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POPULATION DYNAMICS OF THE EUROPEAN LEAF-TOED GECKO (*EULEPTES EUROPAEA*) IN NW ITALY: IMPLICATIONS FOR CONSERVATION

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A continental population of the European leaf-toed gecko (*Euleptes europaea*) was studied from 1996 to 2000 in Central Liguria (NW Italy), to obtain data on demography, abundance and population trends. Each year in July, three night mark-recapture sessions were carried out to obtain data on population structure and abundance. The population structure of the European leaf-toed gecko was assessed on the basis of polymodal body-size frequency distributions, and the demographic structure was characterized by three well-separated size groups: juveniles ending their first year of life, subadults in their second year and mature individuals aged three or more. Growth appeared constant during the first two years, and then apparently decreased in the third year when functional sexual maturity was achieved in both sexes. The sex ratio of the reproductive population did not differ from unity and females were, on average, 5% larger than males. The physiological status of different age groups, assessed by a body condition index, did not show significant variations during the study. The observed stability of overall population size highlights the capacity of small and completely isolated colonies of the European leaf-toed gecko to persist for a long time, even in extremely simple habitats. However, the number of breeding adults showed large fluctuations, from 120 to 50 animals in different years, and count data suggested a downward trend in population size. Nevertheless, the statistical power of not reject ing the null hypothesis of "no change" (i.e. Type II error) was low, and a Monte Carlo simulation analysis showed that doubling the monitoring effort (i.e. 10 annual surveys with 30 sampling occasions) should be sufficient to detect a 10% decrease in population size with a power of >0.80. Without detailed population data from such intensive monitoring, isolated populations of *E. europaea* remain exposed to a high risk of extinction through stochastic and anthropogenic processes.

Key words: conservation, Geckonidae, Liguria, population size, population structure, power analysis

INTRODUCTION

Geckos are relatively poorly studied compared to some other lizards (Henle, 1990*a*), and little is known about their population ecology and demography in the Mediterranean basin. In this area, out of 41 gecko species (Sindaco, 1998), only the European leaf-toed gecko, *Euleptes europaea* (Gené, 1839), formerly *Phyllodactylus europaeus* (see Bauer *et al*., 1997), is listed as "vulnerable" by IUCN (1996). It is an extremely small nocturnal lizard with a maximum adult body mass of 2 g (Delaugerre, 1997); it is endemic to the western Mediterranean, and belongs to a monophyletic genus (Bauer *et al*., 1997). *Euleptes europaea* is found on the mainland and some islands of Southern France; the coast and two islets of Liguria (NW Italy); the coast of Tuscany and the Tuscan Archipelago; Sardinia and Corsica and nearly all their satellite islands, as well as three islands off the coast of Tunisia (Delaugerre, 1997). Its present geographical range is clearly relictual and is composed of hundreds of isolated populations inhabiting islets and a few continental areas in Southern France, Liguria and Tuscany (Capocaccia, 1956; Vanni & Lanza, 1978; Delaugerre, 1981*a*, 1997). *Euleptes europaea* shows peculiar biological features, being particularly well adapted to small islands and even islets of less than 1000 m² in size, where it is the only resident vertebrate and the main terrestrial predator (Delaugerre & Cheylan, 1992; Poggesi *et al*., 1996; Thibault, *et al*., 1987). Across its geographical range, *E. europaea* displays a certain degree of morphological variation in body size, sexual size difference and coloration, suggesting that environmental or stochastic events have had a direct influence upon the ecological adaptation and life history of these populations (Delaugerre, 1985, 1992; Kulesza *et al*., 1995).

Understanding geographical and temporal variations in life-history characteristics appears critical for the conservation of gecko populations living in fragmented habitats (Sarre, 1995, 1998; Sarre *et al*., 1996). Although *E. europaea* is considered by the IUCN to be "vulnerable" (IUCN, 1996) and by the European Herpetological Society to be "threatened" (Stumpel *et al*., 1992), little is known about its population dynamics and long-term fluctuations in abundance. Whereas Delaugerre and co-workers (Delaugerre, 1981*a*,*b*, 1985; Delaugerre & Dubois, 1986; Delaugerre & Cheylan, 1992) studied in detail some aspects of its population autoecology in southern France and Corsica, quantita-

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tive data on Italian and Sardinian populations are completely lacking, apart from a preliminary report by Allosia *et al.* (1999) on a continental population. For these reasons, the conservation actions proposed by Stumpel *et al.* (1992) were based on little field evidence.

