BIOLOGY OF THE PUERTO RICAN CAVE-DWELLING FROG, ELEUTHERODACTYLUS COOKI, AND SOME RECOMMENDATIONS FOR CONSERVATION

RAFAEL L. JOGLAR,1,2 PATRICIA A. BURROWES,2 AND NEFTALÍ RIOS1

Abstract.—With the exception of Eleutherodactylus coqui, little is known about population fluctuations and reproductive biology of Eleutherodactylus in Puerto Rico. Eleutherodactylus cooki inhabits a system of caves on the southeastern part of the island. During a 33-month study, we determined that reproductive activity and population density decrease during the winter months, when air temperatures and precipitation decrease. Most egg clutches were in rock depressions; fewer were in rock crevices and on flat surfaces. Most of the clutches were attended by males that attend 1–3 clutches from different females. We consider that E. cooki could be at risk and is in need of further monitoring in order to determine its status. An important step should be the protection of its habitat, all of which is privately owned.

INTRODUCTION

ON 24 JANUARY 1932, CHAPMAN GRANT COLLECTED an adult frog that he later described as the most elusive species he discovered. He named the species Eleutherodactylus cooki in honor of Melville T. Cook. Grant (1932) eloquently described the habitat and behavior of the species:

This is the most romantic species on the Island. It inhabits the “guajonales” of the Panduras Mountains, and is known locally as a “guajone” [sic]. A “guajonal” is a place where wild bamboo grows, but here used to designate a mountain gorge tumbled full of granite boulders from bungalow to grand piano size. One can hear from the surface a most melodious note coming from the depths, a sweet liquid pe-pe-pe-pe-pe-pe-—resounds from the gloomy caves, echoes, re-echoes and is repeated by other “guajones.” “The “guajone” [sic] is only a voice. No one has ever seen one,” the natives say. In the day, with a flash light, one can crawl down one, two, three tiers of jumbled boulders to the hidden stream bed in disinte-grating granite. The “guajones” sing, but it is impossible to locate them by ear. The flash light and a slender twig will serve to locate and dislodge them from deep cracks less than half an inch wide under husks of exfoliating granite, or from the damp earth where earth and boulder meet. It took me three all day trips to secure one specimen. It was on the third trip that I discovered their hiding places and then several escaped after being pried out. One might as well try to bribe a mountaineer to catch a ghost as a “guajone” [sic]. I tried it; money is no object.

Eleutherodactylus cooki is known in Puerto Rico as “guajón” and/or “demonio” of Puerto Rico (Rivero 1978). This species is a member of the West Indian subset of the unistrigatus group of Eleutherodactylus (Joglar 1989). This petricolous species (Schwartz and Henderson 1985) inhabits crevices and grottos known as “guajonales” along the Sierra de Panduras region in southeastern Puerto Rico (Figure 1) and west to the San Lorenzo–Patillas road (Schwartz and Thomas 1975; Rivero 1978).

With the exception of the common coqui (Eleutherodactylus coqui), little is known about the population fluctuations and reproductive biology of Eleutherodactylus in Puerto Rico. Despite the fact that E. cooki was reported to be declining in some
areas (Moreno 1991) and it was proposed as a candidate for protection as a threatened species (Drewry 1986), no status surveys have been conducted on this species in recent years. The purposes of our research were to: (1) study several aspects of the biology of E. cooki, including distribution, population fluctuations, and reproduction; and (2) make recommendations for the species’ conservation and management.

METHODS AND MATERIALS

Distribution was determined from collection data from the following museums: American Museum of Natural History; Carnegie Museum of Natural History; Museum of Natural History, The University of Kansas; Museum of Comparative Zoology, Harvard University; Museum of Zoology, University of Michigan; Universidad de Puerto Rico, Recinto de Mayagüez; National Museum of Natural History, Washington; and Museo de Biología, Universidad de Puerto Rico, Recinto de Río Piedras. Historic localities were visited and the presence of rock boulders (“guajonales” = caves) and frogs (“guajones”) were verified in the field. All localities were visited by day. Acoustic surveys and visual search for individual frogs were performed within the caves.

