SCIENCE AND RESEARCH INTERNAL REPORT N0.55

INITIAL SURVEYS FOR THE BLACK-EYED GECKOS, *HOPLODACTYLUS KAHUTARAE,* IN THE SEAWARD KAIKOURA RANGE: NOVEMBER 1987, JUNE 1988 AND FEBRUARY 1989

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September 1989

ISSN 0114-2798

ISBN 0-478-01137-7

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SUMMARY

A method of surveying for black-eyed geckos and the results of three such are presented. Seven geckos were caught and a further eight sighted, most within known range of the species. Four were caught/sighted at a new locality, on bluffs adjoining those at Kahutara Saddle where the species has been recorded previously. However, a local tramper photographed a specimen on George Spur at about 2100 m above sea level. This record extends the species' range and represents the greatest height at which any New Zealand lizard has been observed. No rats were caught along trap lines set up within the gecko's range. It is suggested that *H. kahutarae* and certain other local fauna (e.g. an undescribed *Deinacrida* weta) are still extant in alpine areas partly because of the apparent rarity of rats. Further surveys should be conducted to gain a better understanding of the species, in particular at George Spur, the Batty area, the Limestone Stream and the Shearwater Stream.

1. INTRODUCTION

Following the description of the black-eyed gecko (Whitaker 1987) staff of the Conservation Sciences Centre and Blenheim District Office of the Department of Conservation undertook a survey to find out as much as possible about the distribution and ecology of the gecko, designed a suitable technique for survey, and made management recommendations.

The survey started from the most recent locality record of the species, near Kahutara Saddle, Seaward Kaikouras. While most effort was spent searching for the geckos, the presence of other lizard species and giant was noted. Trap lines were set up to determine presence or absence of rats and hence what threat they might constitute to black-eyed geckos.

2. METHODS

2.1 Search technique

Using the original discovery site at the Kahutara Saddle as a starting point, we searched surrounding areas which displayed similar physical features i.e. stable bluffs with deep crevices over 1060 metres ASL. Although the black-eyed gecko had been reported only from sheer alpine rock faces (Whitaker 1987), other habitats such as screes and vegetation to levels well below the alpine zone were also examined. Black-eyed geckos are nocturnal, but it was necessary to survey an area during the day before the night-time search so that a route could be planned.

Night-time searching began immediately after dark. At least two people were necessary to safely and effectively search for black-eyed geckos. A spotlight attached to the head was necessary for moving around while another mounted on the central pivot arm of binoculars was used to locate geckos by the reflection from their eyes. When a light reflection from a gecko eye was seen, one person kept it in view while directing another to the site, either to capture it, or to get close enough for identification. Although capture was the best way to positively identify an animal, often it was too steep and dangerous to climb onto the rock faces where the lizards were. Using climbing ropes was impracticable because of the disturbance they would cause to the animals, and the time and effort involved setting them up.

At night the bluffs were searched by scanning the same areas from a number of positions because the angle of the incident light beam on the gecko's eye had to be precisely correct to get a bright reflection and because irregularities in the rock surface meant the geckos were not always visible. Two people improved the thoroughness of searching. The ambient air temperature was recorded from the start of searching (first dark) to try and correlate gecko activity with temperature. Three captured animals were kept in captivity for two days to collect faeces for dietary analysis before being returned, at night, to the site of capture.

