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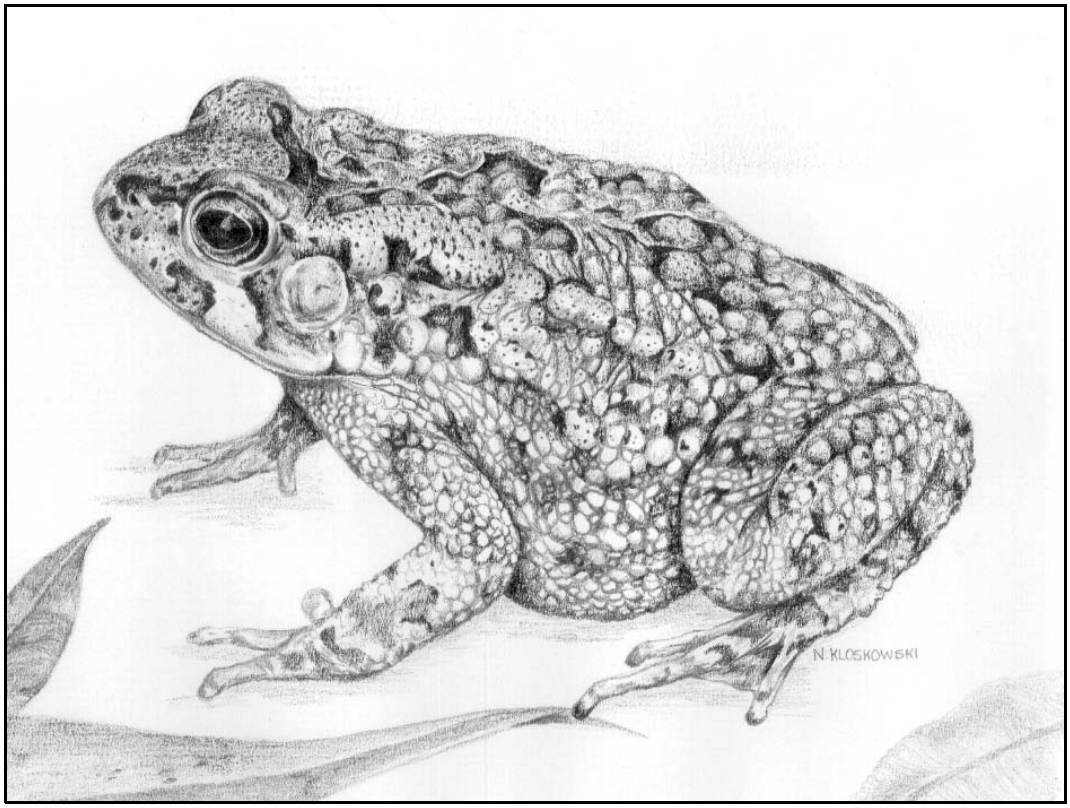

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Cover: Ranger's or raucous toad, *Amietophrynus* (formerly *Bufo*) *rangeri*. Drawing by Nancy Kloskowski.

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On the Road to Nowhere: Galápagos Lava Lizard Populations

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Abstract

Roads threaten wildlife populations worldwide, especially in fragile ecosystems of tropical islands. Galápagos lava lizards (*Microlophus albemarlensis*) play a pivotal role in ecosystems and are heavily impacted by roadways. We measured lava lizard mortality on Santa Cruz Island and used Kaplan-Meier survival curves to model fatalities by life stage and estimate roadkill based on measured disappearance of carcasses. Lava lizard fatalities averaged 0.4 mature males and 1.8 juveniles per km/day. In addition, we used available data, our field surveys and best professional judgment to estimate population survival at each life stage. Historic lava lizard demographic data lizards were available from the area of our fieldwork. We used Leslie matrices to model lizard populations and identify population trends resulting from impacts including but not limited to roads. The lizard population is on the path to local extirpation ($\lambda = 0.60$). Innovative design and management of roads and traffic on the archipelago would improve the probability of a sustainable lava lizard population. Our models offer planners in the Galápagos and in other tropical environments an improved opportunity to incorporate wildlife population impacts in development planning.