One locality, km 16.1 on Route 181, Barrio Espino, San Lorenzo, Puerto Rico (18°05'00"S, 65°59'30"W) was chosen for long-term population studies. At this locality, two cave systems were sampled monthly from October 1991 through June 1994, for a total of 33 months. The caves were visited between 1100 and 1400 h. In each of these visits, the same area was sampled and frogs were counted and categorized by age and sex. Because of the complexity of the caves, the area was not measured, and thus, population counts represent only an estimate of the relative abundance of the species at a particular time. These estimates are used as indicators of natural population fluctuations for Eleutherodactylus cooki.

Snout-vent length (SVL) of animals was measured following Woolbright (1989). Estimates of the relative abundance of the species included individuals of all age and sex categories. These categories were defined as: (1) adults (females, > 46 mm; males, > 40 mm); (2) subadults (females, 30–45 mm; males, 30–39 mm); and (3) juveniles (< 29 mm). When egg clutches were found, the following data were taken: (1) microhabitat; (2) presence or absence of guarding frog; (3) sex and coloration of guarding frog; (4) number of eggs per clutch; (5) egg diameter; (6) presence or absence of differences in size and stage of development among eggs within egg mass; and (7), if eggs hatched, number and SVL of hatchlings. Townsend and Stewart’s (1985) staging table for Eleutherodactylus coqui was used to determine developmental stages of eggs.

Preliminary work on nocturnal behavior was initiated. During five nights caves and their surroundings were surveyed from dusk to dawn. Air temperature and relative humidity were measured in and outside of caves on each visit with a Fisher NIST Certified Hygrometer/Thermometer. Monthly precipitation was recorded from February 1993 to June 1994 using a RainWise Automatic Electronic Rain Gauge. The relationship between activity patterns of Eleutherodactylus cooki and climate was determined by calculating Pearson product-moment correlation coefficients. A regression analysis on the abundance of frogs over time was performed to determine if the population was declining.

For comparative purposes we present data on Eleutherodactylus coqui, a better-known relative of E. cooki. Unless otherwise stated, the data on E. coqui are from our ongoing study at 661 m above sea level in El Yunque, Sierra de Luquillo, northeastern Puerto Rico.
TABLE 1. Size and reproductive biology of *Eleutherodactylus cooki* and *E. coqui*. Unless indicated otherwise, data include mean (range); *n*. All measurements are in mm. Data from Townsend et al. (1984) are indicated by an asterisk (*); data from Townsend and Stewart (1994) are marked by a double asterisk (**).

<table>
<thead>
<tr>
<th>Parameters</th>
<th><em>E. cooki</em></th>
<th><em>E. coqui</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SVL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>43.1 (39.6–47.4); 19</td>
<td>36.4 (30.0–42.5); 435</td>
</tr>
<tr>
<td>Females</td>
<td>48.9 (45.0–54.0); 19</td>
<td>46.4 (38.8–57.7); 103</td>
</tr>
<tr>
<td>Parental care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attended egg clutches (%)</td>
<td>85.0; 58</td>
<td>98.2; 616*</td>
</tr>
<tr>
<td>Non-attended egg clutches</td>
<td>15.0</td>
<td>1.8*</td>
</tr>
<tr>
<td>Egg clutch microhabitat (%)</td>
<td>Depressions</td>
<td>Bromeliads</td>
</tr>
<tr>
<td>(49.2; 61)</td>
<td>Crevices</td>
<td>Palm fronds</td>
</tr>
<tr>
<td>(23.0)</td>
<td>Flat surfaces</td>
<td>Tree cavities</td>
</tr>
<tr>
<td>(19.7)</td>
<td>Other</td>
<td>Other</td>
</tr>
<tr>
<td>Number of eggs per clutch</td>
<td>16 (4–34); 66</td>
<td>25.2 (10–40); 119</td>
</tr>
<tr>
<td>Multiple clutches (%)</td>
<td>27.6; 58</td>
<td>5.0; 119*</td>
</tr>
<tr>
<td>Double clutches</td>
<td>22.4</td>
<td>4.7*</td>
</tr>
<tr>
<td>Triple clutches</td>
<td>5.2</td>
<td>0.3*</td>
</tr>
<tr>
<td>Egg diameter</td>
<td>5.2 (4.4–6.3); 54</td>
<td>4.5 (3.5–5.5); 45</td>
</tr>
<tr>
<td>SVL (hatchlings)</td>
<td>8.7 (8.1–10.3); 19</td>
<td>6.9 (6.0–7.9); 16</td>
</tr>
<tr>
<td>Hatching success (%)</td>
<td>64.9 (61.5–68.4);</td>
<td>60.0 (0–100.0);</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>109**</td>
</tr>
</tbody>
</table>

females of *E. coqui* are larger than males (Table 1). The coloration of *E. coqui* is dark brown by day or when under white light, but pale when photographed by flash. Only males have yellow throats; in some males, the yellow color extends onto the abdominal and dorsolateral regions.