2.2 Effort

2.2.1 Black-eyed geckos

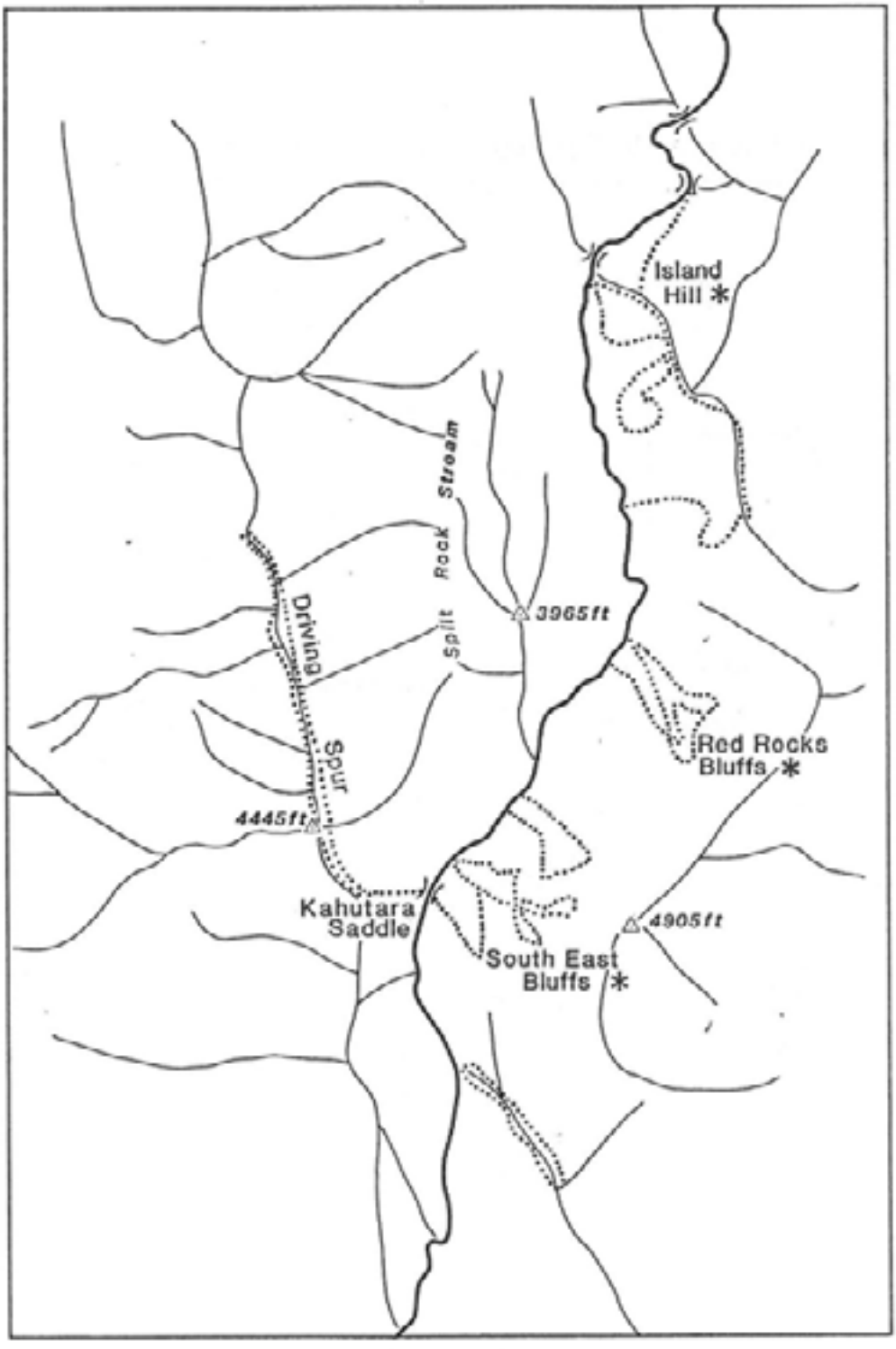
Searching around Kahutara Saddle (NZMS1 S48 738016) for black-eyed gecko was carried out on 11.12.87 (9 hours, daytime only) amongst all recognisable habitats (screes and rock jumbles, vegetation and bluffs), between 19.2.88 to 1.3.88 (all possible habitats, and night-tune searching) and from 15-17.12.88 (6 hours night-time searching on the southeast bluffs -see Figure 1). The bluffs (central on grid ref 902085) above a Hutton's shearwater colony ("Harrows" colony S49 : 898085, Fig. 2) were searched for 3 hours on 23.3.88 in temperatures between 8-10^{o} from 2100 to 2400 hours. A northwest facing bluff behind Cameron's residence (Puhipuhi Peaks farm, Fig. 2) centred on a point (S42+43 062167) just below Mt Alexander was searched on 1.6.88 for four hours between 2030 and 2330 hours. The bluffs known as "Batty" above the Wharekiri Stream (grid ref S49: 71027163) were searched by day for approximately 3 hours on 19.12.88.

The bluffs at the species' discovery site in the headwaters of Shearwater Stream were searched (grid reference S42+43 014198) on two occasions. The bluffs run parallel to a large active slip opposite the shearwater colony that Mr Geoff used to carry out his research. Three hours were spent on 14.3.88 (1945 to 2245 hours) in barely suitable conditions and 2.5 hours on 10.3.89 in ideal conditions.