The purpose of this study was to collect data on the demography, abundance and population trend of an isolated continental population of *E. europaea,* to evaluate its conservation status, to propose a long-term monitoring protocol to be used in similar ecological situations and to provide a baseline for comparison with other populations.

STUDY SITE AND METHODS

The study site is located near Genova, NW Italy, at an altitude of about 300 m a.s.l. The climate of this region is sub-Mediterranean (*sensu* Daget & David, 1982) with a short dry period in July and two rainfall peaks in October and March (Brancucci, 1994). Mean annual temperature averages 17 °C (ranging from 21-27 °C), reaching a maximum (24°C) in July-August. Geckos were found only on the walls of an isolated building that is now abandoned. This isolated population was first described by Capocaccia (1956) and is considered by several authors to be of natural origin (Capocaccia, 1956; Delaugerre, 1981*a*; Vanni & Lanza, 1978; Sindaco, 1994); however, an introduction by man cannot be completely ruled out. During this study, three other reptile species were observed at the study site: one specimen of the common wall lizard (*Podarcis muralis*), and one adult wall gecko (*Tarentola mauritanica*) were seen on the building at dusk in 1996 and 1999 respectively, while the Southern smooth snake (*Coronella girondica*) a potential gecko predator, was observed on the walls of the building by night once in 1997, twice in 1998 and once again in 1999.

The gecko population was sampled from 1996 to 2000 in July, during relatively hot nights, by at least three researchers. Three sampling sessions were performed within a time period not exceeding eight days. Specimens were captured from ground level up to 2.5 m, since few geckos were observed above this height. The total wall surface sampled in this study was about 150 m^2. Intensive collecting started immediately after sunset and continued for about 45 min after the first gecko was captured, or until two complete searches on the building walls failed to locate further specimens. Animals were spotted by the aid of hand- and head-lights, captured by hand and kept temporarily in small plastic boxes. Snout-vent length (SVL) was measured to the nearest mm, from the tip of the snout to the posterior end of the vent, holding the gecko ventral-side-up against a transparent plastic ruler. Body mass of individuals with complete tails (W) was measured, to the nearest 0.1 g, with a Pesola spring dynamometer. Geckos were sexed on the basis of external sexual characters: presence of horny spurs on both sides of the tail base in males, absence of spurs and presence of well developed white neck glands in females (Camerano, 1904; Delaugerre, 1981*b*). Moreover, geckos were inspected for recently broken tails (i.e. tails with missing parts) and developing eggs. All the animals captured on the same night were marked with a single, specific paint spot on the back, and different colours were used in successive sampling sessions. At the end of each night's search, all captured geckos were released on the study site.

The SVL measurements generated polymodal frequency distribution histograms that were analysed with the FAO-ICLARM Stock Assessment Tools (FiSAT) computer programme (Gayanilo *et al.*, 1996). This programme enables the decomposition of mixed length-frequency distributions into their Gaussian components by means of Bhattacharya's (1967) log-differences method. This is an iterative process in which each identified component is subtracted from the remainder of the sample using a Gaussian function. A linear regression analysis for each separate component and a χ^2 goodness-of-fit statistic for the entire sample is then calculated (classes with expected frequency <5 are automatically combined with adjacent classes). In addition, a separation index (S.I.) for each pair of adjacent groups is estimated; when S.I. ≤ 2, separation between components is unreliable (Sparre & Venema, 1996). Moreover, FiSAT provides the mean, the standard deviation, and the theoretical number of individuals in each group. As *E. europaea* lives for up to eight years in captivity, according to Knoepffler (1973), there was the possibility of recapturing the same individuals in successive years. For this reason, between-year variations in population structure, mean SVL, mean body mass, and growth increments were analysed by Friedman two-way analysis of variance by ranks, a nonparametric test used to compare repeated measures of matched groups (Siegel & Catellan, 1988). Mean SVL and body mass of males and females within each year-sample were compared by means of Mann-Whitney nonparametric tests. Statistical analyses were processed using Minitab release 12.21 computer software. The population abundance was estimated by means of the CAPTURE programme (White *et al.*, 1982), which is suitable for closed populations. Three estimators were used, the Null Model (M_0), in which capture probabilities for every animal are assumed to be constant on every capture occasion; the Jacknife Model (M_h), which assumes that capture probabilities vary between animals; and the Darroch Model (M_t), which allows capture probabilities to vary only by time – thus, for 't' capture occasions, 't' different values of capture probability are calculated (White *et al.*, 1982). All models give the estimated population size, standard error, mean capture probabilities, and 95% confidence intervals.