Introduction

Much is known about effects of roads on wildlife. Early studies of the impact of roads on wildlife focused on macrofauna that could damage cars or injure humans (cf., Bellis and Graves, 1971; Holyroyd, 1979). Through the 1990s, road ecology research evolved to include raptors and songbirds (Loos and Kierlinger, 1993; Mumme et al., 2000; Forman et al., 2003). More recently, the field has embraced less charismatic but ecologically important species like reptiles and amphibians (Ashley and Robinson, 1996; Haxton, 2000; Whitaker and Shine, 2000; Gibbs and Shriver, 2002) and invertebrates (Riffell, 1999). Documentation of road impacts in tropical environments has been rare, focusing mostly on charismatic species (Drews, 1995; Jones, 2000; Hayward et al., 2005) but recently broadening to document a range of species (Ramp et al., 2005). Roads fragment landscapes, causing population and community level effects critical to some species (Forman et al., 2003).

Careful roadway design and management can protect wildlife. Reduced speed limits, signs posted in important crossing areas, underpasses, and exclusion barriers to channel wildlife crossings (i.e., drift fences with strategic openings to allow animals to cross at specific locations) (Southall, 2000) are being implemented. Yet, roads are pervasive in the landscape and species protection strategies will only be effective when road ecology and management are integrated (Forman, 1998). Integration requires understanding the significance of road fatalities, evaluation of their potential to reduce wildlife population fitness, and careful assessment of management actions. Even when documented and dramatic, population impacts may be underestimates if they lack understanding of scavengers removing roadkilled animals killed (Antworth et al., 2005). To understand road impacts on wildlife and offer viable management strategies, we need additional population-level studies to quantify the significance of traffic fatalities to animal populations.

Impacts to terrestrial herpetofauna such as snakes, lizards, and amphibians can be especially damaging to ecosystem function because such animals are important in food webs. Herpetofauna are the prey base of many local food webs and are important predators on invertebrate populations (Pough, 1980). In the Galápagos Archipelago, lava lizards exemplify a highly productive, locally important prey base species. They are diurnal (Stebbins et al., 1967), medium-sized (7.2–8.5 cm snout–vent length [Snell et al., 1988]), sexually dimorphic (Werner, 1978) terrestrial lizards. They are found on Santa Cruz, Fernandina, Isabela, Santiago, Santa Fé and other smaller islands (Moncayo and Calderon, 1978 [unpublished]) in the Galápagos. Lava lizards apparently are declining around major human population centers, although specifics are limited (e.g., Pierce and Snell, 2003 [unpublished]). In addition to roads, lava lizards are threatened by rats, feral cats, and habitat loss due to human settlement (Pierce and Snell, 2003 [unpublished]).

Potential impacts to lava lizards have broad significance: they are an abundant prey item for natural predators including Galápagos hawks, owls, herons, mockingbirds, and snakes; consume large quantities of invertebrates; and are widely distributed (CDRS, 2001; Pierce and Snell, 2003 [unpublished]). Tanner and Perry (in press) showed that road fatalities reduce lava lizard abundance throughout a road-effect zone up to 400 m from the road.

The Galápagos Archipelago, ~ 960 km west of Ecuador, is famed for the numerous endemic species on these relatively young volcanic islands. Human settlement is a recent addition

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to the Galápagos landscape, with density very low before the mid-1900s (Constant, 2002). Roads are even more recent. The 40-km N-S road across the island of Santa Cruz was begun in 1974 and paved in 2000. Vehicle density has increased rapidly increasing: 28 cars in 1980, 140 in 1985, and 670 by 2000 (Betancourt et al., 2003). Thus, exposure of island species to motor vehicles has only been recent. Insular species generally lack wariness of humans. This lack of wariness combined with increased vehicle density and travel speeds poses high risk. Lava lizards have had little time to adjust behaviorally or genetically to road impacts.

Santa Cruz Island contains over half the human inhabitants of the archipelago, and traffic impacts on native species are high (Valle, 2002). The city of Puerto Ayora, at the southern end of Santa Cruz, has 9700 permanent residents in approximately 2.4 km^2 (2001 data, Pierce and Snell, 2003 [unpublished]). The human population of the Galápagos is growing at an annual rate of 5.8% (Valle, 2002), the highest of any Ecuadorian province (Ecuadorian Census Department, 2001, as cited in Pierce and Snell, 2003 [unpublished]). Santa Cruz is an important hub for Galápagos tourism; in 2001, 71567 people visited, nearly a tenfold increase in just over 25 years (Servicio Parque Nacional Galápagos, 2001, as cited in Constant, 2002).