**Distribution**

*Eleutherodactylus cooki* is known only from Southeastern Puerto Rico, in the Cuchilla de Pandura region and between San Lorenzo and Patillas. Altitudinal distribution is 91–303 m (Figure 1; Appendix A).

**Calls**

The call of *Eleutherodactylus cooki* consists of 3–7 similar notes (Drewry and Rand 1983; R. L. Joglar, personal observations). Vocal activity from dusk to dawn reaches a maximum around 2100 h and then decreases until dawn (Drewry and Rand 1983). However, we observed that vocal activity was more intense by day than by night. Several differences were observed between *E. cooki* and *E. coqui* regarding calling behavior. Males of *E. cooki* often continue to call while attending single or double egg clutches. These calling males are usually separated from their egg clutch by distances of less than 40 cm. The yellow throat in males is associated with the vocal sac and other areas of the body that are inflated when the frog calls; perhaps this coloration is involved with male-male or male-female communication. We never heard sounds produced by females.

**Parental Care**

Parental care is performed exclusively by males, and may consist of egg attendance, egg brooding, and occasional defense of egg clutches. Most egg clutches observed were attended by males (Table 1). Unattended clutches (15%) probably represent situations in which males temporarily abandoned clutches in response to our presence. One male that abandoned his clutch returned to it in less than 45 min. Two guarding males attacked us and bit our fingers while we were measuring eggs in their clutches. Egg-brooding behavior in *Eleutherodactylus*
cooki resembles that which has been described for E. coqui (Townsend et al. 1984). Males of E. cooki usually brood one or more clutches by covering eggs with their bodies. However, unlike E. coqui, in which males usually cover most of the clutch with their bodies (Townsend et al. 1984; R. L. Joglar, personal observations), E. cooki can cover only part of the clutch, because the eggs usually are deposited in a single layer.

Reproductive Activity
The number of egg clutches per month was used as an indicator of reproductive activity. Reproductive activity in Eleutherodactylus cooki was significantly correlated with precipitation ($r = 0.7021; n = 17$) and air temperature ($r = 0.5657; n = 24$). We observed a distinct seasonal pattern. Reproductive activity decreased in winter when precipitation and air temperature also decreased (Figure 2). No egg clutches were found during January through March 1993, which were the driest and coldest months. An atypical, long dry period extended from November 1993 through May 1994; no egg clutches were found during that time.

Most egg clutches (72.1%) were in protected microhabitats (Table 1). Shallow depressions and small crevices in the rocks probably reduce evaporative water loss and the possibility of predation of eggs and guarding males. Eleutherodactylus cooki may prefer these microhabitats to flat rock surfaces (19.7%).

More than one fourth (27.6%) of the egg masses was considered multiple egg clutches (Table 1). Obvious differences in sizes and stages of development of eggs permitted the identification of one to three distinct clutches among egg masses. Most multiple clutches (68.7%) were contiguous egg masses. Five of the 16 multiple clutches were separated by 1.5–85.0 mm ($\bar{x} = 40.3$ mm).

Two egg clutches were observed both before and after they hatched. One had 19 recently laid eggs and produced 13 hatchlings 22 days later. The other clutch had 13 eggs and produced eight hatchlings 29 days later. Percent hatching success (initial number of eggs per number of eggs hatched x 100) was similar in both clutches (61.5% and 68.4%) (Table 1). From these observations, we estimate that developmental time (time between oviposition and hatching) in Eleutherodactylus cooki is 20–29 days. In all observed clutches, hatchlings remained together as a group in the nest for several days, then they dispersed. This behavior resembles that of E. coqui (Townsend et al. 1981, 1984; R. L. Joglar, personal observations).

Four hatchlings from two clutches were captured in order to observe color and pattern. A dorsal pattern of dark brown inverted parentheses [()] was present in all four hatchlings. Two had supratympanic lines, pale spots on a dark background in the dorsolateral region, and bars on fore- and hindlimbs.