The physiological status of immature individuals, sub-adults, females and males was assessed separately by means of a body condition index (BCI), calculated as the residual obtained from a regression of log-transformed body mass against log-transformed SVL (Henle, 1990*b*). Specimens with broken tails and egg-carrying females were excluded from calculations.

The population trend of count data was assessed with the Spearman rank-order correlation coefficient (Siegel & Catellan, 1988). A power analysis was conducted by means of MONITOR version 6.2, a programme designed to test the power of monitoring protocols to detect linear or exponential trends in count data (Gibbs, 1995). In this software, the user defines the number of annual surveys and the mean and standard deviation of population counts. MONITOR uses Monte Carlo simulations to generate data sets based on these input variables, estimating how often the sampling protocol will detect trends of varying strength (Gibbs, 1995). The statistical power estimated ranges from 0 (i.e. low power) to 1 (i.e. high power), and was used to determine how many years of data are required to provide statistical confidence in the results (Reed & Blaustein, 1995). The coefficient of variation (CV = standard deviation/mean) was used to evaluate the variability of the population size estimates and field count data.

RESULTS

INFLUENCE OF AIR TEMPERATURE ON ACTIVITY

On all sampling occasions, gecko activity started shortly after sunset. During our capture-recapture sessions, air temperatures varied from 18.5 to 25 °C (mean 21.9, SD±2.2, n=15). There was no correlation between air temperature and the number of geckos captured during the study (Spearman rank correlation test r_s=0.075, n=15, P=0.71).

POPULATION STRUCTURE

During this study 318 geckos were measured (Table 1). As leaf-toed geckos are long-lived and marks were not permanent, this number probably does not correspond to different individuals. The smallest individuals were 20 mm in SVL, and the largest was a 46 mm female. In all year-samples, size-frequency distributions were polymodal and were resolved into three Gaussian components (Fig. 1). Since in all cases S.I. was > 3.2, the separation between adjacent components was considered reliable. These components were estimated to correspond to three age classes on the basis of external