Road mortality studies in the Galápagos have focused on avian species (Llerena, 2002) and have been used to develop management strategies. Effectiveness of these strategies on the abundant lava lizards is unknown. Current road management practices include signs for motorists, speed bumps on the 1-km road from Puerto Ayora to the Charles Darwin Research Station (CDRS), education campaigns (e.g., school children carrying signs to tell motorists to slow down and watch for wildlife), and posted speed limits (Wiedenfeld, pers. comm.). In addition to work on birds, there is a wildlife sign for tortoises in the high elevation area where tortoises often cross the road. We know that vehicles affect individual animals, but the effect on populations is less clear. This paper assesses the impact of current management practices on Santa Cruz with respect to lava lizards. Our goals were to identify the status of this population, to quantify the population-scale consequences of fatalities, and to suggest adaptive management strategies to protect these lizards.

Methods

Field Methods

Data were collected between 1 and 31 January 2004, during peak tourist season (Servicio Parque Nacional Galápagos, 2001, as cited in Constant, 2002) and peak lava lizard activity (i.e., beginning of the breeding season, high mobility, and territoriality) (Burger, 1993; Jordan and Snell, 2001). We selected a 1-km road connecting Puerto Ayora to the Charles Darwin Research Station to examine lizard fatalities, and we assume this stretch of road represents an impacted area on Santa Cruz. The road is paved with cobblestones, is approximately 4.1 m wide with a curb 15 cm high on either side (easily climbed by lava lizards), and is in the littoral zone, close to the beach in all areas. Vegetation is dense, consisting of black mangroves (*Avicennia germinans* [L.]), salt bush (*Cryptocarpus pyriformis* Weberbauer), common carpetweed (*Sesuvium portulacastrum* [L.]), thorn shrub (*Scutia spicata* Ferreyra) and others (McMullen, 1999). Marine iguanas (*Amblyrhynchus cristatus*) are often seen on the road during late afternoon as high tide approaches.

We gathered data to determine if road traffic was impacting lava lizard populations; we also documented bird fatalities to compare with available bird data (Llerena, 2002). These combined lizard–bird data were analyzed to allow managers to focus practices on roadways with high incidence of fatalities of both lava lizards and birds (Llerena, 2002). We used a Santa Cruz Island GIS base map and created a road layer of the 1-km road. All field data were downloaded daily from the GPS, using MN DNR Garmin 4.1 software, and incorporated onto GIS maps of Santa Cruz using ArcView 3.3.

Lava lizards are active from approximately 0600 to 1800 h; therefore, we measured fatalities at the end of each 6-hr interval (i.e., 1200–1230 and 1730–1800). Each lizard found dead on the road was identified; its position was recorded with a Garmin GPS unit; and the location was marked on the curb with flagging tape. Information for each fatality included sex, reproductive status, snout–vent length, evidence of tail loss, and distance to the nearest wildlife protection speed bump. We documented presence/absence of each roadkill on subsequent surveys to determine how long it could be identified before being removed by predators or being rendered unrecognizable by further traffic.

Data analysis

We addressed the issue of predation and scavenging of carcasses by applying a mark-recapture technique, where survival to next capture was defined as a dead lizard remaining on the road surface and identifiable during the next search on the road. We used Rweb 1.03 statistical software to produce Kaplan-Meier survival curves based on the length of time a dead lizard remained on the road. Mature adult lizards were separated from juveniles for this analysis. This carcass-survival estimate was then further evaluated by running simulations in SAS to estimate the number of lizards that would have disappeared from the road surface before they were identified during searches (Tanner, 2005). Observed plus simulated fatalities provide the total number of lizards hit on the road, as fatalities per km/day.

We used a range of available demographic data to develop population models. Lava lizard incubation time is 90–100 days (Carpenter, 1966; Werner, 1978; Jordan and Snell, 2002); for simplicity we used 91.3 days (the number of days per calendar quarter) for our modeling. Egg survival is 80% when artificially incubated in the lab (Jordan, 1999), but with the reality of nest predation, a more realistic number is 50% (Snell, pers. comm.). However, we ran models with 80% and 50% egg survival rates. Juvenile survival is 32–40% annually (Jordan, 1999); time to reproductive maturity is generally 18.8–24.0 mos, but can be as long as 36.0 mos for females and 28.8–35.6 mos for males (Jordan, 1999; Snell, pers. comm.).