The Clarence Valley was searched for bluffs similar to those on which the black-eyed geckos occur near Kahutara Saddle. This search was made by driving down Seymour Stream (NZMS 1 S48) along the vehicle track to the Willows Hut, to the saddle below Palmer (S48 : 633082). From the Palmer Saddle all the south east facing hills on the true left of the Clarence River between Dillon Cone (S48: 555082) and Beattie (S41: 652160) were searched (see Fig. 2). No rock bluffs similar to those where black-eyed geckos are known to occur were seen in another vehicle survey to the Warder Neck (S49: 697049) along the track marked on the map (S49) from the Seymour and its unmarked extension, and the various driving about the Kahutara Saddle area in a rectangle with coordinates: S48: 7000950, 680950, 700710, 680710.

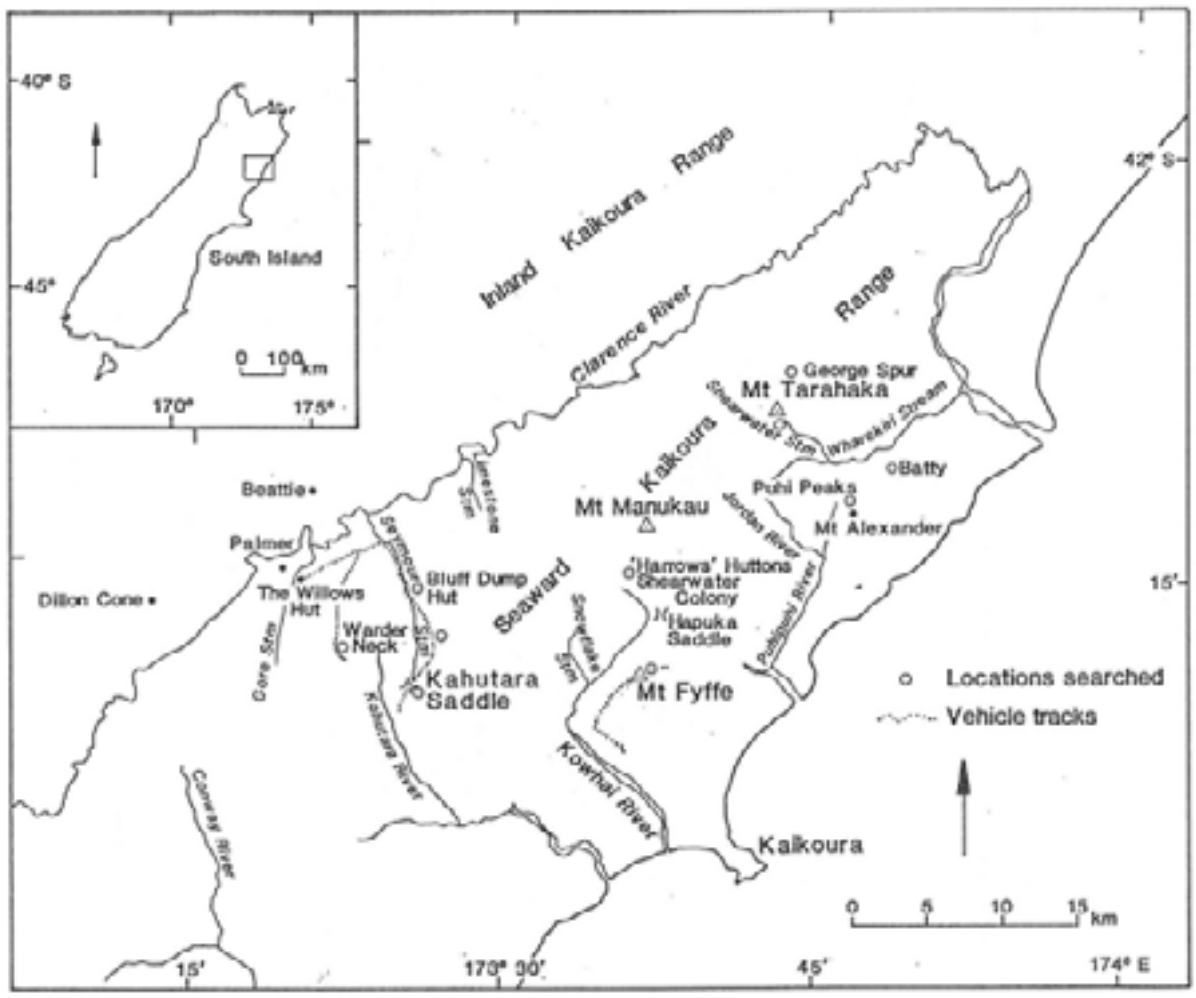
Similarly, a visual search of the east facing ridges of the Seaward Kaikoura Ranges between Kahutara Saddle and Mount Tarakaha (S42 + 43: 013217) indicated there were no bluffs likely to harbour black-eyed geckos. Further checks made on 1.3.88 indicated there were no likely bluffs on the ridge-line associated with Mt Fyffe from Kowhai River to the Hapuka Saddle, in the Puhipuhi Valley (except the Puhipuhi Peaks bluff below Mt Alexander mentioned earlier), nor in "Blue Duck Valley" except the north-west facing bluffs below Batty (S42 + 43 : 713175).

