven species), *Typhlosaurus* (nine species) and *Acontophiops* (one species), are currently placed in a separate subfamily within the Scincidae, but this arrangement is questioned by some researchers, and is being investigated (Rieppel 1981, 1982). Apart from problems of its higher taxonomic affinities, the genus *Acontias* (which is the only one found in the eastern Cape) is also speciose, and although the studies of Broadley & Greer (1969) resolved many of the problems within the genus, others still remain (Branch 1981). Many of the species show disjunct distributions, with scattered, relictual populations. Three species occur in the AENP, but none are seen frequently due to their burrowing habits. They appear to utilise different soil substrates.

27. *Acontias meleagris orientalis* Hewitt, 1938  
Eastern Striped Legless Skink

Map 16  
Cape Temperate



Map 15 Collecting sites for the anguine skink *Scelotes anguina* in the AENP



Map 16 Collecting sites for the eastern striped legless skink *Acontias meleagris orientalis* in the AENP

As noted by Broadley & Greer (1969) two morphs of this race occur in the eastern Cape. The thin, gracile 'lineicauda morph' is usually found in sandy soils in the coastal regions, whilst the more robust 'orientalis morph' is found inland in moist localities. It is probable that they are different species. The 'lineicauda morph' occurs in the Addo Elephant National Park.

Most specimens were collected in the northern section of the AENP; one in loose, sandy soil beneath a limestone boulder under bush on the edge of Suurkop (H5b); another under a pile of wood chips (J2a).

AENP Specimens examined: PEM R1260–3, R1277, R1282.

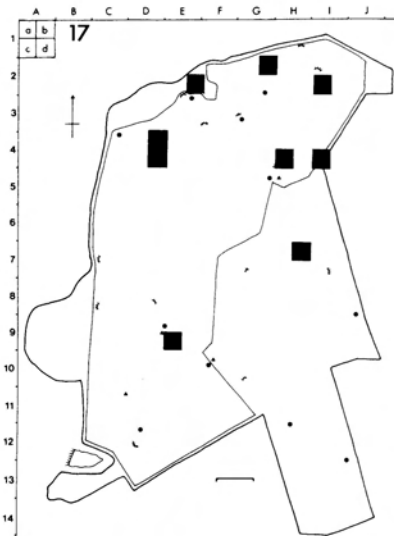
28. *Acontias percivali tasmani* Hewitt, 1937  
Tasman's Legless Skink

Map 17  
Cape Temperate

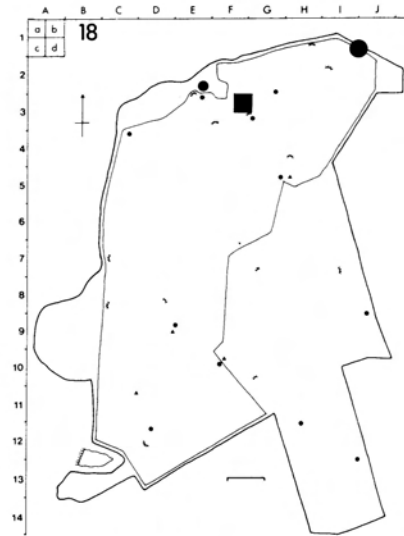
The species has a remarkable disjunct distribution; typical *A. percivali* is found in the vicinity of Voi in south-eastern Kenya; the race *A. p. occidentalis* occurs in a broad band from southern Angola and northern Namibia, through Botswana to Zimbabwe and the Transvaal; the southern race, *A. p. tasmani*, is restricted to the eastern Cape from Port Elizabeth to King William's Town, and extends inland along the Sundays River as far as Graaff-Reinet.

This is the commonest species in the Addo Elephant National Park. It is found throughout, and seems to prefer loose litter beneath the spekboom thicket. Most specimens have been uncovered beneath rotting spekboom logs.

AENP Specimens examined: PEM R1259, R1484, R2981.



Map 17 Collecting sites for the Tasman's legless skink *Acontias percivali tasmani* in the AENP



Map 18 Collecting sites for the slender-tailed legless skink *Acontias g. gracilicauda* (circle), and Smith's skink *Mabuya homalocephala smithii* (square) in the AENP

29. *Acontias gracilicauda gracilicauda* Essex, 1925  
Slender-tailed Legless Skink

Map 18  
Cape Temperate

Like the previous species *A. gracilicauda* has a disjunct distribution with an isolated race (*A. g. namaquensis*) occurring in Namaqualand. The typical subspecies occurs from Port Elizabeth, northwards onto the highveld of the Orange Free State and southern Transvaal.

The species prefers more solid, clay-based soils. This is to be expected from its more robust build, and thick skull. A specimen was uncovered at night in clay soil (I1d).

AENP Specimens examined: PEM R1353, R1420, R2982.

Family Cordylidae  
Subfamily Cordylinae

30. *Cordylus tasmani* (Power, 1930)  
Tasman's Girdled Lizard

Fig. 7 and Map 8  
Cape Temperate

For long treated as a subspecies of the common girdled lizard *C. cordylus*, this species is both morphologically and ecologically distinct, and deserves specific recognition (Branch *in prep.*). It is restricted to the Valley Bushveld thicket of the Algoa Basin.

This lizard is a small, fat-bodied, mahogany-coloured species, common in the Addo Elephant National Park. Unlike all other girdled lizards in the Cape Province, this species is mainly arboreal. The 'apron' of dead leaves covering the stems of



Fig. 7 Tasman's girdled lizard *Cordylus tasmani*, common in the AENP.

the large aloes (e.g. *Aloe ferox* Mill., *A. africana* Mill., and *A. speciosa* Bak.) form the preferred habitat. These are almost absent in the elephant enclosure, having been selectively grazed out. The lizards also utilise the peeling bark and hollow stumps of spekboom and other dead trees. Rock cracks in the small limestone bedrock exposures on the slopes of Suurkop, and the rockery and rock walls surrounding the rest camp and restaurant are also used.

AENP Specimens examined: PEM R520, R2977 – 8, R4256 – 59.

Suborder Serpentes  
Family Typhlopidae

31. *Typhlops lalandei* Schlegel, 1844 Map 19  
Delalande's Blind Snake

This pale-slate, sometimes pinkish coloured blind snake occurs throughout the Cape Province, extending north to the Transvaal and Zimbabwe.

It is relatively common in the park, but rarely seen due to its fossorial habits. Specimens have been unearthed in old termite nests on Suurkop (I4c), and in the Karoo Bushveld vegetation in the south-eastern section (G9b). Other specimens have been uncovered beneath rocks, including two adults hibernating in a crack in limestone bedrock on the slopes of Suurkop (H5b). A subadult was regurgitated by a brown house snake *Lamprophis fuliginosus* caught at the rest camp (E2d).

Family Colubridae  
Subfamily Boaodontinae  
Tribe Boaodontini

32. *Lamprophis fuliginosus* (Boie, 1827) Fig. 8 and Map 20  
Brown House Snake Tropical Wide-ranging

The species extends from Cape Town to West Africa, where (as befits its scientific name) it is black, and not brown.