Adult survival is estimated to be 30% per year on Santa

$$L = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & c \times (f/4) \\ s \times h & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & j^{1/4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & j^{1/4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & j^{1/4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & j^{1/4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & j^{1/4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & j^{1/4} & a^{1/4} \end{pmatrix}$$

$$\begin{aligned} E(q+1) &= (cf/4)A(q) \\ J_1(q+1) &= shE(q) \\ J_2(q+1) &= j^{1/4}J_1(q) \\ J_3(q+1) &= j^{1/4}J_2(q) \\ J_4(q+1) &= j^{1/4}J_3(q) \\ J_5(q+1) &= j^{1/4}J_4(q) \\ J_6(q+1) &= j^{1/4}J_5(q) \\ A(q+1) &= j^{1/4}J_6(q) + a^{1/4}A(q) \end{aligned}$$

$E(q)$ is the number of eggs in quarter q

$J_i(q)$ is the number of female juveniles of age $i-1$ quarters in quarter q

$A(q)$ is the number of female adults in quarter q

Figure 1. Leslie matrix, quarterly time steps, with equivalent algebraic equations. Parameters are as defined in the text. Time units are annual; iterated time step is quarterly. Four quarters per year enters the matrix as a ¼ power in survival coefficients and as a multiplier of ¼ in fecundity coefficients.

Cruz, with areas as low as 20% around Puerto Ayora where predation by feral mammals is high (Snell, pers. comm.). Mature females lay one to three clutches per year. The upper level of three is rare, and the number of clutches depends on the amount of rain received during the wet season (Jordan, 1999; Snell, pers. comm.). Each clutch contains one to six eggs, usually two to three (Stebbins et al., 1967; Carpenter, 1966; Jordan, 1999). The time between clutches is a minimum of 28 days (Jordan, 1999). Lava lizards are highly territorial between same-sex adults (Stebbins et al., 1967). Two studies conducted at CDRS suggest densities of approximately 78 mature males/ha and two to three females per male territory (Stebbins et al., 1967; Stone and Baird, 2002).

Lava lizard population dynamics were modeled with Leslie matrices (Figure 1). Traditionally, the final stage of a Leslie matrix has a value of 0 as the survival coefficient, which defines an upper age class. In our study, adults were grouped into one adult category. To test our decision to group adults, we ran alternative models expanding the adult age category into multiple classes with a finite maximum age. In the alternative model, all adults died in seven to nine years, which is less than the reported maximum age for *Microlophus* (Constant, 2002).

We ran one instance of the model for each possible combination of parameter values, across the full range for each variable. Parameter *s* represents the sex ratio, proportion of females (½); *c* represents the number of eggs per clutch (1, 2.5, 6); *f* represents the number of clutches per female per year (1, 2, 3); *h* represents the probability that an egg hatches to become a juvenile (0.5, 0.8); *j* represents the probability that a female juvenile survives another year (0.32, 0.36, 0.40); and *a* represents the probability that a female adult survives another year (0.2, 0.3). Time units in this system are per year; the iterated time step is per quarter. The corresponding factor of four quarters per year enters the matrix as a ¼ power in survival coefficients and as a multiplier of ¼ in fecundity coefficients. A conservative population growth estimate for the incubation period (91.3 days) is implicit in the time step of the model. Because adult survival is approximately independent of age, a single matrix column for adults suffices.

With three values for parameter *c*, three for *f*, two for *h*, three for *j* and two for *a*, this amounted to $3\times3\times2\times3\times2 = 108$ individual runs. The Leslie-matrix approach allowed us to establish general trends and calculate λ for each parameter set. Lambda (the eigenvalue) is a statistic that shows, in a single numeric measure, the trend of the population over time. In this context, $\lambda < 1.0 =$ a decreasing population, $1.0 =$ an unchanging population, and $> 1.0 =$ an increasing population. This distinction allowed us to test the suspected local population decline hypothesis (Pierce and Snell, 2003 [unpublished]). All matrices were normalized to an annual growth rate for comparison across different time steps.