![Figure 2](image_url)

**FIGURE 2.** A. Air temperature inside of caves (solid line) and precipitation (dashed line) at study site. B. Population fluctuations (solid line) and number of egg clutches per month (dashed line) of Eleutherodactylus cooki.
Population Fluctuations
During our study, population fluctuations of *Eleutherodactylus cooki* were associated with precipitation and air temperature (Figure 2). Relative abundance decreased during winter months when precipitation and air temperature decreased. We did not find a significant linear relationship between number of individuals and time ($y = 33.5 + 0.015x; r^2 = 0; p = 0.953$).

Diel Activity
Diurnal activity of *Eleutherodactylus cooki* occurs only inside caves. Areas of the caves receive different amounts of sunlight; no individuals were observed in the illuminated areas of caves. By day we observed males: (1) calling; (2) brooding eggs; (3) attending egg clutches without brooding eggs; and (4) calling while attending egg clutches. Because males do not call outside of caves, we assume amplexus takes place during the day inside caves. Diurnal activity within caves is not limited to rock substrate. During dry conditions, individuals commonly were in contact with soil and in rock crevices, some of which contained soil. Individuals also were observed on roots and vines inside caves.

We observed that many *Eleutherodactylus cooki* leave the caves at dusk and return before dawn. Males attending egg clutches remain within the caves. Females are seen more easily at dusk while leaving caves or at night outside of caves than inside caves during the day. The following additional observations were made at night: (1) individuals moving at least 20.7 m away from the cave entrance; (2) individuals perching outside of caves; (3) individuals feeding outside of caves; (4) males calling inside caves (no males were heard calling outside caves); and (5), on dry nights, individuals adopting a water-conserving posture outside of caves.

Parasites
Examination of preserved and live specimens revealed that these frogs are parasitized by the tick *Ornithodoros talaje*, of which 1–13 ($\bar{x} = 7.0$) were found on a sample of five live males. The effect of this parasite on *Eleutherodactylus cooki* is not known.

Discussion
Sexual Dimorphism
If *Eleutherodactylus karlschmidtii* is, indeed, extinct (as suggested by Joglar and Burrowes, this volume), *E. cooki* is the largest species of the genus in Puerto Rico (Joglar 1981). However, sexual dimorphism in size is less obvious in *E. cooki* than in *E. coqui* (Table 1). Snout-vent lengths of female *E. cooki* are 13.5% greater than those of males. In contrast, *E. coqui* females from the population that we are studying currently are 27.5% larger than males, and Woolbright (1989) found that in a different locality they can be 29% larger than males. Sexual size dimorphism in *E. coqui* may be maintained by energetic constraints associated with male reproductive behavior that reduce the growth of males relative to females (Woolbright 1989). Thus, following Woolbright’s hypothesis, one can infer that, if *E. cooki* males are not much smaller than females, they must have lower energy expenditure associated with mating and parental care than do males of *E. coqui*. Environmental and ecological conditions provided by caves (lower risk of predation, less evaporative water loss, and possibly better acoustics for mating calls) could decrease parental energy expenditure in *E. cooki* and allow the species to allocate more resources to growth. *Eleutherodactylus cooki* may exhibit another form of sexual dimorphism that has not been reported for other species of *Eleutherodactylus* in Puerto Rico. Yellow throats occur in calling and attending males but are absent in gravid females; thus, *E. cooki* seems to be the only species of *Eleutherodactylus* in Puerto Rico that exhibits sexual dimorphism in color.

Multiple Clutches
Males of *Eleutherodactylus coqui* markedly reduce their calling activity while attending egg clutches (Townsend et al. 1984; Townsend and Stewart 1994; R. L. Joglar and P. A. Burrowes, personal observations); in doing so, they reduce their opportunity to mate. By continuing to call while attending egg clutches, males of *E. cooki* reduce paternal investment, i.e., the extent to which parental care of individual offspring reduces parents’ residual reproduc-
tive value (Clutton-Brock 1991), and possibly mate more often. This could explain the difference in numbers of multiple clutches in these two species—4.8 times more double clutches and 19 times more triple clutches in *E. cooki* than in *E. coqui*.