This harmless snake is one of the commonest in the park, particularly around the rest camp. They are catholic feeders, usually taking small rodents, but will take other prey as the opportunity presents. A juvenile female (227 + 28 mm, 7,0 g), collected under a rotting log in a small *Acacia* clump (I2c), contained an adult Marico gecko *Pachydactylus mariquensis*. Another specimen, collected at the rest camp (E2d) and retained in captivity temporarily for photography, immediately accepted an adult lacertid *Pedioplanis lineocellata*, but then regurgitated it and a blind snake *Typhlops lalandei*. An adult pair (male, 545 + 97 mm, 64 g; female, 726 + 86 mm, 125 g) were collected in August, hibernating under an old railway sleeper (J2a). A hatchling was unearthed in an old termite nest in Karoo Bushveld vegetation.

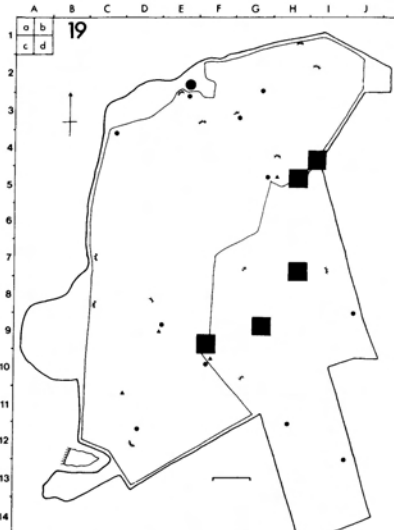
33. *Lamprophis inornatus* Duméril and Bibron, 1854 Cape Temperate  
Olive House Snake



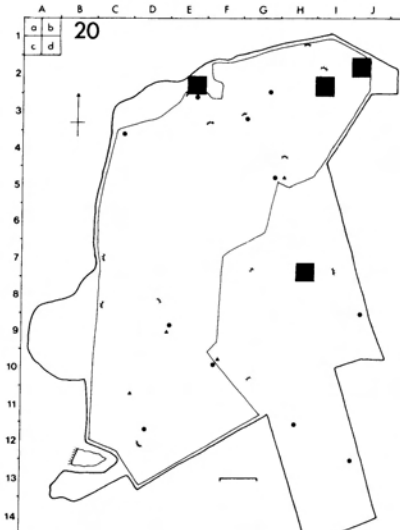
Fig. 8 Brown house snake *Lamprophis fuliginosus*, a harmless, catholic feeder in the AENP.

Endemic to South Africa, this species is restricted to the moist coastal regions of the Cape, extending through Natal into the Transvaal.

None were collected during the present survey. A specimen, collected in the AENP but lacking fuller details, is preserved in the AENP collection. Olive house snakes



Map 19 Collecting sites of Delalande's blind snake *Typhlops lalandei* in the AENP



Map 20 Collecting sites of the brown house snake *Lamprophis fuliginosus* in the AENP

eat a greater proportion of reptiles than their brown relatives, and regularly eat other snakes. A hatchling (TL 285 mm) collected in April in Port Elizabeth was observed eating a legless skink *Acontias meleagris orientalis* almost its own length (TL 203 mm) (*unpubl. obs.*).

34. *Lamprophis aurora* (Linnaeus, 1754)

Aurora House Snake

Cape Temperate

Another house snake endemic to South Africa, but preferring drier situations, and extending through the karroid areas of the Cape and onto the highveld.

A single specimen was collected in the park in September 1982 at Caesar's Dam (C13b).

Tribe Pseudaspidini

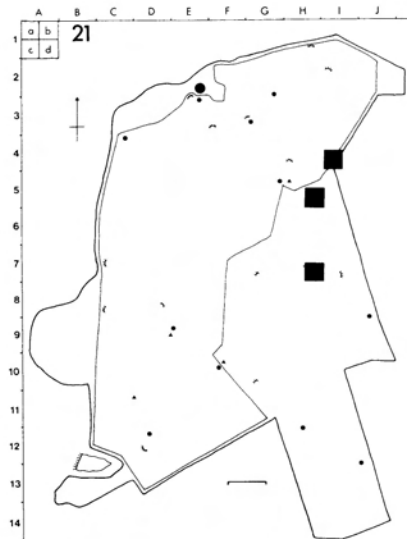
35. *Duberria lutrix lutrix* (Linnaeus, 1758)

Common Slug-eater

Temperate – Transitional

This small relative of the mole snake *Pseudaspis cana* (Linn.) 1754 is found in the moist regions of the southern Cape coastal belt (extending inland along the river valleys), and extends northwards through Natal and the highveld regions to the Limpopo. It is replaced in the north-east of Zimbabwe by the race *D. l. rhodesiana*.

A single specimen was observed on an overcast February day crossing a road passing through moist spekboom vegetation in the portion of the Elephant camp (D8d).



Map 21 Collecting sites of the cross-barred sand snake *Psammophis crucifer* in the AENP



Map 22 Collecting sites of spotted skaapesteker *Psammophylax r. rhombeatus* in the AENP

Tribe Psammophiini

36. *Psammophis crucifer* (Daudin, 1803)  
Cross-barred Sand Snake

Map 21  
Cape Temperate

A Cape Temperate species found in the montane regions of the Cape (i.e. Cape fold mountains, and the montane grasslands of the old escarpment mountain chain). It extends north through the highveld regions, with an isolated population on the eastern escarpment mountains of Zimbabwe.

Most specimens in the AENP have been found in the vicinity of the grassland on Suurkop (I4c, H5d), or open Bontveld (H7d). Two specimens were collected hibernating; one sheltering under a small limestone boulder on the edge of Suurkop; and another in an old termite nest.

37. *Psammophis notostictus* Peters, 1867  
Karoo Whip Snake

Western Tropical – Transitional

This species is a common, diurnal snake of the western arid regions of the Cape Province and Namibia.

A number of specimens have been collected in the AENP, but lack capture details. During the present survey a single adult was found sheltering under a large limestone slab on the edge of a borrow pit (H4c).

38. *Psammophylax rhombeatus rhombeatus* (Linnaeus, 1754)  
Spotted Skaapsteker

Fig. 9  
and Map 22  
Cape Temperate



Fig. 9 Spotted skaapsteker *Psammophylax rhombeatus* a common psammophine in the AENP.

This species has a similar distribution to the cross-barred sand snake *Psammodphis crucifer*, extending through the Cape montane regions and north onto the highveld. Relict populations occur in Little Namaqualand, Namibia and southern Angola, the latter being recognised as a separate race (*P. r. ocellatus*).

The commonest psammophine in the park, it has been found in all vegetation types. Four juveniles were discovered in one day in winter (June), two sheltering under small limestone boulders on a soil embankment next to the elephant fence (F9a), another in a similar situation on the summit of Suurkop, and yet another sheltering in an old termite nest at the same location (I4c). During a mild winter spell (July, 1984) a young adult was discovered foraging in a spekboom bush near the rest camp. Palpation of the obvious, bulging stomach revealed an adult spotted gecko *Pachydactylus maculatus* and the autotomised tail of another specimen.

#### Subfamily Atractaspinae

39. *Homoroselaps lacteus* (Linnaeus, 1754)  
Spotted Harlequin Snake (Dwarf Garter Snake)

Map 23  
Cape Temperate

This species is restricted to South Africa, and has a similar distribution to the rhombic skaapesteker *Psammodhylax r. rhombeatus*.

It is a common species in the AENP, but due to its fossorial habits is rarely seen. One was found, crossing a road (D5d) on an overcast day. Others have been found beneath limestone boulders on an earth embankment next to a borrow pit (D11d), and in weathered termite nests on Suurkop (I4c) and in Bontveld (G8d).

AENP Specimen examined: PEM R2114.



Fig. 10 Sundevall's shield-nose snake *Prosymna s. sundevallii* a small burrower in the AENP, rarely seen.