We conducted a sensitivity analysis to determine which of the demographic variables might be most important to population estimates. We examined a hypothetical stable age distribution with a sample increasing population. Further, we weighted the parameter values according to their estimated probabilities (Tanner, 2005) to determine the likelihood of various population scenarios.

Results

Thirty-five roadkilled lava lizards were documented; 17 of these were less than 15 m from the nearest speed bump. Lava lizard fatalities were relatively randomly distributed along the 1-km road (Figure 2). Average distance to speed bumps was 18.4 m. Only one roadkilled bird was found; that individual was greater than 15 m from a speed bump. Marine iguanas (*Amblyrhynchus cristatus*) were observed each day on or near the road, but no iguana fatalities were observed.

Lava lizards found on the road were divided into groups of mature males (7), mature females (0), subadult males (2), and juveniles (26) to analyze possible sex bias in fatalities. Subadult males are not yet sexually mature and were grouped with juveniles (following Pereira and Fairbanks, 1993). This dataset was used for analysis with Kaplan-Meier survival curves. The Kaplan-Meier curves suggest that time to removal for each mature male was 12 hrs (SE 0.13), suggesting that we documented all mature males killed on the road during our study. In contrast, 15 of 28 roadkilled juveniles disappeared within a 6-hr period (SE 0.09). Thus, the direct count of juvenile lizard fatalities underestimated the real value. Using the disappearance rate, we extrapolated the actual number of lizards that were likely killed on the road during this study by running two

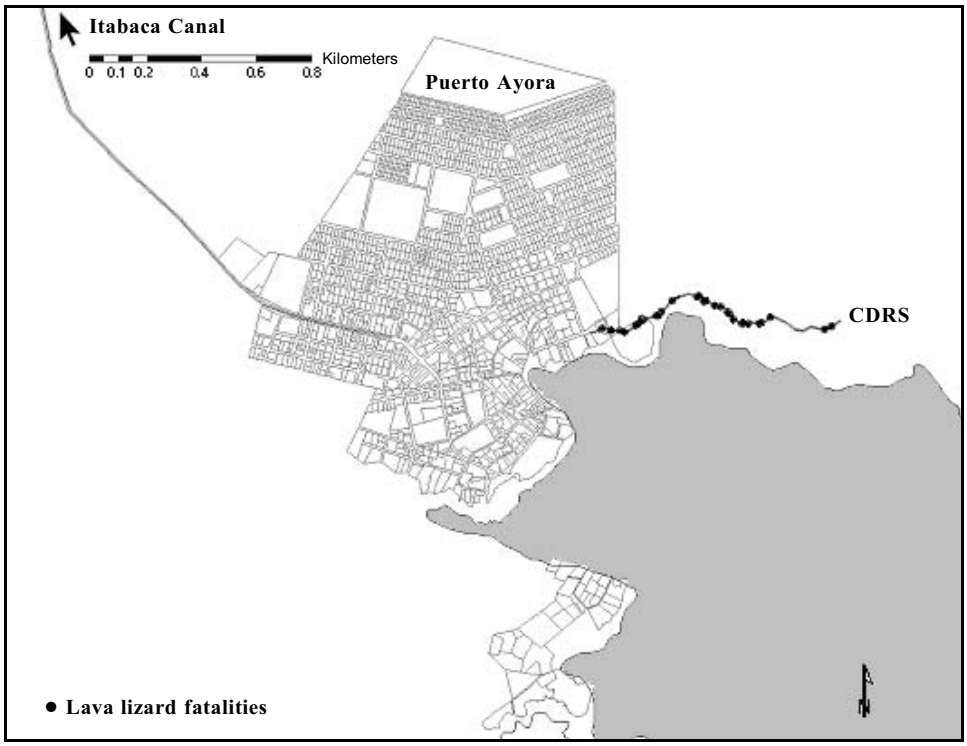

Figure 2. Study location: Charles Darwin Research Station, Puerto Ayora, Santa Cruz, Galápagos.

simulations to estimate total number of juvenile fatalities. The first simulation assumed that fatalities were uniform during a 6-hr interval. The second simulation used a shortened timeframe to compensate for peaks in lizard activity (following Jordan [1999] and Stebbins et al. [1967]) and resulted in a 4-hr uniform period of fatalities. Each simulation was run with 1000 replications. The two simulations suggested that we underestimated total number of juvenile fatalities by 26.2% to 26.5%. The 6-hr interval required fewer assumptions and was chosen for further analysis (Table 1). This resulted in a 26.2% increase in estimated number of fatalities for juveniles killed during the sampling period. Based on the total number of fatalities, we estimated that an average of 0.37 mature males and 1.76 juvenile lava lizards per km/day were killed during our sampling period.