Figure 1: Routes walked (dotted lines) in the Kahutara Saddle area, drawn from aerial photo, scale 1:5000.



Notes: Trig stations correspond with those found on NZMS 1, S42 and S43.
Those names marked * are not offical place names.

Figure 2: Eastern Marlborough, showing localities mentioned in text.



Mike Morrisey searched cliffs in the Limestone Stream (tributary of the Clarence River) in January 1989 near the DOC's shooters' hut (S42+43 818108). No geckos were seen although apparently ideal habitat occurs there.

2.2.2 Rats
Rat-trap lines were set up in the black-eyed gecko range (all over 1220m ASL) as opportunity afforded on (I) Kahutara Saddle -two lines of 30 traps located at each end of the bluffs where black-eyed geckos occur (grid refs S48 : 741017 and 745021 approx.) set on 14 to 16.12.88, (2) Shearwater Stream - one line of 20 traps (grid ref S42 + 43 : 014202) set on 11, 12.2.89 and (3) Harrow's Hutton's' shearwater colony Upper Kowhai River (Fig 2) -one line of 8 traps (17-20.3.88) (grid ref S49 : 898088 approx.). While black-eyed geckos are not known from the Kowhai River area, this site was included to gain a better idea of rodent distribution in the Seaward Kaikoura Ranges.

3. RESULTS

3.1 Black-eyed gecko
Seven black-eyed geckos were caught and measured in the Saddle area (except the south east facing bluffs): two adult males, one adult female, one sub-adult female, one juvenile female and two juveniles of unknown sex. A further 8 positive sightings of the species were made and an additional 3 probable sightings. All observations of black-eyed geckos were made in 33 hours of night-time observation over 14 nights, usually between the hours of 2100 and 0100 hours. It was possible that the adult female was gravid given her apparent distended abdomen. Details of the sightings and the captured animals occur in Appendices 1 to 3.

Two black-eyed geckos were caught and measured on the south east facing bluffs (Appendix 3), one caught and lost (juvenile; grid ref. 743015) and three eye reflections that were almost certainly black-eyed geckos were seen. The adult male (Appendix 3) was with another gecko (one of the three 'reflections' noted previously) and was about the same size. The escapee was caught on a bluff near a shallow crevice about 2m from the ground. It was apparently alone.

No lizards were found during daylight searching of crevices in the bluffs. Similarly, none were found in the headwaters of Shearwater Stream by day or night. Hence our searching did not extend, or even confirm the known range of *H. kahutarae* except to include the southern bluffs of the hill they were discovered on.

Mr Doug Hockey of Atheney Road, Kaikoura, found a juvenile black-eyed gecko during the day on George Spur (29.1.89, grid ref. S42+ 43 : 016228, Fig. 2). It occurred on a north-facing scree, composed of crumbling rock above some bluffs, at 2134m ASL. Mr Hockey took two photographs of the animal and of the locality which I have viewed: the dark hooded eyes were obvious and the colouration typical of black-eyed geckos. This is the highest record of a black-eyed gecko so far (or for any lizard in New Zealand according to the Amphibian and Lizard Distribution Scheme of New Zealand) and is about 2.7 km in a straight line from the species' discovery site (Shearwater Stream). It is the only sighting in recent years to significantly expand their range.