Subfamily *Incertae sedis*

40. *Prosymna sundevallii sundevallii* (A. Smith, 1849)  
Sundevall's Shield-nose Snake

Fig. 10  
Temperate – Transitional

This species probably ranges throughout the Cape Province. Although there are no records from the central Cape region (see distribution maps in Broadley 1983b), this is probably an artifact of insufficient collecting. It occurs in the Karoo National Park (Branch & Braack, *unpubl. obs.*). The typical race extends from Cape Agulhas to Pretoria, but is replaced in the Transvaal lowveld and Zimbabwe by the northern race, *P. s. lineata*.

A small burrowing snake that is rarely seen. A single specimen was collected under a limestone boulder on loose, sandy soil in cleared veld beside the elephant fence (F9a). The shovel-snouted snakes appear to be specialist feeders on reptile eggs (Broadley 1979). A captive specimen (collected in the Karoo National Park) ate the fresh, hard-shelled eggs of the gecko *Pachydactylus maculatus* (*unpubl. obs.*).

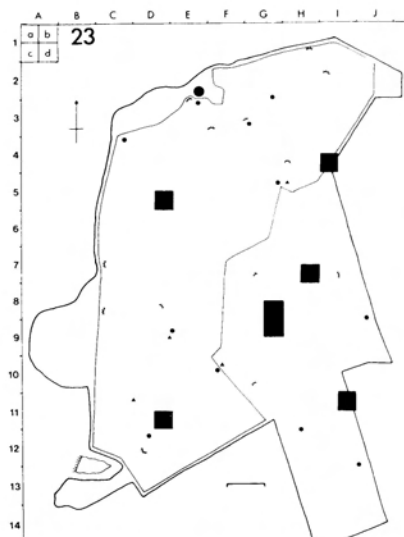
AENP Specimen examined: PEM R2986.

Subfamily Colubrinae

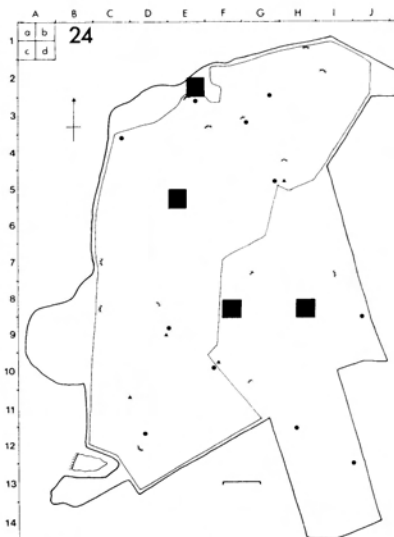
41. *Crotaphopeltis hotamboeia* (Laurenti, 1768)  
Red-lipped or Herald Snake

Tropical Wide-ranging

Another wide-ranging species, found throughout Tropical Africa, and extending to Cape Town and the western Cape, but being absent from the arid western regions of the sub-continent.



Map 23 Collecting sites of the spotted harlequin snake *Homoroselaps lacteus* in the AENP



Map 24 Collecting sites of the boomslang *Dispholidus t. typus* in the AENP

A specimen was exposed during bush clearance around Bird Hide Dam (E2d), and a subadult female (420 + 65 mm, 29 g) was uncovered beneath a dead log beside a water-filled ditch containing *Cacosternum* tadpoles (G2a).

42. *Dasypeltis scabra* (Linnaeus, 1758)

Common Egg-eater

Tropical Wide-ranging

This species is widely distributed throughout southern Africa and extends northwards to the southern Sudan, Ethiopia and Somalia (even extending into the Arabian peninsula) in the east, and to Gambia in West Africa.

A single specimen has been collected in the AENP, but details of its capture are lacking.

43. *Dispholidus typus typus* (A. Smith, 1829)

Boomslang

Map 24

Tropical Wide-ranging

The range of this venomous colubrid extends throughout most of sub-Saharan Africa, but in the Cape its distribution is patchy, depending upon the existence of suitable bushveld. The nominate race is replaced in Angola and Zaire by *D. t. punctatus*.

Due to its size and arboreal habits this is a conspicuous snake, and it has been recorded throughout the Addo Elephant National Park.

#### Family Elapidae

44. *Naja nivea* (Linnaeus, 1758)

Cape Cobra

Map 25

Western Tropical – Transitional

The Cape cobra is found throughout most of the Cape Province (being absent only from the north-east region and vicinity of East London), extending into the southern parts of the Orange Free State, Botswana and Namibia.

It occurs throughout the AENP, and in all vegetation types. Most individuals have been seen crossing roads, or foraging at the edge of clearings. A large adult was observed basking in early morning sun on rocks by the edge of a borrow pit (F7d).

#### Family Viperidae

45. *Bitis arietans arietans* (Merrem, 1820)

Puff Adder

Map 26

Tropical Wide-ranging

Found throughout Africa, from southern Morocco to Cape Town. It is absent only from dense forested areas and extreme desert. A northern race (*B. a. somalica*) from Somalia differs from the typical race in having keeled subcaudals.

This large, cryptically-coloured viper is common in the Addo Elephant National Park. A large adult male (TL 1010 mm) was killed by a Secretary Bird *Sagittarius*

*serpentarius* in March, whilst in the same month another large adult was observed being attacked by a Spotted Eagle Owl *Bubo africanus* in the same area (G3d).

Order Chelonii  
Suborder Cryptodira  
Family Testudinidae

46. *Homopus areolatus* (Thunberg, 1787)  
Parrot-beaked Tortoise

Fig. 11 and Map 27  
Cape Temperate

The small parrot-beaked tortoise (also known as the padloper) is endemic to the Cape Province, extending in a wide belt from Port Alfred to Cape Town. It is one of the world's smallest tortoises, and relatively uncommon in the park, although it may be overlooked due to its small size and secretive nature.

A number of individuals have been observed around the rest camp, and a juvenile was collected in winter (August) sheltering under a limestone boulder on the slopes of Suurkop (I4c).

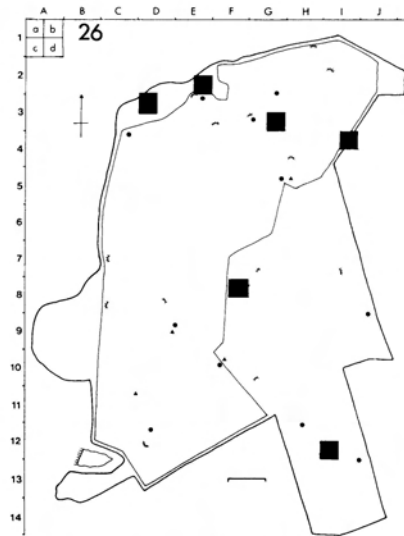
47. *Chersina angulata* (Schweigger, 1812)  
Angulate Tortoise

Fig. 11 and Map 28  
Cape Temperate

The angulate tortoise has a similar distribution to the padloper, but extends further inland in the Karoo region and up the west coast into southern Namibia (Greig & Burdett 1976). It is very common in the eastern Cape coastal region, and can reach densities of up to 40 tortoises/hectare (Branch 1984).