Among the 108 instances of individual Leslie matrix runs, the majority of the growth rates were less than one, indicating decreasing populations. To ensure we had the correct temporal resolution—neither too coarse nor fine—we compared the quarterly resolution with a higher-resolution model having time steps of one month and with a lower-resolution model having

Table 1. Lizard carcasses disappear from the road surface through scavenging and physical processes. Disappearance rates of individual carcasses were measured then the rate modeled to develop an estimate of total roadkill (i.e., the population of animals killed on the road).

Time (hrs)	Number of dead individuals	Number disappearing from road	Proportion remaining on road	Standard Error	95% Confidence Interval
Mature males (total observed = 7)					
12	7	1	0.86	0.13	0.63–1.00
18	6	1	0.71	0.17	0.45–1.00
24	5	1	0.57	0.19	0.30–1.00
36	4	2	0.29	0.17	0.09–0.92
Juveniles (total observed = 28)					
6	28	15	0.46	0.09	0.31–0.69
12	13	5	0.29	0.09	0.16–0.51
18	7	1	0.25	0.08	0.13–0.47
36	6	1	0.20	0.08	0.10–0.43
48	5	1	0.16	0.07	0.07–0.39

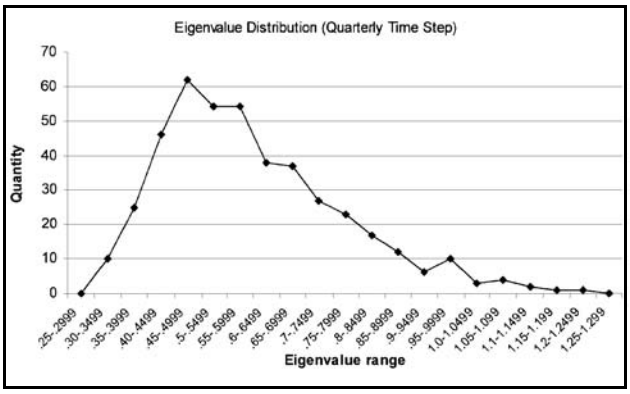

Figure 3. Lambda distribution from Leslie matrices, quarterly time steps.

time steps equal to the female age to maturity (varying from 18 to 36 mos). Quarterly time steps provided sufficient resolution and are expressed here. A larger time step proved too coarse for significant additional accuracy, while a shorter time step added no significant accuracy. At the quarterly time step, annual mean growth rate was 0.60 (s.d. 0.17), predicting that the lava lizard population between Puerto Ayora and CDRS would be precipitously declining without immigration from areas outside the study area (Figure 3). Our sensitivity analysis showed that changes in adult survival rates exerted relatively little influence on the population (average slope = 0.08). Juvenile survival, however, was 9.3 times more influential with a slope of 0.78. The influence of time to female maturity demonstrated that increasing generation time would decrease the slope but would not change the direction (i.e., a growing population will grow more slowly if the generation time is increased) (Figure 4). Only the most positive demographic conditions (e.g., fast time to maturity, highest fecundity) resulted in lava lizard population growth. Under most scenarios, the Puerto Ayora population will decrease even without additional traffic impacts. Given the analyses reported here, our estimate of the most highly probable population-dynamic scenario was a 99.4% probability of population decline (for details see Tanner [2005]).

An analysis of eigenvectors shows how each age class changes as the population progresses through time, so it is possible to project a stable age distribution for the model population. The various age classes may oscillate at the beginning (Tanner, 2005) but eventually even out at this distribution (Figure 5). A stable distribution will typically not be attained in an actual population because of nonlinearities and stochastic events, but the most sensitive life stage was by far the juvenile class. In other words, the loss of juveniles is more important to the population than maintaining survivorship of adults.