There was no relationship between gecko activity and ambient air temperature, except to suggest that activity was greatest above 9°C. Only one dropping was collected from captured animals and this contained blowfly remains.

3.2 Other species

3.2.1 Lizards.
Two scree skinks (*Leiolopisma otagense form waimatense*) were seen (at the same time and location) and one was captured. The sightings were made on 20.2.88 at 1545 hours in warm conditions on a north west facing bluff outcrop, just above the sub-alpine vegetation (S48 : 746017 approx.). The third scree skink, a sub-adult female, was caught on a scree at 1240 hours (21.2.88, temperature 11.3°C, S48 : 752047).

"Maxi" and "mini" (large and small forms of the common gecko *Hoplodactylus maculatus* were seen on 22.2.88 at S48: 67467023 in fine, sunny weather under a stable boulder jumble (rocks less than lm diameter). A "mini" female was found with an adult male on Driving Spur (S48 : 733014) on 22.2.88 in fine weather beneath a flat rock on the ridge top. Finally, a "mini" juvenile male was caught on a rock face on 28.2.88 at 2200 at 17.5°C at S48: 749023.

Common skinks (*Leiolopisma nigrplantare maccani*) were seen on seven occasions - two in the saddle region where black-eyed geckos occur, three at S48: 746023, one at Bluff Dump Hut and one at Mt Warder.

3.2.2 Wetas and weevils.
A male weta (*Deinacrida* sp.) was collected from the black-eyed gecko habitat at S48 : 744018 (at 1310 m ASL). Another weta of the same species was seen in a crevice on a rock bluff (28.2.88 at 2300 hours, air temperature 17.8°C S48: 749023). This animal was also active. The colouring of these specimens was darker than that of *D. parva*. Their hind legs were reddish-coloured and were more slender than those of *D. connectens* or *D. parva*. The thoracic tergite of the collected specimen is similar to that of *D. connectens* and *D. parva*, but the first two abdominal tergites differ in that their anterior dorsal edges are rounded. The wetas seen, and caught, appear to represent an undescribed species previously known from eastern Marlborough from one specimen (pieces only, G. W. Ramsay, Entomology Division, DSIR; pers. comm.). I collected a second specimen (broken pieces) of the same weta from Shearwater Stream at grid ref 016200 (NZMS1, S42 + 43) on 23.1.89.

M. J. Meads (Ecology Division, DSIR) collected a large (about 12mm long) light brown, ribbed, flightless weevil on 15.12.88. It had a pronounced rostrum and an almost striped appearance. The weevil is thought to be a new species of *Anagotus* sp. and was caught from the "Red rocks" bluffs, Kahutara Saddle (grid ref S48 : 748023 approx).

3.2.3 Mammalian predators.
A cat was seen during the day near the outlet of the Seymour Stream (28.2.88) and cat scats were found near Kahutara Saddle. An adult ferret was seen at night near the Kahutara Saddle as were a number of possums. A stoat was seen foraging about Hutton's Shearwater burrows, Shearwater Stream, at grid ref (approx.) 010205 (NZMS1, S42+43) on 11.2.89. On another trip, M. J. Meads (pers. comm.) saw a stoat with a spotted skink (*Leiolopisma lineoocellatum*) in its mouth at the Kahutara Saddle. No rats were caught in the three areas trapped.

4. DISCUSSION

One can speculate that the reason black-eyed geckos still occur in the Kahutara Saddle area (and others) is partly because rats are rare above about 1220m ASL despite having had ample opportunity to colonise the area over the years. For example, there are reports of "droves" of rats in the Kaikoura high country from early in the century (Geoffrey Harrow pers. comm.). Low numbers of rats at high altitude coupled with the gecko's habit of occupying deeply creviced bluffs which afford ideal retreats, and the abundance of bluffs may have contributed to the survival of black-eyed geckos in the Seaward Kaikoura Ranges.

There is apparently no threat to the lizard population from present land management practices. This situation might change if the stocking rate of sheep was increased significantly or cattle introduced. However, there appears to be little chance of this happening.

Some tentative generalisations about black-eyed gecko follow. Black-eyed geckos are not known from outside the Seaward Kaikoura Range and may be endemic to it. Black-eyed geckos appear to prefer sheer alpine bluffs above 1220 m ASL made of stable sedimentary rock with deep fissures. Bluffs may be north, west or south facing. The small black-eyed geckos found were invariably on screes or non-bluff sites, though bluffs were very near. The presence of juveniles, and an almost certainly gravid female, suggest that the populations (Kahutara and George Spur) are reproducing.