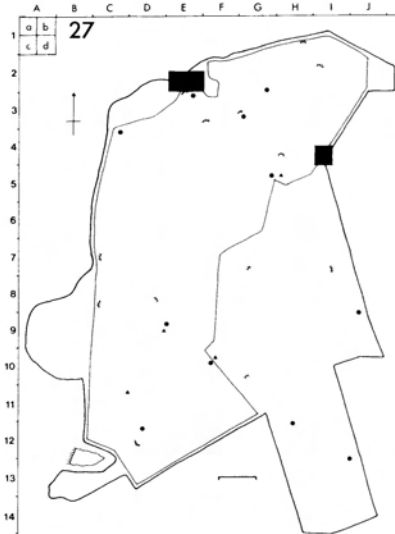


Map 25 Collecting sites of the Cape cobra *Naja nivea* in the AENP

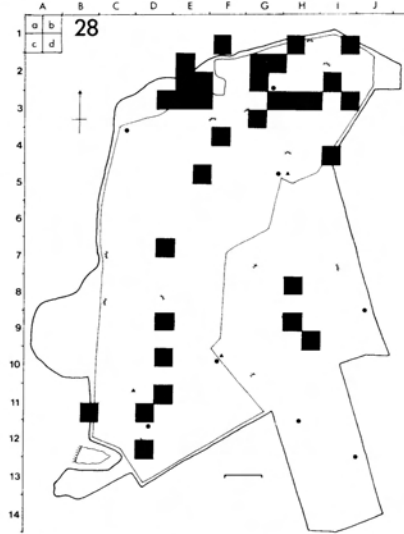


Map 26 Collecting sites of the puff adder *Bitis a. arietans* in the AENP

It is distributed throughout the Addo Elephant National Park. Specimens have been observed feeding on couch grass *Cynodon dactylon*.



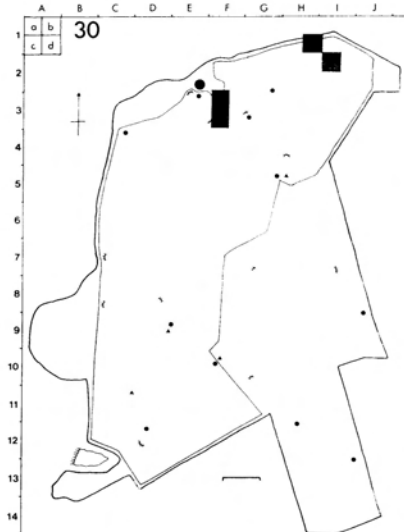
Map 27 Collecting sites of the parrot-beaked tortoise *Homopus areolatus* in the AENP



Map 28 Collecting sites of the angulate tortoise *Chersina angulata* in the AENP



Map 29 Collecting sites of the leopard tortoise *Geochelone pardalis* in the AENP



Map 30 Collecting sites of the marsh terrapin *Pelomedusa subrufa* in the AENP

48. *Geochelone pardalis* (Bell, 1828)  
Leopard Tortoise

Fig. 11 and Map 29  
Tropical Wide-ranging

The leopard tortoise is the largest South African tortoise, and one of the largest mainland tortoises in the world. It has a curiously disjunct distribution in southern Africa, being very common in the eastern Cape and lowveld region of the Transvaal, but scarce elsewhere. It is apparently absent from the south-western Cape and central Cape karroid areas; from most of the highveld regions of the Orange Free State and southern Transvaal; and from Lesotho, the Transkei and southern Natal (Greig & Burdett 1976). In most cases either summer heat and/or winter cold may be responsible for the tortoise's absence. Wilson (1968) records that the leopard tortoise is common throughout Zambia, but absent above 1 830 m on the Nyika Plateau. For this reason the common name mountain tortoise or bergskilpad seems singularly inappropriate, especially as in the eastern Cape the species occurs down to sea level. Although some large adults may lose their colour pattern this does not occur in all cases, and all hatchlings and subadults are well-spotted: leopard tortoise is a better name. There seems to be no natural explanation for the absence of the leopard tortoise from the Transkei and southern Natal. It is possible that human predation has led to local extinction.

The species is the most conspicuous tortoise in the AENP, and found throughout its boundaries. Adults average from 10 kg – 15 kg in mass, and in exceptional cases may be much larger. 'Domkrag', the AENP's famous leopard tortoise, died in unfortunate circumstances in 1976 when he got trapped in an aardvark hole. At the time he measured 656 mm × 408 mm and weighed 43 kilogram. Due to their size adults are immune from predation by any carnivore in the AENP, but juveniles are still vulnerable. Hall-Martin & Botha (1980) found tortoise

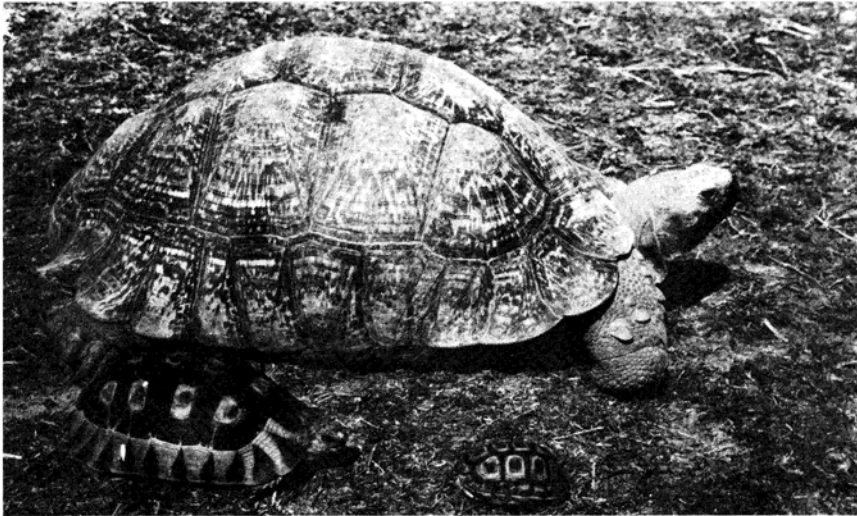


Fig. 11 Land tortoises of the AENP: large, leopard tortoise *Geochelone pardalis*; medium, angulate tortoise *Chersina angulata*; small, parrot-beaked tortoise *Homopus areolatus*.

remains in the stomach contents of a black-backed jackal *Canis mesomelas* from the park. Elsewhere, one was once found in the gut of a puff adder (Wilson 1968), and although the rock leguaan *Varanus exanthematicus* has not been found in the AENP (it is known from adjacent regions) it is also known to feed regularly on tortoises (De Waal 1980; Branch *unpubl. obs.*). A young subadult (carapace length approximately 200 mm) was found crushed in the muddy margin of Domkrag Dam, and from spoor at the site appeared to have been crushed by an elephant drinking at the dam. Another large adult female (plastron length 430 mm) was discovered (F3c) with a crushed carapace, but it could not be determined whether this had been caused by an elephant although this seemed likely.

Leopard tortoises have been observed feeding on *Portulacaria afra* Jacq., *Blepharis* sp., *Sansevieria* sp., *Opuntia* sp. and *Gazania krebsiana* Less. A marked subadult female had more than doubled her body weight when recaptured nearly four years later (14 April 1981, 285 mm TL, 4,6 kg; 14 February 1985, 410 mm TL, 10,5 kg).

Suborder Pleurodira  
Family Pelomedusidae

49. *Pelomedusa subrufa* (Lacépède, 1788)

Map 30

Marsh Terrapin

Tropical Wide-ranging

This species ranges throughout the savanna regions of sub-Saharan Africa, and is even known from Madagascar. Its local name (Cape terrapin) is thus again inappropriate, and elsewhere in Africa it is known as the marsh or helmeted terrapin.