Discussion

Reptile and amphibian declines resulting from a combination of human-induced causes, including traffic impacts, can be damaging to ecosystem functioning because of the importance of these species in food webs (Pough, 1980). Lava lizards are especially important in the Galápagos Archipelago as both an important food item and predator for many species. Low lava-lizard survival and low annual population growth rate near Puerto Ayora reflects a combination of human-induced perturbations including traffic and introduced species (Stone and Snell, 1994; Constant, 2002). Understanding these impacts allows development of adaptive management plans to ensure population health of the species. Population-level modeling, including techniques applied here to reveal population trends rather than detailed population trajectories, empowers understanding and enables management decision making. Population modeling often has been seen as difficult because of the time and expense required to collect life-history data and the effort to construct an accurate model. We overcame such obstacles by utilizing material from a combination of published sources, supplemented with best professional judgment, and by employing simple trend-based models. This enabled us to predict population scenarios based on current conditions; this model can be readily adapted as new information becomes available.

Our sensitivity analysis and stable age distribution demonstrate that lava lizard juveniles are proportionally more valuable to population growth on Santa Cruz than other age classes. The population is sustained by juvenile recruitment and immigration (Figure 5). Based on model estimates, the area near Puerto Ayora is a population sink for lava lizards, and without recruitment into this population, lava lizards would become extirpated. Reality for lava lizards may be more stark; juvenile mortality on the road was much higher than adult males, further reducing juvenile contributions to recruitment. (No adult female fatalities were identified in this study, but see Tanner and Perry, in press, for female mortality elsewhere on Santa Cruz.) Our results suggest that juvenile mortality due to road-kill will be more important to population sustainability than will the loss of mature males on the road.

The Leslie matrices show that, except in the most optimistic scenarios, the lava lizard population around CDRS is declining. Although the effects of roadways are not solely the result of traffic fatalities, the current situation causes the lava lizards to face an uncertain future around Puerto Ayora and possibly other centers of human activity. Effective landscape management will influence the future of insular populations subject to road effects. This research suggests that these species would benefit from adaptive management focusing on monitoring survivorship of lizards to confirm or modify predictions based on our models and implement strategies to protect lizards.

Current strategies for protecting wildlife along roadways on Santa Cruz (i.e., signs and speed bumps) may slow motorists and reduce road mortalities for some species. However, lizards and birds may be difficult for motorists to see because landscape characteristics, including vegetation at the roadside and viewshed* scales, vary. Previous studies (Llerena, 2002) involving bird fatalities on the island led to placement of the signs. On the 1-km road that has reduced speeds and regularly placed speed bumps, birds fare quite well (only one fatality was

* In this context, the viewshed for a given point is the area visible to a driver from that point along the road.