**Different Females for Multiple Clutches?**

According to Rivero (1978), egg clutches of *Eleutherodactylus cooki* contain up to 59 eggs, probably from several females. Based on our data, a 59-egg clutch is a double, or possibly even a triple clutch. We agree with Rivero’s assumption that these eggs probably were deposited by different females. Female *E. coqui* were estimated to produce a maximum of six clutches per year or one clutch every two months (Townsend and Stewart 1994). Because these two species are thought to be closely related (Schwartz 1969; Joglar 1989) and on the basis of other reproductive similarities documented in this study, we suggest that females of *E. cooki* could have a similar interclutch interval of approximately 60 days. If the interclutch interval is about 60 days and the developmental period is 22–29 days, finding eggs or hatchlings of a female’s first oviposition with eggs or hatchlings of her second oviposition would be impossible. Most observed multiple clutches had developmental differences corresponding to a 7–14-day oviposition interval. These observations may indicate that male *E. cooki* contribute to the genetic makeup of double and triple clutches by mating with different females. Thus, male *E. cooki* are reducing paternal investment and, at the same time, maximizing the number of offspring per guarding effort.

**Why “Guajones” Leave Caves at Night**

Our limited observations on nocturnal activity suggest two possible explanations, both of which are associated with activities common to most anurans: foraging and rehydrating. At least one additional cave-dwelling species, *Eleutherodactylus gaigeae* in South America, also leaves caves at night to forage (J. D. Lynch, personal communication). *Eleutherodactylus cooki* probably is forced to leave caves at night to forage because of the scarcity of food in the caves.

Terrestrial amphibians must rehydrate in order to compensate for evaporative water loss (Duellman and Trueb 1986 [1985]). Opportunities for *Eleutherodactylus cooki* to rehydrate are probably better outside of the caves at night, given that dew and rain, which provide moisture for rehydration, are not available in the caves.

**Is the Species Declining?**

Our data suggest that the species is still present in all of its historically known localities. We lack data on the abundance of this species at our study site prior to October 1991, and we do not know the status of other populations in other localities. The population we studied was stable during the study period. Because part of the geographical range is an area being developed (Moreno 1991) and eastern Puerto Rico is one of the fastest growing and developing areas on the island, protecting the species before a detrimental impact is noted would be wise. We consider that the species could be at risk because its distribution is limited to a small geographical area and all known localities are on privately owned land. Moreover, *Eleutherodactylus cooki* is a habitat specialist, as are other Puerto Rican species that are declining or have become extinct. Conservation efforts should focus on research and the acquisition and protection of privately owned land within the range of *E. cooki*. Other populations of *E. cooki* should be studied in order to determine the status of the species throughout its range. Because *E. cooki* is a cave-dweller, with a naturally fragmented habitat and restricted distribution within eastern Puerto Rico, studies of genetic variability within and among populations should be emphasized. Knowledge gained from such study will provide a quantitative measure of its vulnerability to extinction and may suggest management strategies to ensure the survival of the species. For a complete list of recommendations for the protection of *E. cooki*, see Appendix B.

**ACKNOWLEDGMENTS**

Many persons and institutions assisted generously in various aspects of this research. For providing
information on museum specimens we are grateful to C. W. Myers, American Museum of Natural History; the late C. J. McCoy, Carnegie Museum of Natural History; W. E. Duellman, Natural History Museum, University of Kansas; J. Rosado, Museum of Comparative Zoology, Harvard University; A. G. Kluge, Museum of Zoology, University of Michigan; J. A. Rivero, Universidad de Puerto Rico, Recinto de Mayagüez; W. R. Heyer, National Museum of Natural History; and M. Vélez, Museo de Biología, Universidad de Puerto Rico, Recinto de Río Piedras and Yale University Peabody Museum of Natural History. We are grateful to José García, Fernando Rivera, Carlos Morales, David Bermúdez, Janice Alemán, Sandra Santiago, María Maymí, Alex Puig, Javier Caldera, José Ruíz, Pedro Ayala, and Ingrid Cruz for assistance in the field. Special thanks go to Pablo Rivera and Marcela Muñoz for allowing us to work on their property. We thank William E. Duellman, Linda Trueb, and two anonymous reviewers for comments on the manuscript, and Helio da Silva for figures. This research was funded by United States Fish and Wildlife Service through a collaborative agreement with La Fundación Puerto- rriqueña de Conservación (from 1991–1992); Fondos Institucionales Para la Investigación, Decanato de Estudios Graduados e Investigación, Universidad de Puerto Rico, Recinto de Río Piedras (from 1991–1994); and supported by the Departamento de Biología, Universidad de Puerto Rico–Recinto Universitario de Río Piedras, who provided release time and logistics. In addition, Proyecto Coqui, Inc. provided funds for one student’s summer salary.