It is found in all the standing water in the AENP, including the temporary dams. During periods of drought terrapins migrate between dams, looking for water. In its absence they dig into deep soil beneath bushes and await rain. In February 1982, a large female, covered in dried mud, was found 700 m from the nearest dam (F3a) having emerged after recent rain. On sunny days, when undisturbed, the terrapins crawl onto mud banks or partly-submerged logs to bask. At such times up to 20 individuals may be seen. The flushed stomach contents of adults from Domkrag Dam contained only algae and invertebrates.

## Discussion

The eastern Cape is an exciting phyto- and zoogeographic region. The Sunday's River Valley, in which the AENP is situated, is bordered by three major phytogeographical subdivisions; i.e. Capensis (fynbos), the Karoo Domain of the Karoo-Namib Region, and the Tongaland- Pondoland Regional Mosaic of the Indian Ocean Coastal Belt (Werger 1978). The Algoa Basin has been subject to a number of marine inundations, dating as far back as the Cretaceous (70 million years ago) and as recently as the Tertiary (2 million years ago). The resultant limestone deposits have been subject to erosion, dependent upon local topography, and these, in addition to accumulations of wind-blown coastal sand, give the region a complex

pattern of soil types (Toerien 1972). In addition Port Elizabeth is situated at the transition between the winter and summer rainfall zones, and thus has rain in all months. The region supports a complex mosaic of vegetation types, and this botanical diversity is, in turn, reflected in the faunal diversity of the Addo Elephant National Park.

#### Composition and diversity of the AENP herpetofauna

Currently 49 taxa of reptiles and amphibians have been recorded within the AENP boundaries. A single specimen of the day gecko *Lygodactylus capensis* was collected within the AENP, but it can be discounted as the genus normally occurs only north of the Orange River. However, a population has recently been discovered within a small suburb in Port Elizabeth, and appears to have been present there for over 30 years. This population is almost certainly introduced (Branch *unpubl. obs.*). The AENP specimen may have been translocated from this population or from the Kruger National Park, either in staff effects or in game crates when rhino or other game were introduced.

The composition and relative diversity of the reptiles and amphibians in the AENP is compared with other regions in Table 3. For the most part the herpetofauna has a similar composition to both the surrounding eastern Cape and the more distant Kruger National Park. There are, however, some obvious differences. The AENP, like the rest of the eastern Cape, lacks crocodiles and amphisbaenids, both of which are found in the Kruger National Park. Crocodiles appear to have been on the decline in the eastern Cape at the time of European settlement, and the last specimen was shot, in 1903, at the mouth of the Macurassa River, Elliotdale. Subfossil material, including a massive skull, is also known from the Swartkops River near Port Elizabeth (Stuart 1983), and they were probably once found in the Sunday's River. The closest amphisbaenids to the eastern Cape occur in the alluvial sands of the Orange River Valley.

Table 3  
*Relative composition and diversity of the AENP herpetofauna*

Taxa	Addo Elephant National Park (77,3 sq.km)	Eastern Cape <sup>a</sup> (150,000 sq.km)	Kruger National <sup>b</sup> Park (19,480 sq.km)
Amphibians	16 (32,6)	30 (21,7)	34 (22,9)
Lizards	14 (28,6)	58 (41,4)	51 (34,5)
Snakes	15 (30,6)	41 (29,7)	51 (34,5)
Amphisbaenids	0 (0)	0 (0)	6 (4,1)
Chelonians	4 (8,2)	11 (8,2)	5 (3,3)
Crocodylians	0 (0)	0 (0)	1 (0,7)
Total	49 (100)	140 (100)	148 (100)

Data from <sup>a</sup>Branch 1985

<sup>b</sup>Pienaar *et al.* 1976; Pienaar *et al.* 1983; Jacobsen & Pienaar 1983; Pickersgill 1984.

The AENP has a high proportion of amphibians, which reflects the generally moist climate. The relative lack of lizards can be attributed to the absence of rock outcrops or open sandy areas. This is in contrast to the general eastern Cape herpetofauna (Branch 1987a), where lizards are the dominant component (41,4 %) due to their prevalence in the arid karroid interior. They also dominate in the Orange Free State (De Waal 1978) and Namibia (Channing & Van Dijk 1976; Mertens 1971). They are not as speciose as snakes in the Kruger National Park (41 and 51 species, respectively; Pienaar, Haacke & Jacobsen 1983; Jacobsen & Pienaar 1983), but are represented by a similar number of taxa due to localized races of *Afroedura pondolia* (Hewitt), *Pachydactylus capensis* A. Smith, *Cordylus warreni* (Boulenger), and *Platysaurus intermedius* Matschie. The area of the AENP is too small and uniform for subspecies to occur.

The Cape Province has the richest land tortoise fauna in the world, and three species (*Geochelone pardalis*, *Chersina angulata* and *Homopus areolatus*) can be found in high densities within the Addo Elephant National Park. Only a single species of freshwater terrapin *Pelomedusa subrufa* is found in the whole of the Cape Province, whilst the Kruger National Park has three species of terrapin, but only two tortoises.

#### Zoogeographic affinities of the AENP herpetofauna

Following the categories proposed by Bruton & Haacke (1980) the zoogeographic affinities of the herpetofauna of the park are listed in the individual species accounts, and summarised and compared in Table 4 with that of the total herpetofauna of the eastern Cape (Branch 1987a). There is little significant difference between the composition of the AENP and the surrounding area. Approximately a third (49 of 140) of the reptiles and amphibians found in the eastern Cape occur within the AENP, and this proportion will increase still further if the boundaries of the AENP are extended to include part of the adjacent

Table 4  
Summary of the zoogeographic affinities of the AENP herpetofauna

Zoogeographic Regions	Addo Elephant	
	Nat. Park	Eastern Cape
Cape Temperate	23 (46,9) <sup>a</sup>	65 (46,4)
Temperate-Transitional	8 (16,3)	19 (13,5)
Eastern Tropical Transitional	5 (10,2)	16 (11,4)
Western Tropical Transitional	4 (8,2)	12 (8,5)
Tropical East Coast Littoral	1 (2,0)	3 (2,1)
Temperate Wide-ranging	8 (16,3)	25 (17,8)
Total Species	49 (100)	140 (100)

<sup>a</sup>Number (%)



Suurberg. The Cape Temperate element (47%) is by far the dominant component of the park's herpetofauna, followed in importance by Temperate – Transitional (16,3%) and Temperate Wide-ranging species (16,3%). Only a few (8,2%) of the species characteristic of the arid western regions (Western – Tropical Transitional) range into the park and all are reptiles. Conversely, the few species characteristic of the wet, sub-tropical Indian Ocean coastal belt (Eastern – Tropical Transitional and Tropical East Coast Littoral) that are found in the park are all amphibians (12,2%).

### Ecology of the AENP herpetofauna

Studies on the herpetofauna of the AENP have mainly concerned documentation of its composition and distribution. However, ecological data was collected opportunistically, and some general comments can be made.

#### *Frogs*

The seasonal utilisation of the dams and vleis by amphibians in the AENP was assessed by surveys of these areas after dark. Visits were irregular, but occurred in every month of the year. All species observed or heard vocalising were recorded. The results of these surveys are listed in Table 5 and graphically presented in Fig. 12. The Algoa Basin has rain all year round, with a major peak in March – May and a smaller spring peak in August – September (Fig. 12). The species breed at different periods, although there is considerable overlap. Only Caesar's Dam, which is supplemented by water from the Sunday's River irrigation system, is truly permanent. All other water in the park, depending upon its extent, is seasonal, and dries up to a greater or lesser degree in times of drought. The frogs are thus opportunistic, and most have rapid tadpole development. Exceptions, such as *Rana fuscigula* and *R. angolensis*, which may take over a year to undergo metamorphosis, are restricted to the major dams.

