

Predation by Cats on the Unique Endemic Lizard of Socorro Island (*Urosaurus auriculatus*), Revillagigedo, Mexico¹

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ABSTRACT. During 1990 the distributions of the endemic lizard (*Urosaurus auriculatus*) and the feral cat (*Felis catus*) of Socorro Island were observed and scats of the last species were collected. A total of 46 cat scats were analyzed, showing that lizards were an important prey item, varying in frequency from 33.33% in February to 66.66% in November. Because of the impact of sheep (*Ovis aries*) on the natural vegetation and because of the impact of cat predation, we recommend that a plan be developed for the removal of exotic species and the restoration of natural vegetation to Socorro Island.

OHIO J. SCI. 93 (4): 101–104, 1993

INTRODUCTION

The Revillagigedo Archipelago of México, with the incidence of endemic species reaching almost 30%, is an important spot for consideration by world diversity conservation programs (Ortega et al. 1992). For instance 90% of terrestrial avian fauna are unique at the level of subspecies, species, or genus.

Considering the entire Archipelago there exist only two species of endemic lizards: *Urosaurus clarionensis* from Clarion Island, and *Urosaurus auriculatus* (Cope 1871), populations of which are restricted to Socorro Island. At present, *U. auriculatus* lizard reaches high densities in the remnants of natural ecosystems of the island, but in the areas where the natural vegetation has been deforested by the feral sheep (*Ovis aries*) no lizards are present (Ortega-Rubio et al. 1991).

The effects of feral sheep are more moderate on other islands (Dilks and Wilson 1979, Hercus 1964, Howard 1964), but on Socorro their impact is severe, causing erosion damage, shifts in abundance of plant species, and impaired forest regeneration (Ortega et al. 1992). Approximately 30% of the original natural vegetation and soil of the island have been destroyed and eroded through overgrazing by introduced sheep (Ortega et al. 1992). The problem is alarming because the rate of soil erosion has been estimated at 30 to 90 tons per hectare annually in the deforested zones (Ortega et al. 1992).

There exists little work concerning the impact by cats on lizard island populations, mainly because of the availability and abundance of other prey items for the cats in these islands (Karl and Best 1982, Nogales et al. 1988, Santana et al. 1986). In Socorro Island, most of the previous work concerning *U. auriculatus* is devoted to taxonomic aspects, while only secondarily considering ecological relationships (Brattstrom 1955, 1982, 1990; Cope 1871; Mittleman 1942; Slevin 1926). Particularly there is no previous work considering the impact on endemic lizards by exotic species introduced to this oceanic island; such is the case of the domestic cat (*Felis catus*), responsible for the decline in population density

and the extinction of many other species, especially birds (Karl and Best 1982, Moore and Atkinson 1980, Veitch 1980), in insular ecosystems (Ebenhard 1988).

MATERIALS AND METHODS

Study Site

Socorro Island is a volcanic cone whose highest point is Mount Everman (1,040 m), which is located at the Revillagigedo Archipelago (18°20' and 19°20' N; 110°45' and 114°50' W) along with three other oceanic islands: San Benedicto, Clarión, and Roca Partida. Socorro Island is the biggest of the four with a surface area of 140 km² (Fig. 1). It is also the more biologically important as evidenced by the incidence of endemic species.

The climate of Socorro Island is arid tropical with an average annual temperature of 24.8° C and an average annual precipitation of 327.7 mm. The hurricane season extends from July to October. Remanent natural vegetation of Socorro includes nine associations (Fig. 1), varying from coastal halophytes at the seashore to several kinds of shrubs and forest along an elevation gradient reaching 1,040 m.

Methods

During 1990 we spent 13 consecutive days in February, 6 consecutive days in May and 8 consecutive days in November searching for scats, tracks, and other evidences of feral cats, and also looking for lizards. The feral cat is the unique mammal predator in Socorro Island.

For each fecal sample collected, the vegetal association in which the sample was found and the altitude were recorded. Each fecal sample was analyzed for remnants of *U. auriculatus*, using a stereoscopic microscope (Zeiss Stemi SR) and comparing the residuum of scales, bones, feathers, and hairs with those of the collection of the Centro de Investigaciones Biológicas, previously established.