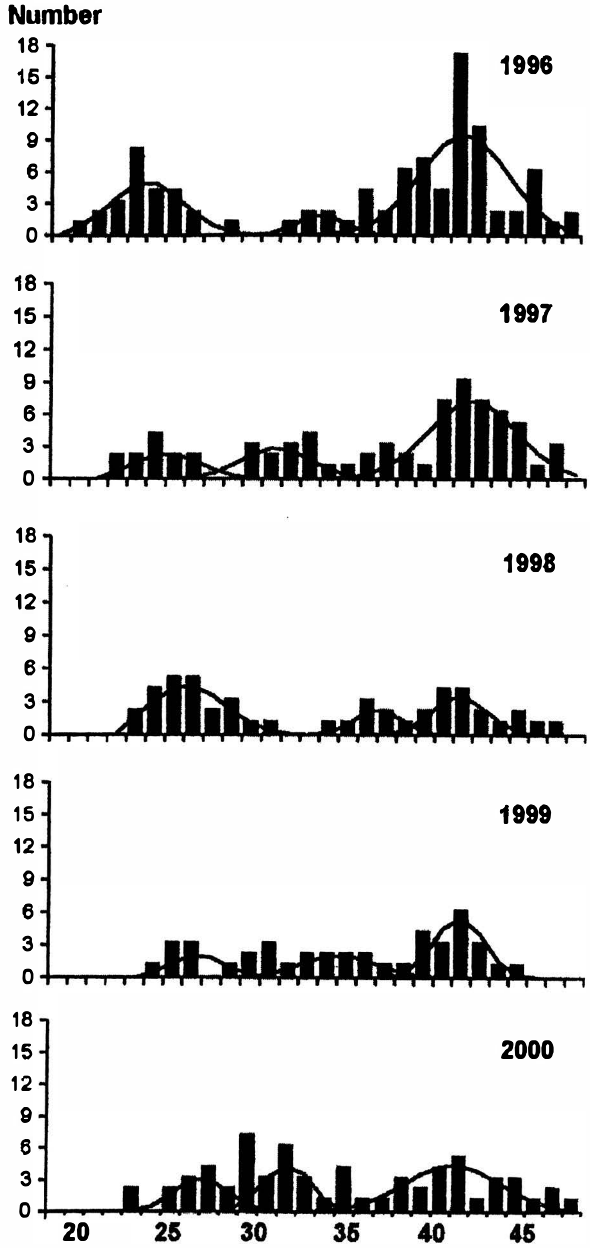

FIG. 1. *Euleptes europaea* body size distributions. SVL = snout-vent length. The curves separating each component were calculated by the FiSAT software (see text).

TABLE 1. Population structure of *Euleptes europaea* from central Liguria, estimated by the FiSAT computer programme (Gayanilo *et al*., 1996). *N*, geckos caught; N_{th},theoretical number of geckos in each snout-vent (SVL) component. NS, P>0.10.

		Component 1		Component 2		Component 3		χ^2
Year	*N*	N_{th}	mean SVL ±SD	N_{th}	mean SVL ±SD	N_{th}	mean SV ±SD	
1996	92	24	23.3±1.9	6	32.5±1.2	57	40.1±2.4	χ^2_{10} = 15.1 NS
1997	72	10	24.5±1.7	13	30.1±1.8	43	40.3±2.3	χ^2_2 = 4.0 NS
1998	49	22	25.6±1.9	7	35.5±1.1	13	39.7±1.4	χ^2_4 = 0.7 NS
1999	41	7	26.2±1.3	10	33.5±1.9	17	39.7±1.2	χ^2_3 = 2.4 NS
2000	64	11	26.5±1.4	18	31.5±2.1	23	39.8±2.7	χ^2_6 = 2.2 NS

TABLE 2. Sexual dimorphim in SVL (mm) and body mass (g) in the reproductive population of *Euleptes europaea*.

Year	Sex	SVL±SD (*N*)	SVL range (min-max)	W±SD (*N*)
1996	Females	41.7±2.62 (24)	37-46	1.4±0.21 (23)
	Males	39.1±1.90 (36)	36-43	1.1±0.15 (34)
1997	Females	41.4±2.19 (26)	36-45	1.6±0.28 (23)
	Males	38.6±3.01 (21)	35-43	1.2±0.21 (16)
1998	Females	40.7±2.42 (12)	38-45	1.5±0.15 (11)
	Males	39.4±1.27 (7)	37-40	1.2±0.18 (6)
1999	Females	40.9±1.35 (7)	39-43	1.6±0.17 (7)
	Males	39.2±1.08 (11)	38-41	1.2±0.20 (7)
2000	Females	41.5±3.26 (13)	36-46	1.4±0.28 (11)
	Males	39.6±1.76 (13)	37-43	1.4±0.14 (10)

sexual characters (Delaugerre, 1981*b*; Delaugerre & Dubois, 1986): the smallest size-group (SVL ≤ 30 mm) was composed of immature specimens (i.e. without mature gonads and external sexual characters); the intermediate size-group (31 ≤ SVL ≤ 33-36 mm, depending on the year sample) comprised subadults with maturing gonads but with poorly developed external characters (as males had very small horny spurs and females were never gravid). The largest size class (SVL ≥ 33-36 mm) comprised only mature specimens of both sexes. This demographic composition did not differ among years, either by estimated number (Friedman's test by year blocked by age group *S*=2.13, df =4, *P*=0.71) or by mean SVL (Friedman's test by year blocked by age group; *S*=0.47, df=4, *P*=0.97, adjusted for ties). The mean growth increment between the first and second size classes was 7.40±2.15 mm (range 5.0-9.9 mm) and the mean growth increment between the second and third size classes was 7.30±2.25 mm (range 4.2-10.2 mm). These growth increments did not vary statistically during the study period (Friedman test by year blocked by age group: *S*=0.80, df=4, *P*=0.930) or between age classes (Friedman test by age group blocked by year: *S*=0.20, df=1, *P*=0.655).

SEXUAL DIMORPHISM

For mature males as well as for mature females, no significant differences between years were detected in mean body length or mass (Table 2; Friedman test by year blocked by sex: *S*=4.60, df=4, *P*=0.406 and *S*=2.40, df=4, *P*=0.663 for females and males, respectively).