Only a few species have not been heard calling at dams in the park. These include *Xenopus laevis* (whose call is given underwater and is thus inaudible to humans), *Pyxicephalus adspersus* and *Bufo pardalis*. The snoring toad is a winter breeder (*unpubl. obs.*) and in the AENP has only been found at Caesar's Dam. Bullfrogs have a unique life history, and breed in small temporary ponds, and undergo very rapid development (30 days – 35 days). They are cannibalistic, an adaptation that maximizes energy conversion into the surviving young (Balinsky & Balinsky 1954; Grobler 1972). Although subadults have been seen, no breeding congregations have been observed.

The most conspicuous frogs in the AENP (having been observed in seven to eight months of the year) are the striped stream frog *Strongylopus fasciata*, Cape sand frog *Tomopterna delalandii*, and common caco *Cacosternum boettgeri*. They are closely followed (observed in six months of the year) by the clicking stream frog *Strongylopus grayii grayii*, the common river frog *Rana angolensis*, and Natal puddle frog *Phrynobatrachus natalensis*.

Table 5  
*Amphibian reproductive activity in the Addo Elephant National Park*

SPECIES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NON-BREEDERS												
<i>Pyxicephalus adspersus</i>			O	O								
<i>Bufo pardalis</i>								O			O	
WINTER-BREEDERS												
<i>Strongylopus fasciata</i>		O	C	C	C	C	C	O		C		
<i>Strongylopus grayii</i>				C	C	C	C		O	C		
DOUBLE-BREEDERS?												
<i>Tomopterna delalandii</i>		C	C	C		O			C	C	C	
<i>Cacosternum boettgeri</i>			C	C			C	C	C	C	C	
<i>Cacosternum nanum</i>			C	C				C	C	C		
SUMMER-BREEDERS												
<i>Bufo rangeri</i>		O	O	O					C	C		
<i>Rana angolensis</i>		O	C	O		O	O			C		
<i>Rana fuscigula</i>			C									
<i>Phrynobatrachus natalensis</i>	C	C	C							C	C	
<i>Kassina wealii</i>									O	C		
<i>Kassina senegalensis</i>		O		O					C	C	C	
<i>Hyperolius marmoratus</i>				O					C	C	C	
<i>Breviceps adspersus</i>		C	O							C	C	C
<i>Xenopus laevis</i>		O	O	O						O		
Total Number Species calling	1	3	7	5	2	2	3	2	6	12	6	1
Total Number Species observed	1	8	11	11	2	4	4	4	8	13	7	1
Monthly rainfall in AENP 1981 (mm)	43	45	102	6	116	28	16	93	12	88	43	70
Monthly rainfall in AENP 1982 (mm)	20	10	50	61	0	39	50	17	45	36	6	6
Combined rainfall 1981–82 (cm)	6,3	5,5	15,2	6,7	11,6	6,7	6,6	11	5,7	12,4	4,9	7,6

Rainfall in the Algoa Basin occurs throughout the year, with minor peaks in March and October. The frogs fall roughly into winter and summer breeders, although some species (i.e. *Tomopterna delalandii*, *Cacosternum boettgeri*, and *C. nanum*) appear to have much longer breeding seasons, and may breed in both spring and autumn. These groupings correspond well to the zoogeographic affinities of the frogs, and may thus reflect fundamental adaptations in the species embryonic temperature tolerances. Winter breeders include *Bufo pardalis*, *Cacosternum nanum*, *C. boettgeri*, *Strongylopus fasciata* and *S. grayii*. The first two are Cape

**Amphibian reproductive activity**  
Addo Elephant National Park, 1981 – 1982

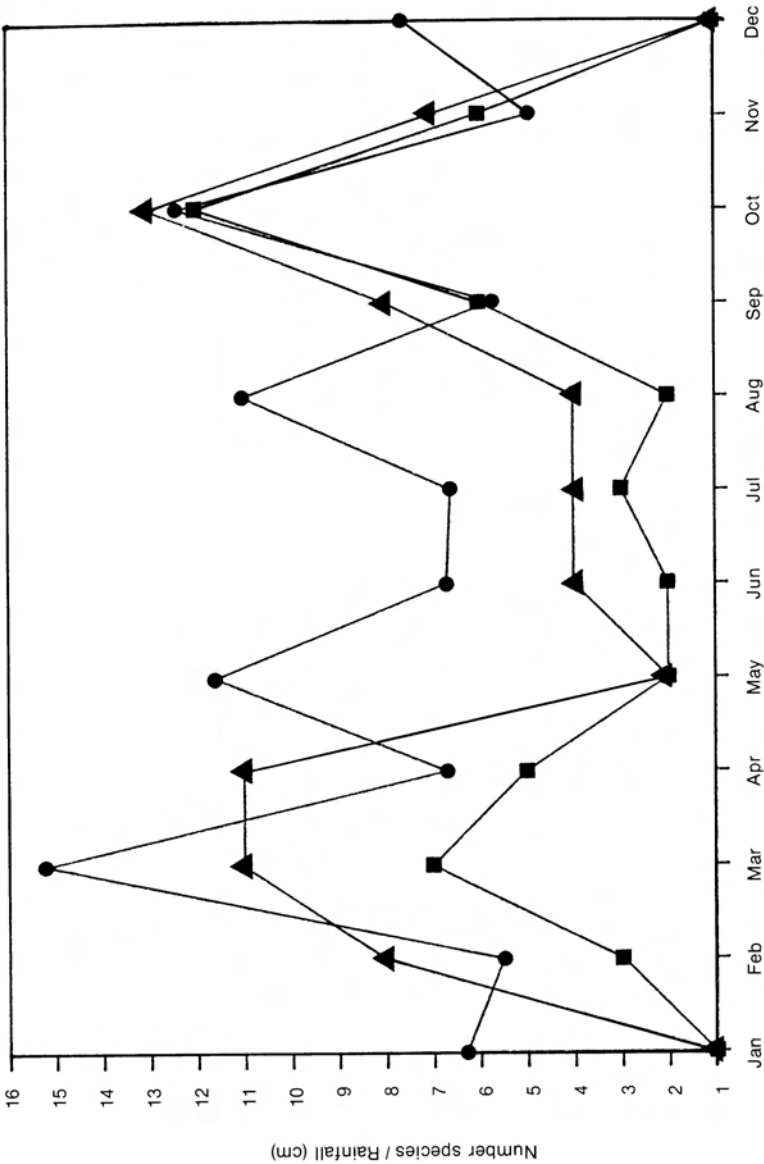


Fig. 12 Rainfall and reproductive activity in amphibians of the AENP during 1981 – 82 (circles, rainfall, cm; triangles, number of species observed; squares, number of species calling).

Temperate species, the last two Temperate – Transitional forms. Specific summer breeders include *Bufo rangeri*, *Phrynobatrachus natalensis*, *Kassina senegalensis*, *Kassina wealii*, *Hyperolius marmoratus* and *Breviceps adpersus*. Only *K. wealii* (Cape Temperate) is not an Eastern Tropical Transitional or Tropical East Coast Littoral species.