RESULTS

U. auriculatus was observed in all vegetal associations of the island, from sea level to the top of the Everman volcano. However, no lizards were observed in the eroded zones. Despite the difficulty in accurately estimating their number, the evidence of feral cat activity indicated that

¹Manuscript received 26 January 1993 and in revised form 22 June 1993 (#93-03).

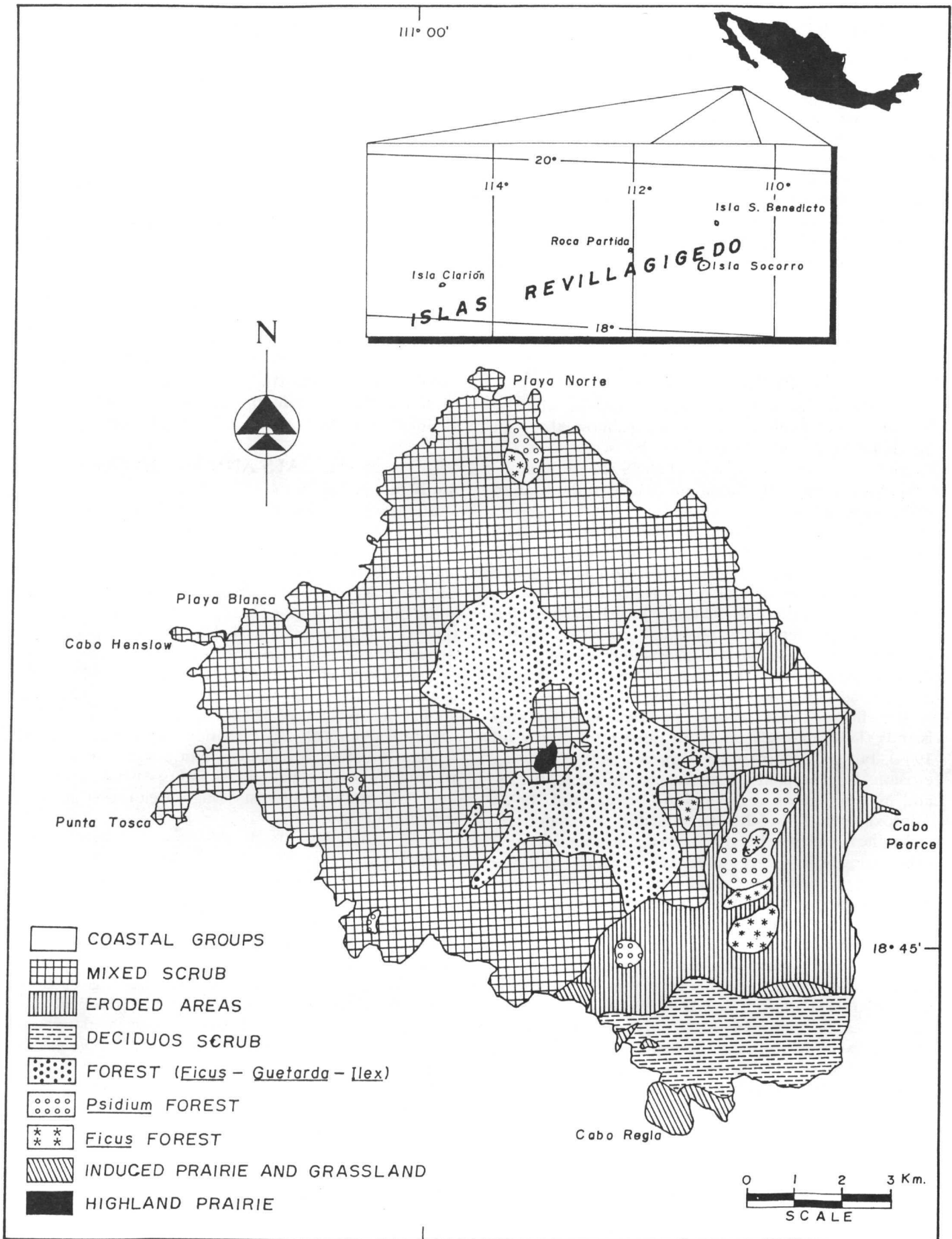


FIGURE 1. Location and vegetation of Socorro Island.

F. catus was present in the southern half of the island, and the population seemed to be greater in the southeast portion of the island. This area is the most perturbed by human activities (Rodríguez-Estrella et al. 1991) and apparently the cat is associated with such activities.