Females were significantly larger than males in 1996, 1997 (Mann-Whitney *U*-test; *P*=0.001 in both cases) and 1999 (*P*=0.02), but not in 1998 and 2000 (*P*=0.10). Sexual dimorphism was, on average, 5% – ranging from 7% both in 1996 and 1997, to 3% in 1998. The sex ratio of the adult population fluctuated from 0.67 females per male in 1996 to 1.72 females per male in 1998 (Table 2).

BODY CONDITION INDICES

The mean BCI was calculated for juveniles, subadults, adult males and adult females separately (Table 3). Standard deviations were usually large, indicating strong intra-group variability. Annual BCI values were compared by means of Friedman's two-way analysis of variance by year blocked by age group and did not show significant variations (*S*=6.97, df=4, *P*=0.137, adjusted

TABLE 3. *Euleptes europaea* mean body condition index (BCI). Specimens with broken tails and females with eggs were excluded.

	Juveniles		Subadults		Adult females		Adult males	
Year	*N*	BCI±SD	*N*	BCI±SD	*N*	BCI±SD	*N*	BCI±SD
1996	19	-0.07±0.21	8	-0.04±0.18	34	-0.10±0.09	12	-0.03±0.09
1997	11	0.19±0.20	13	0.12±0.13	16	0.05±0.11	23	0.03±0.07
1998	22	-0.04±0.22	6	0.13±0.05	6	0.01±0.05	7	0.03±0.15
1999	7	0.15±0.08	15	-0.09±0.21	10	0.04±0.10	6	0.01±0.14
2000	13	-0.08± 0.20	23	-0.09±0.12	7	-0.05±0.06	10	0.12±0.09

TABLE 4. Number of juvenile, sub-adult and adult female and male *Euleptes europaea* with complete or recently broken tails.

Year	Juveniles		Subadults		Females		Males		Total (%)	
	complete	broken	complete	broken	complete	broken	complete	broken	complete	broken
1996	20	4	8	-	23	1	34	2	85 (92)	7 (8)
1997	11	1	13	-	23	3	16	5	63 (88)	9 (12)
1998	22	1	6	1	11	1	6	1	45 (92)	4 (8)
1999	9	1	11	-	8	-	11	-	39 (98)	1 (3)
2000	19	1	17	1	11	2	11	2	58 (91)	6 (9)
Total	91	8	55	2	70	7	78	10	290 (91)	27 (9)

for ties). In addition, age groups displayed similar mean BCI (Friedman test by age blocked by year: S=0.60, df=3, P=0,896, adjusted for ties), indicating an overall similar body condition within each year-sample.

The numbers of geckos with intact and recently broken tails are shown in Table 4; differences among years (Friedman test by year blocked by age group: S=5.59, df=4, P=0.232, adjusted for ties) and among age classes (Friedman test by age group blocked by year: S=5.12, df=3, P=0.163 adjusted for ties) were not statistically significant, suggesting that the agents causing tail loss (i.e. predator attacks or intraspecific competition) did not vary in their intensity during the study period.

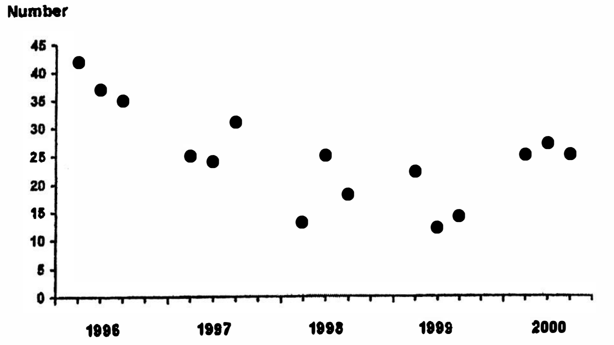

FIG. 2. Temporal variations in capture data in a *Euleptes europaea* population from central Liguria.

POPULATION SIZE

During our five-year study only four marked juveniles were recaptured (i.e. one in 1997 and three in 2000), suggesting a differential response to manipulation between juveniles and adults, as already observed by Delaugerre (1985) in the population living on the Corsican islet of Sperduto Grande. The percentage of subadults plus adults recaptured once varied from 22% in 2000 to 15% in 1998, with an average value of 18%.