### Tortoises

Ecological studies on southern African tortoises are still in their infancy, and little is known of how sympatric species partition resources. Adult size is an obvious parameter. The three species in the AENP differ considerably in maximum size (*Geochelone pardalis*, average 10 kg – 15 kg, exceptionally 40 kg; *Chersina angulata*, average 600 g – 800 g, exceptionally 1 kg; *Homopus areolatus*, average 120 g – 180 g, exceptionally 200 g). Size differences have diverse ramifications, affecting such factors as predation pressures, thermoregulation, foraging strategies and food preferences. The subject is presently being investigated. With the exception of large leopard tortoises, the small forms forage at the ecotone between cover and clearing. Elephant activity generates clearings in thick spekboom veld, and is important in allowing tortoises to exploit the dense thicket. This advantage is in part counter-balanced by increased tortoise mortality from being trodden upon by elephants.

### Lizards

Lizards in the AENP show diverse ecological adaptations that permit co-existence. Their niches are differentiated by a number of parameters, including time, space, diet, and foraging strategies. These are summarised in Table 6.

The nocturnal niche is pre-empted by geckos, although it is possible that the activity patterns of the fossorial skinks extend after dark. Brownlie & Loveridge (1983) have demonstrated that oxygen consumption in *Acontias m. meleagris* is fairly constant over 24 h, with a tendency for it to be lower during the “light” hours. Temporal segregation may also occur between diurnal species, with different species staggering their activities during the day. *Pedioplanis lineocellata pulchella* is active during the middle of the day (except on very hot days), whilst *Nucras t. taeniolata* is active during the early morning and late afternoon. The latter species is also seasonally active, and most frequently seen in late summer when winged termite alates are dispersing.

Spatial separation occurs vertically and in substrate preferences. Climbing lizards in the AENP include the totally arboreal dwarf chamaeleon *Bradypodion ventrale*, and the partially arboreal Tasman’s girdled lizard *Cordylus tasmani*, and variegated skink *Mabuya v. variegata*. The latter forages on and among dead logs and in the shattered spekboom clumps resulting from elephant feeding. Most of its activity is restricted to within 0,5 m above ground. The girdled lizard also forages on dead logs and adjacent ground but often utilises retreats under dead bark, or among the apron of shrivelled leaves on aloe stems (*Aloe ferox* and *A. africana*).

Substrate preferences are shown by different fossorial and terrestrial species. The three species of *Acontias* in the AENP show a distinct trend from a robust species

Table 6  
Niche segregation among lizards in the Addo Elephant National Park

Species	Maximum Size (SV mm)	Active Nocturnal Diurnal	Habitat	Hunting Strategy	Breeding Oviparous Viviparous
<i>Pachydactylus maculatus</i>	45	Noc	Terrestrial	Slow scan	Eggs
<i>Pachydactylus mariquensis</i>	43	Noc	Terrestrial	Slow scan	Eggs
<i>Bradypodion ventrale</i>	73	Diurn	Arboreal	Sit and wait	Eggs
<i>Varanus niloticus</i>	628	Diurn	Semiaquatic	Active search	Eggs
<i>Pedioplanis lineocellata</i>	54	Diurn	Terrestrial	Active search	Eggs
<i>Nucras t. taeniolata</i>	84	Diurn	Terrestrial	Active search	Eggs
<i>Mabuya capensis</i>	135	Diurn	Terrestrial	Active search	Young
<i>Mabuya v. variegata</i>	52	Diurn	Terrestrial	Active search	Young
<i>Mabuya homalocephala</i>	68	Diurn	Terrestrial	Active search	Eggs
<i>Scelotes anguina</i>	71	Di/Noc	Fossorial	Slow search	Young
<i>Acontias meleagris</i>	202	Di/Noc	Fossorial	Slow search	Young
<i>Acontias percivalli</i>	196	Di/Noc	Fossorial	Slow search	Young
<i>Acontias gracilicauda</i>	202	Di/Noc	Fossorial	Slow search	Young
<i>Cordylus tasmani</i>	74	Diurn	Arboreal	Active search	Young

with a large head broader than the body (*A. g. gracilicauda*), through a species with moderate build and smaller head (*A. percivalli tasmani*), to a slender species with a very small head (*A. meleagris orientalis*). This morphocline is reflected in the species substrate preferences, as they inhabit clay soils, leaf litter/loam, and sandy soils, respectively. *Scelotes anguina* also prefers sandy soils, but appears to restrict its activity to the top few centimetres.

Surface living lizards segregate not only on substrate preferences, but also on the amount of vegetation cover. *Pedioplanis lineocellata pulchella* and *Pachydactylus mariquensis* prefer rocky, sparsely-vegetated areas associated with exposed or superficial limestone bedrock, i.e. on the summit and upper slopes of Suurkop, or the various borrow pits exposed during road building in the park. Their closest relatives, *Nucras t. taeniolata* and *Pachydactylus maculatus*, are usually found in the leaf litter understorey of the spekboom thicket, although both may use retreats under limestone boulders. Smith's skink *Mabuya homalocephala smithii* is also found among the leaf litter of the spekboom thicket, whilst its congener *M. capensis*

prefers the mixed scrub and grass veld associated with Suurkop and the Open Spekboomveld and Karoo Bushveld.

With some exceptions, lizards mostly eat invertebrates, minor variation occurring in the type and size of the species taken. As noted above, they partition this common food resource by feeding in different habitats and at different times. They may also employ different hunting strategies. These have been reviewed by Schoener (1971). Lizards may be categorised as “sit and wait” foragers or active searchers. Arnold (1984) has introduced another technique, described as “slow visual scan”. This is utilised by large terrestrial nocturnal geckos on open ground, and involves walking very slowly for long distances. Geckos are very visual hunters and this technique represents a compromise feeding strategy allowing the detection of slow-moving, cryptic prey in poor light conditions, whilst avoiding predation in exposed positions. At times chamaeleons employ a similar tactic, and it may also be used by the smaller geckos, e.g., *Pachydactylus maculatus* and *P. mariquensis*. The feeding techniques of fossorial skinks may be comparable and involve a slow olfactory search. Subterranean searching may reduce detection by predators, but olfaction is more restricted than sight and may require longer activity periods. This may account, in part, for the absence of any difference between the “day” and “night” rates of oxygen consumption by *Acontias* (Brownlie & Loveridge 1983).

Table 7  
*Niche segregation among snakes in the Addo Elephant National Park*

Species	Maximum Size (mm)	Active	Terrain	Food	Breeding
<i>Typhlops lalandei</i>	333	Di/Noc	Burrowing	Termites	Eggs
<i>Lamprophis fuliginosus</i>	1300	Nocturnal	Terrestrial	Rodents	Eggs
<i>Lamprophis inornatus</i>	1125	Nocturnal	Terrestrial	Rodents	Eggs
<i>Lamprophis aurora</i>	745	Nocturnal	Terrestrial	Rodents	Eggs
<i>Duberria lutrix</i>	435	Nocturnal	Terrestrial	Slugs	Young
<i>Homoroselaps lacteus</i>	550	Nocturnal	Burrowing	Reptiles	Eggs
<i>Psammophis crucifer</i>	709	Diurnal	Terrestrial	Lizards	Eggs
<i>Psammophis notostictus</i>	980	Diurnal	Terrestrial	Lizards	Eggs
<i>Psammophylax rhombeatus</i>	1197	Diurnal	Terrestrial	Rod/Liz	Eggs
<i>Prosymna sundevallii</i>	361	Nocturnal	Burrowing	Rep. eggs	Eggs
<i>Crotaphopeltis hotamboeia</i>	810	Nocturnal	Aquatic	Frogs	Eggs
<i>Dasypeltis scabra</i>	898	Nocturnal	Terrestrial	Bird eggs	Eggs
<i>Dispholidus typus</i>	1820	Diurnal	Arboreal	Birds/cham	Eggs
<i>Naja nivea</i>	1715	Diurnal	Terrestrial	General	Eggs
<i>Bitis arietans</i>	1240	Nocturnal	Terrestrial	Rodents	Young

## Snakes

Snakes partition resources in a slightly different manner to lizards. They are less habitat-specific, but more food-dependent. Many snake species have very specific food preferences, that are reflected in their common names, e.g. egg-eater, slug-eater, mole snake, and centipede-eater. Nonetheless they do show additional segregation with respect to time, space and hunting strategies. These are summarised in Table 7.