The analysis of the cat fecal samples collected demonstrated that during 1990, orthoptera, the domestic mouse (*Mus musculus*), and the endemic lizard, represent the greatest frequency of occurrence (Table 1). The frequency of occurrence of lizards in the scats varies from 33.3% in February to 66.7% in November.

Consequently, the threat for the endemic lizard will increase directly as the cat population continues to grow. Species introduction has been demonstrated to be a key factor in the extinction of island species (deVos 1977), and cats are one of the most destructive of the species introduced by man (Ebenhard 1988). For instance, Jehl and Parkes (1983) proposed that feral cats are responsible for the extinction of the endemic Socorro dove (*Zenaida graysoni*).

We recommend the institution of an urgent program for removal of exotic species, specially feral sheep and

TABLE 1

Domestic cat (Felis catus) diet at Socorro island during 1990.

	Feb N = 12		May N = 19		Nov N = 15		Total N = 46	
	n	%	n	%	n	%	n	%
Mammals	11	91.66	17	89.47	7	46.66	35	76.08
<i>Mus musculus</i>	9	75.00	17	89.47	7	46.66	33	71.73
Birds	3	25.00	4	21.05	2	13.33	9	19.56
<i>Zenaida macroura</i>	0	0.00	2	10.52	1	6.66	3	6.52
<i>Columbina passerina</i>	2	16.66	3	15.78	1	6.66	6	13.04
<i>Thryomanes sissonii</i>	1	8.33	1	5.26	0	0.00	2	4.34
<i>Parula pitaiayumi</i>	2	16.66	1	5.26	0	0.00	3	6.52
<i>Mimodes graysoni</i>	1	8.33	0	0.00	0	0.00	1	2.17
Reptiles	4	33.33	10	52.63	10	66.66	24	52.17
<i>Urosaurus auriculatus</i>	4	33.33	10	52.63	10	66.66	24	52.17
Invertebrate	9	75.00	14	73.68	15	100.00	38	82.60
Orthoptera	8	66.66	12	63.15	15	100.00	35	76.08
Lepidoptera	2	16.66	0	0.00	0	0.00	2	4.34
Coleoptera	2	16.66	4	21.05	5	33.33	11	23.91
Hymenoptera	1	8.33	1	5.26	0	0.00	2	4.34
Scorpions	0	0.00	4	21.05	0	0.00	4	8.69
Decapoda								
<i>Gecarcinus planatus</i>	0	0.00	2	10.52	0	0.00	2	4.34
Miscellaneous	9	75.00	17	89.47	15	100.00	41	89.13

N represents the total number of analyzed samples and n the number of scats in which item was observed.

DISCUSSION

Urosaurus auriculatus individuals can use different kinds of habitats, depending mainly on the availability of various classes of microhabitats, and probably because of the intrinsic plasticity of members of this species (Ortega-Rubio et al. 1991). Such plasticity could explain the wide distribution of this species on Socorro Island. However, suitable habitat for this lizard is rapidly disappearing because of the growing rate of deforestation and erosion (Ortega et al. 1992). Additionally, in the places where natural vegetation remains, endemic lizards must cope with predation by feral cats, since approximately half of the feral cats are preying on *Urosaurus auriculatus*.

cat, and the development of a restoration program to protect to *U. auriculatus*, as well as the total Socorro Island biodiversity. Additionally, we hope to call attention to endangering conditions that affect the endemic lizard populations of the Revillagigedo Islands and to urge implementation of the necessary measures for their effective protection.

ACKNOWLEDGEMENTS. This study was funded by the Centro de Investigaciones Biológicas de Baja California Sur (CIB), the Secretaría de Programación y Presupuesto (SPP), the Consejo Nacional de Ciencia y Tecnología (CONACyT), the Fund for Studies and Research Ricardo J. Zevada from México and by The World Wildlife Fund (WWF) of the United States of America. Thanks are also due to the Secretaría de Desarrollo Urbano y Ecología (SEDUE), the Armada de México, and

Ricardo Rodríguez-Estrella. We would like to thank two anonymous reviewers and *The OJS* editorial staff for their invaluable comments and suggestions on an earlier version of the manuscript. Lolita Vázquez and Veronica Hiraes provided expert secretarial assistance.

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