There were slight differences (on average, 10%) among the estimated population sizes obtained using different methods (Table 5), and capture probabilities were on average higher than 0.20, a value considered adequate in estimating abundance in closed populations (White *et al*., 1982). Estimated probabilities of capture were similar among models, and those calculated by Darroch's estimator did not show significant variations among years (Friedman test by year blocked by capture occasion: S =2.10, df=4, P=0.717, adjusted for ties). The adult subpopulation was characterized by large fluctuations in estimated abundance, ranging from 120 in 1996 and 1997 to 50 in 1998 (Table 5). The CV showed relatively low variations according to the model used and was 0.33 (Null estimator), 0.35 (Darroch estimator) and 0.41 (Jacknife estimator). Estimated gecko densities varied from 0.8 to 0.4 individuals per square metre of wall surface.

POPULATION TREND

The number of individuals captured during each survey, including juveniles, was used to evaluate population trends over time. The resulting trend was downward (Fig. 2), but not yet statistically significant (r_s=-0.46, P>0.06, N=15). The CV of population counts was 0.35.

The mean (25.0) and the standard deviation (±8.8) of field count data were used as input variables to test the statistical power. Results of 10 000 simulations showed that our five-year study had a low power (0.22) to detect a 10% linear decrease in *E. europaea* abundance (α=0.05, two tailed). With our monitoring protocol, 10 annual surveys with a total of 30 population counts would be needed to obtain evidence of a 10% decrease

TABLE 5 *Euleptes europaea* population size estimated by the CAPTURE programme (White *et al*., 1982). N_e, number estimated; SE, standard error; capt. prob., capture probabilities; CI, confidence intervals.

	Year				
Estimator	1996	1997	1998	1999	2000
NULL (M_0)					
$\hat{N}$	117	123	52	69	95
$\hat{SE}$	17.56	23.98	13.73	19.31	23.81
Capture P	0.25	0.20	0.22	0.19	0.19
95% CI	93-164	91-189	37-97	47-129	66-165
DARROCH (M_T)					
$\hat{N}$	116	120	48	66	94
$\hat{SE}$	17.18	22.61	11.58	17.31	22.67
Capture P 1st	0.28	0.18	0.12	0.29	0.14
Capture P 2nd	0.23	0.17	0.35	0.15	0.21
Capture P 3rd	0.25	0.28	0.25	0.17	0.21
95% CI	93-162	90-182	36-85	46-119	66-140
JACKNIFE (M_H)					
$\hat{N}$	133	113	48	61	77
$\hat{SE}$	10.64	10.00	6.57	7.58	8.29
Capture P	0.25	0.23	024.	0.20	0.23
95% CI	115-156	97-136	39-65	50-80	65-97

with a statistical power >0.80 (α=0.05, two-tailed), which is considered adequate in long-term monitoring protocols (Peterman, 1989; Meyer *et al.*, 1998). Similar results were obtained for exponential population trends and therefore are not shown.

DISCUSSION

During our study, gecko activity was not related to air temperature and the observed fluctuations have to be attributed to other factors such as wind speed, relative air humidity, food availability or, more probably, to a combination of environmental and behavioural factors. Indeed, this species shows a weak dependence on air temperature for its activity, having one of the better thermoregulatory abilities among Mediterranean geckos (Delaugerre, 1984). For this reason, *E. europaea* forages even on cool nights, and is capable of surviving up to about 1500 m a.s.l. in Corsica and 1300 m a.s.l. in Sardinia (Delaugerre, 1984, 1992). Thus, the observed irregular pattern of activity in relation to ambient temperature suggests that this species may be difficult to find, even in apparently suitable conditions.

The demographic structure observed in the NW Italian population was similar to that of conspecifics on the islands of Port-Cros (Delaugerre, 1981*b*) and Lavezzi (Delaugerre, 1984), in which three age-groups were recognized. In Port-Cros Island (S France), newborn individuals hatch from August until September at about 17 mm SVL (Delaugerre, 1981*b*). Thus, in the study population, juveniles in the smallest age-class were probably ending their first year of life, subadults were becoming two years old, and adults were in their third year or older. Males with well developed tail spurs and gravid females were found only in the largest body-size group, suggesting that functional sexual maturity was reached by both sexes during the third year of life or later. Growth was constant during the first two years. Several demographic parameters such as age structure, sex ratio, immature annual growth, and physiological condition seemed to remain constant during the five-year study period. The only comparable data on temporal variation in this species are those concerning adult sexual dimorphism reported by Delaugerre & Dubois (1986) in the Port-Cros population (SW France). These authors analysed the mean body length of males and females collected in different seasons during two successive years, and concluded that they were relatively constant. Our results confirm these observations, extending them to more complex biological features such as overall demographic composition and physiological status. However, caution should be used in interpreting these data, since *E. europaea* is long-lived, and the persistence of old individuals in successive years could influence these findings.