## Distribution

The observed and expected distributions of the ten commonest reptiles and amphibians in the AENP is shown in Table 8. Only two species, *Chersina angulata* and *Bufo rangeri*, show a significant deviation from the null hypothesis (that assumes a random distribution of species, unlinked to any particular plant community;  $P < 0,005$ , Chi-square test, (Zar 1974)). The angulate tortoise was found more than expected in Open Spekboomveld (six observed, two expected) and

Table 8  
Distribution of common reptiles and amphibians in the Addo Elephant National Park

Species	Plant Communities							Chi-square
	1	2	3	4	5	6	7	
<i>Geochelone pardalis</i>	4(8) <sup>a</sup>	16(15)	8(3)	0(0)	0(0)	4(3)	1(2)	9,803
<i>Mabuya capensis</i>	4(6)	12(11)	1(3)	0(0)	1(0)	4(2)	2(2)	5,501
<i>Chersina angulata</i>	1(5)	5(9)	6(2)	0(0)	1(0)	5(2)	2(1)	21,033
<i>Nucras taeniolata</i>	2(5)	13(9)	1(2)	0(0)	1(0)	0(2)	2(1)	8,788
<i>Pachydactylus maculatus</i>	4(4)	6(8)	2(2)	0(0)	0(0)	5(2)	0(1)	10,490
<i>Pedioplanis lineoocellata</i>	4(4)	6(8)	1(2)	0(0)	1(0)	1(2)	4(1)	11,878
<i>Cordylus tasmani</i>	4(4)	9(7)	0(2)	1(0)	1(0)	0(1)	0(1)	10,610
<i>Acontias percivalli tasmani</i>	1(2)	6(4)	0(1)	0(0)	0(0)	2(1)	0(1)	5,228
<i>Mabuya variegata</i>	4(2)	3(4)	0(1)	0(0)	0(0)	1(1)	0(1)	3,789
<i>Bufo rangeri</i>	1(2)	3(4)	0(1)	0(0)	0(0)	4(1)	0(1)	18,049

<sup>a</sup>observed (expected)

Plant communities: 1. Moist Spekboomveld; 2. Dry Spekboomveld; 3. Open Spekboomveld; 4. Coastal Bush; 5. Mixed Shrub and Grassveld; 6. Karoo Bushveld; 7. Bonteveld.

Karoo Bushveld (five observed, 1,7 expected), and less than expected in Moist Spekboomveld (one observed, five expected). The Raucous toad was more common than expected in Karoo Bushveld (four observed, 0,7 expected). It is known that *Chersina angulata* prefers to forage at the edge of cover (Branch 1984), and that it is probably excluded from pure Moist Spekboomveld. However, elephant activity

and road construction in the AENP, generate corridors into this plant community that can be exploited by *Chersina* and other reptiles.

Species recorded in regions adjacent to the Addo Elephant National Park

Although the AENP contains a relatively diverse herpetofauna, a number of taxa can still be expected. The following have been collected within 50 km of the park in similar habitats:

Lizards:	Yellow-throated plated lizard	<i>Gerrhosaurus flavigularis</i>
	Rock leguaan	<i>Varanus exanthematicus</i>
Snakes:	Long-tailed worm snake	<i>Leptotyphlops nigricans</i>
	Olive water snake	<i>Lycodonomorphus rufulus</i>
	Cape wolf snake	<i>Lycophidion capense</i>
	Mole snake	<i>Pseudaspis cana</i>
	Spotted bush snake	<i>Philothamnus semivariegatus</i>
	Common green snake	<i>P. hoplogaster</i>
	Natal green snake	<i>P. natalensis</i>
	Rinkhals	<i>Hemachatus haemachatus</i>
	Common night adder	<i>Causus rhombeatus</i>

A number of other reptiles have been collected on Forestry land on the top of the Suurberg range, 10 km – 15 km north of the park's boundary. Many habitats not found in the existing AENP are present, including rocky outcrops and upland grassland. Much of this area has been incorporated into the recently proclaimed (March, 1985) Zuurberg National Park. Should any of this land, particularly that lying to the east of the Suurberg Pass be incorporated into the AENP then the following species can be expected:

Lizards:	Essex's leaf-toed gecko	<i>Phyllodactylus lineatus essexi</i>
	Rock agama	<i>Agama atra</i>
	Ranger's mountain lizard	<i>Tropidosaura montana rangeri</i>
	Delalande's lizard	<i>Nucras lalandii</i>
	Side-striped skink	<i>Mabuya varia</i>
	Common girdled lizard	<i>Cordylus cordylus</i>
	Crag lizard	<i>Pseudocordylus microlepidotus</i>
Snakes:	Yellow-bellied House snake	<i>Lamprophis fuscus</i>
	Black water snake	<i>Lycodonomorphus laevisissimus</i>
	Centipede eater	<i>Aparallactus capensis</i>

A number of other species have been collected in the Algoa Basin (AB) or on other parts of the Suurberg (S) range, and may occasionally enter the existing park or its future boundaries. These include:

Amphibians:	Plaintive rain frog	<i>Breviceps verrucosus</i> (S)
	Karoo toad	<i>Bufo gariiepensis</i> (S)
	Yellow-striped reed frog	<i>Hyperolius semidiscus</i> (AB)
Lizards:	Ocellated gecko	<i>Pachydactylus geitje</i> (S)
	Namaqua sand lizard	<i>Pedioplanis namaquensis</i> (AB)



	Cape 3-toed skink	<i>Scelotes caffer</i> (AB)
	Cape snake lizard	<i>Chamaesaura anquina</i> (AB)
	FitzSimon's plated snake lizard	<i>Tetradactylus africanus fitzsimonsi</i> (AB)
Snakes:	Cape coral snake	<i>Aspidelaps lubricus</i> (AB)

### Conservation

The Addo Elephant National Park contains a number of important herpetological populations. These include:

- i) The most southerly protected populations of the:
 

Bullfrog	<i>Pyxicephalus a. adspersus</i>
Snoring puddle frog	<i>Phrynobatrachus natalensis</i>
Marico gecko	<i>Pachydactylus mariquensis</i>
Southern ornate sandveld lizard	<i>Nucras t. taeniolata</i>
- ii) The only protected populations of the:
 

Bushveld rain frog	<i>Breviceps adspersus pentheri</i>
Tasman's girdled lizard	<i>Cordylus tasmani</i>
Anguine skink	<i>Scelotes anguina</i>
Eastern striped legless skink	<i>Acontias meleagris orientalis</i>
Tasman's legless skink	<i>Acontias percivalli tasmani</i>

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