Black-eyed gecko activity is correlated with temperature: best results when searching were achieved above 10°C at night. They are nocturnal and may be entirely insectivorous. Black-eyed geckos are an alpine gecko which must hibernate during winter since their habitat is snow bound for up to 8 months of the year. They must have highly developed behavioural and physiological adaptations to survive in such an extremely cold, and hot (in summer) habitat.

5. RECOMMENDATIONS

More data are needed on the distribution of black-eyed geckos (e.g. George Spur area, night-time searches of Batty bluffs, bluffs in the Limestone Stream). Until more survey work has been done it is not possible to determine accurately the status of the species. However, it occurs in low density and is currently known from only three localities (Kahutara Saddle, Shearwater Stream and George Spur). I recommend that survey work be carried out during the 1989/90 summer at the George Spur, the Batty area above the Wharekiri Stream, and the Limestone Stream (Clarence River tributary), and at Shearwater Stream determine if a population still occurs at the site where the species was first discovered.

A detailed ecological survey (plants, invertebrates included) of the Kahutara Saddle area is required because I believe this area harbours a number of giant and/or little known insects (two already found accidentally). The area is apparently less modified than other parts of the alpine Seaward Kaikoura Range (pers. obs.) which may, in part, be because of the rarity of rats.

6. ACKNOWLEDGEMENTS

My thanks to Ross Wilson, Mike and other Department of Conservation District office staff - without their assistance the survey would have been impossible. To Tony Whitaker (the amiable teacher), for his tuition and agreeing to undertake the contract to help in the first survey. Tony Whitaker, Don Newman and Mike Clare improved drafts of this report. To Don and Roy Cameron my thanks for permission to stay on their properties and for assistance in fieldwork. The McKenzie generously supported the funding of fieldwork.

7. REFERENCE

Whitaker, A.H. (1984): *Hoplodactylus kahutarae* n. sp. (Reptilia: Gekkonidae) from the Seaward Kaikoura Range, Marlborough, New Zealand. *New Zealand Journal of Zoology 11:* 259-270.

APPENDIX 1:

HOPLODACTYLUS KAHUTARAE CAUGHT NEAR KAHUTARA SADDLE, SEAWARD KAIKOURA RANGE.

1. Adult male, transverse banding obvious, yellow soles of feet, orange mites at base of tail. Chirping calls while handled. Caught at 221 hours in 9.0°C, 10m from base to bluff on 12cm ledge.

2. Adult female, same comments as for 1 above but lighter coloured underside compared with the male. Caught at 0006 hours at 10.3°C in a wide crevice under rock slab about 10x30x5 cm.

3. Sub-adult female, same comments as 2 above. Caught at 2150 hours at about 10.2°C about 10m from the base of a bluff on a shrub-covered ridge on exposed edge, no cracks nearby.

4. Juvenile female caught at 2130 hours at12.3°C (approx). Area unstable with loose small rocks. Animal situated in a small crevice off the main bluff system, some vegetation. Tongue light orange-purple at tip, inside jaws orange.

5. Adult male caught on prominent rock jutting from rock face on bluff. In company of another lizard which looked like a black-eyed gecko. Orange mites present.

6. Juvenile caught at 0100 hours, temp 12.0°C. On bluff removed from large crevices - only small cracks or niches. No vegetation nearby. Near a large scree. Jumped (purposely) downhill to avoid capture when I was c. 2m away. Orange mites present around groin.

7. Juvenile caught (escaped, therefore no reference in Appendix 3) on 16.12.89 at grid ref. 743015. Caught on bluff 3m above ground. No other black-eyed geckos.

Note: These lizards are referred to in Appendix 3 in the same order

APPENDIX 2:

HOPLODACTYLUS KAHUTARAE SIGHTINGS NEAR KAHUTARA SADDLE, SEAWARD KAIKOURA RANGES.

1. 19.2.88, 2230 hours, 15.2°C. Base of bluff, one eye reflection only - moved into crevice.

2. 19.2.88, 2250 hours, 16.1°C Bluffs proper -vertical rock faces, crevices, stable. Two geckos - outline and markings apparent, immobile.