**LITERATURE CITED**


**APPENDIX A.** Locality records for *Eleutherodactylus coqui*.

**SIERRA DE PANDURA REGION:** Yabucoa: Pandura Mountains, southeastern Puerto Rico; under vines growing over granite
boulders, elev. 305 m; Bo. Quebradillas, 245 m; Bo. Quebradillas, Finca Sr. Carraquillo; Bo. Quebradillas, at the ground entrance beside the third business along that road; 3.2 km SW of Yabucoa; 7.6 km WSW of Yabucoa; Bo. Quebradillas, Rte. 900, 6.9 km E of Yabucoa, 220 m; Rte. 3, 2.9 km SW of Yabucoa. **SAN LORENZO PATILLAS REGION:** Rte. 181, km 14.5.

APPENDIX B. Recommendations for the protection of *Eleutherodactylus cooki*.

1. To determine the status of *Eleutherodactylus cooki*, its abundance, genetic variability, and gene flow should be studied.
2. Because the following habitats are privately owned, they should be protected by conservation easements, cooperatively agreements with landlords, or acquired: land in the vicinity of Barrio Espino (Rte. 181, from km 14–18) between San Lorenzo and Patillas, and in Barrio Quebradillas (vicinity of Rte. 900) in Yabucoa.
3. Stop all development management practices that could have a negative impact (e.g., logging, construction, etc.) in the habitat of the species.
4. Design and implement an environmental awareness program to incorporate the local community into the conservation effort.
5. Undertake long-term studies in Puerto Rico on acid rain, soil acidity, air and water pollution, and global climatic change, and make efforts to show how these factors might be associated with declining amphibian populations.
6. Coordinate conservation efforts among protection agencies.

---

**Resumen.**—Informamos sobre varios aspectos de la biología del Guajón o Demonio de Puerto Rico (*Eleutherodactylus cooki*). Con la excepción de *E. coqui*, es muy poco lo que conocemos acerca de las fluctuaciones poblacionales y biología reproductiva del género *Eleutherodactylus* en Puerto Rico. *Eleutherodactylus cooki* habita un sistema de cuevas en el sureste de la Isla. Por medio de un estudio de 33 meses determinamos que su actividad reproductiva y las densidades poblacionales disminuyen durante los meses de invierno, cuando la temperatura del aire y la precipitación también disminuyen. Todas las camadas de huevos fueron encontradas adheridas en la roca, la mayoría de ellas en depresiones y en menor cantidad, en grietas y superficies lisas. La especie exhibe cuidado parental al cargo de los machos, los cuales cuidan de una a tres camadas que han sido depositadas por distintas hembras. Consideramos que la especie podría estar en riesgo y que es necesario continuar estudios para determinar su estado poblacional. Un paso importante, debe ser la protección de su hábitat el cual al día de hoy, se encuentra exclusivamente en terrenos privados.

**Résumé.**—À l’exception d’*Eleutherodactylus cooki*, on sait peu de choses sur les fluctuations démographiques et la biologie reproductives d’*Eleutherodactylus*, à Porto Rico. *Eleutherodactylus cooki* colonise un réseau de grottes dans la région sud-est de l’île. Dans le cadre d’une étude de 33 mois, nous avons observé que l’activité reproductive et la densité démographique diminuaient pendant l’hiver lorsque la température de l’air et les précipitations baissaient. La plupart des oeufs étaient pondus dans des dépressions rocheuses; il est rare de trouver des œufs dans les crevasses ou sur des surfaces planes. La plupart des œufs sont surveillés par les mâles qui s’occupent de 1 à 3 pontes de différentes femelles. Nous pensons que *E. coqui* est à risque et devrait faire l’objet d’une surveillance plus étroite afin de déterminer son statut. Le premier effort en ce sens vise la protection des habitats qu’elle colonise, lesquels appartiennent tous à des particuliers.

---