Adult capture probabilities did not differ among years but were relatively low, considering that the habitat is physically constrained and very easy to explore all over. Juveniles displayed a high behavioural avoidance of recapture, suggesting that they were in some way disturbed by spotlights and/or manipulation. Indeed, the extremely low number of first-year individuals recaptured within one annual sampling indicates that this extremely small and delicate age class (mean body mass = 0.4 g) was in some way disturbed by the investigators. Moreover, this gecko had an irregular pattern of activity and only a fraction of the adult population was active each night, a behavioural pattern already observed in the tropical gecko *Lepidodactylus lugubris*, in French Polynesia (Ineich, 1988).

While demographic and physiological parameters seemed relatively constant from year to year, population size estimates showed large fluctuations during the study period. These results should be regarded with some caution, since fluctuations could be due to both extrinsic (e.g. variations in food availability or predation pressure) and behavioural factors (e.g. avoidance response to capture and searching disturbance). In any case, the statistical power to reject the null hypothesis of no change in population size (i.e. Type II error) was low, and a simulation analysis showed that extending the monitoring protocol up to 10 years should ensure adequate power to detect a biologically significant decrease in population size.

Euleptes europaea is characterized by its nocturnal life-style, small body size, long life expectancy, and aggregation behaviour. Thus, it should be able to maintain populations of sufficient size in even small and simplified habitats, like islets (Delaugerre & Dubois, 1986), as is the case of several insular populations studied in Corsica (Delaugerre & Cheylan, 1992). However, in the absence of a metapopulation structure, *E. europaea* remains exposed to a high risk of local extinction. In fact, several historical occurrences of population decline or possible extinction are known of Southern France islets. For instance, the species was discovered, considered extinct, and then rediscovered on the Marseilles' islets of Pomègue and If (Mourgue, 1910*a*, 1924, 1930; Philippe, 1955 ; Delaugerre 1981*a*; Aillaud & Bayle, 1996). On the two islets of Grand and Petit Congloué (Marseilles), where it was discovered by Mourgue (1910*a*), it has not been sighted since that time, despite several diurnal and nocturnal searches (Nougaret & Petenian, 1999; M. Cheylan, *in litt.*). It is now considered extinct (Delaugerre, 1981*a*) on the islet of Bandor (Bandol), where it was first discovered by Mourgue (1910*b*) and then confirmed by Jahandiez *et al.* (1933). If there is no misunderstanding concerning the designation of the islet, this gecko might also be extinct on the îlot de Pendus (Marseilles), where it had been discovered by Blanc (1876, 1878), considered extinct by Mourgue (1910*a*) and then by Delaugerre (1981*a*). Moreover, the present fragmented continental distribution demonstrates that in the past, many continental extinctions occurred, reducing the species' distributional range to hundreds of small, favourable habitat patches. In these environments, the long-term persistence of gecko populations will be strongly affected by habitat alteration, food shortage, epidemics, increase of predation pressure and catastrophic climatic events. For these reasons, the conservation status of the European leaf-toed gecko all over its distributional range should be assessed to evaluate strategies for population conservation. *Euleptes europaea* is a species listed on annexes II and IV of the European Union Council Directive No. 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the "Habitats and Species" Directive); thus it is protected and requires the establishment of Special Areas of Conservation (SAC) that will form part of the Europe-wide Natura 2000 network. Thus, the assessment of *E. europaea* population status in all the other SACs – in S France, Corsica, Liguria, Tuscany, Sardinia – should be undertaken, and member states should co-operate to ensure consistency of monitoring methods. The monitoring protocol used in the present study – based on simple counts of captured individuals – needed a total sampling effort of about nine nights per person per year, and was rather inexpensive and easy to implement, at least for a small isolated population. Thus, it could be used by trained operators in other, similar ecological situations to evaluate the status and the ongoing trend in other isolated populations.

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