3. 19.2.88, 2350 hours, 11.6°C. Lower bluff, one eye reflection only.

4. 19.2.88, 2428 hours, 11.0°C Lower bluff, one eye reflection only -animal disappeared into a crevice. S48: 734017, 1370 m ASL, south east facing bluffs of Kahutara Road saddle.

5. 26.2.88, 2206 hours, no temp. Twenty metres from #4 sighting. Positive identification - chased into a deep crevice.

6. 26.2.88, 2240 hours, 9.2°C On a pinnacle southeast facing bluffs -exposed, 11m from base. Light grey of body discernable. Positive identification, S48 : 746017, 1370m ASL.

7. 27.2.88, 2200 hours, 12.5°C. On edge sheer south-facing bluff about two thirds from the bottom. First bluff facing Blind Saddle. S48: 67487017, 1433 m ASL.

8. 27.2.88, 2347 hours, 11.3°C. Eye reflection only -probably *H. kahutarae*. One third along the distance from the left facing the bluff nearest road saddle and one third from the top. Alone on a ledge with some vegetation nearby. S48 : 67467013.

9. 27.2.88, 2330 hours, 11.2°C. Eye reflection, alone near crevice on sheer bluff. Halfway along the distance from the left facing the bluff nearest the road saddle and one third from the base. S48: 67487013.

Note: The following were on 15.12.88.

10. Eye reflection at 2050 hours, 13.3°C (Ambient). Rock surface (facing sunset) temperature 20.7°C - perhaps rock temperature is important for black-eyed geckos. Wind = 0, partly cloudy, ½ moon. S48: 753015.

11. Eye reflection at 2246 hours, temp. 13.1°C. On bluff but vegetation above and below lizard. Same weather as 10. Grid ref. 752015.

APPENDIX 3:

MORPHOMETRIC DATA FOR *HOPLODACTYLUS KAHUTARAE* CAUGHT AT KAHUTARA SADDLE

Animal number	l(M ad)	2(F ad)	3(F)	4(F juv)
Snout-vent length	86.0	89.0	87.0	60.0
Vent-tail length	92.0	99.0	92.0	70.0
Snout-forelimb	29.0	32.0	31.0	40.0
Axilla-groin	42.0	42.0	46.0	22.0
Snout-eye	10.0	10.0	9.0	6.0
Eye-ear	7.5	7.0	6.0	5.0
Head length	22.0	24.0	24.0	19.0
Head width	17.0	16.0	16.0	12.0
Eye diameter	4.0	-	-	-
Labial scales				
Upper: left/right	11/11	11/12	11/11	13/10
Lower: left/right	11/12	11/11	11/10	11/12
Fourth toe lamellae (dilated) left/right	12/12	12/14	11/11	11/11
Femoral pores : deep x wide	5 x 9	none	none	none
Cloacal spurs	2	2/3	2	2
	-	Small	Small	-
Weight (grams)	15.2	18.2	14.7	4.6
Temperature at capture (^{o}C)	9.0	10.3	10.2	12.3
Time at capture	2211	0006	2150	2130
Grid reference (NZMS1 S48)	6746	6744	6743	6744
	7017	7018	7015	7017
Date caught (1988)	22.2	22.2	26.2	27.2
Height (m ASL)	1402	1310	1372	1341

APPENDIX 3:

MORPHOMETRIC DATA FOR *HOPLODACTYLUS KAHUTARAE* CAUGHT AT KAHUTARA SADDLE

Animal number	5(M Ad)	6(JUV)
Snout-vent length	87.60	70.80
Vent-tail length	85.90	70.35
Snout-forelimb	33.15	27.45
Axilla-groin	38.65	30.60
Snout-eye	8.40	7.70
Eye-ear	7.85	5.25
Head length	24.90	24.10
Head width	15.40	13.30
Eye diameter	4.05	3.35
Total length	161	
Labial scales		
Upper: left/right	15/10	-
Lower: left/right	12/11	-
Fourth toe lamellae (dilated) left/right	11/11	-
Femoral pores : deep x wide	6x26	-
Cloacal spurs	3	3
Weight (grams)	16	7.4
Temperature at capture (^{o}C)	12.5	12.0
Time at capture	2146	0100
Grid reference (NZMS1 S48)	751016	743015
Date caught (1988)	15/12	15/12
Height (m ASL)	1372	1372