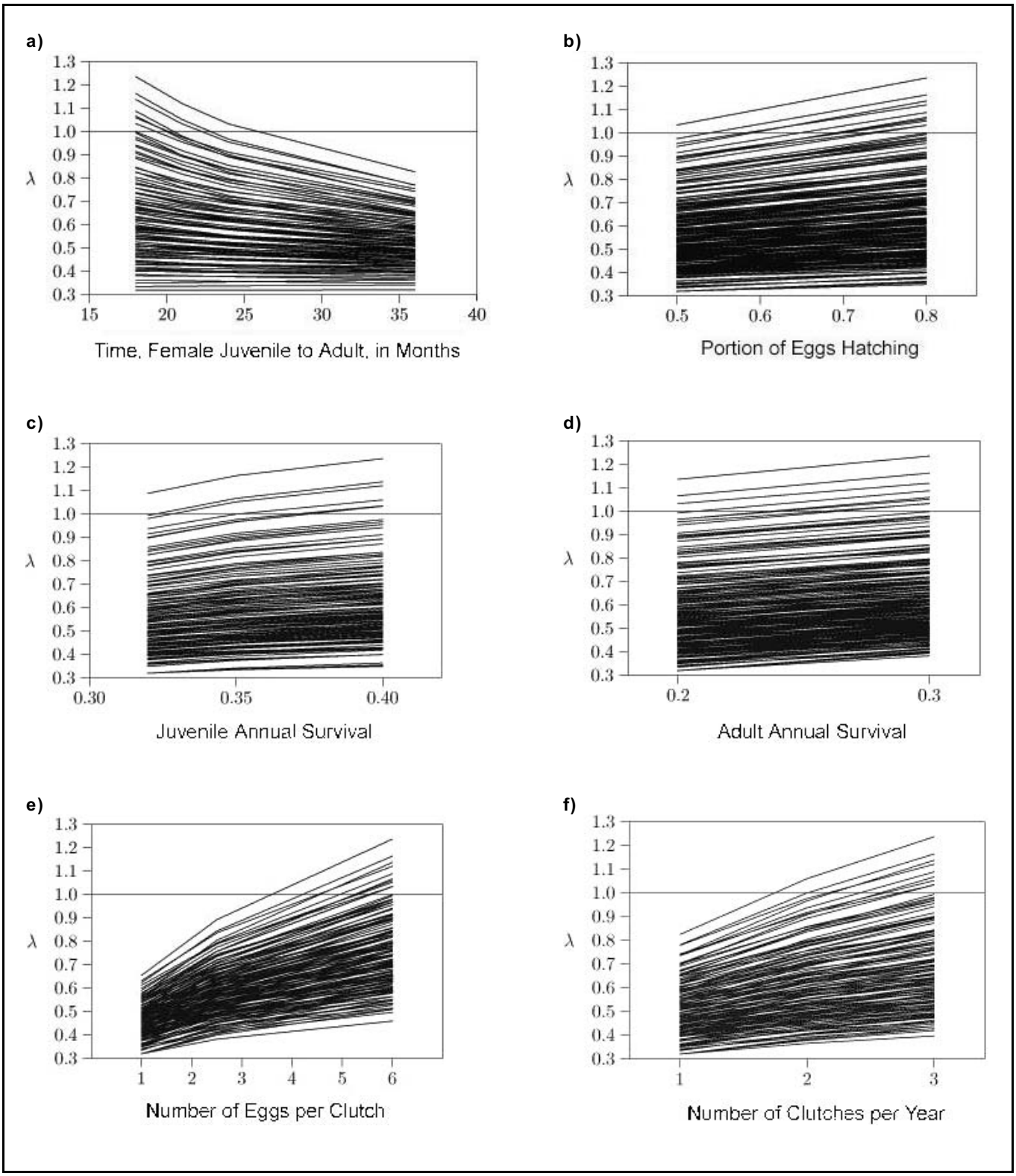

Figure 4. Sensitivity analyses for the six parameters in the Leslie matrix. Parameters are as defined in the text. Each line represents a scenario where the variable of interest changes and all others are held constant. Horizontal line at 1.0 is the where the modeled population is neither increasing nor decreasing.

found during this study); lava lizards do not. With the stresses already affecting lava lizards (i.e., introduced species, habitat changes, and declining population trend), roadway mortality may be inducing unsustainable long-term population trends around Puerto Ayora. Research should continue to assess roadway impacts to terrestrial lizards, and initiatives such as exclusion barriers should be evaluated in areas of high mortality.

A critical issue for managers working in the Galápagos revealed by this project is the importance of juvenile lava lizards to the population. Modeling (that does not include road impacts) revealed that the populations are sensitive to juvenile

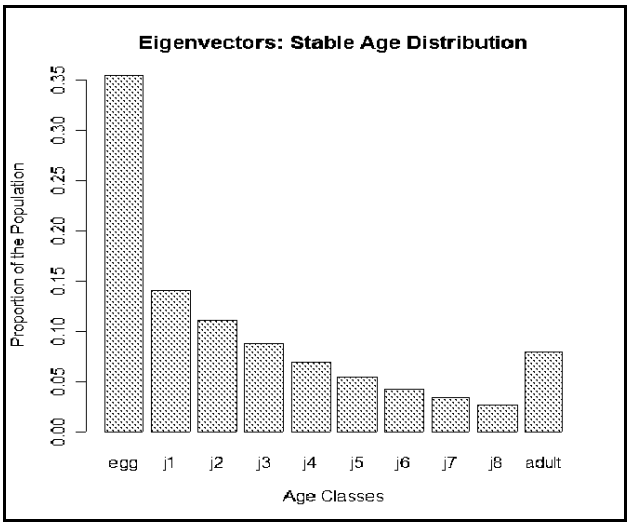

Figure 5. Eigenvectors: Stable age distribution.

survival, and field studies found a high incidence of fatalities of juveniles on the roads. Initiatives already underway to control dogs and cats are critical toward reducing predation and improving survival for juvenile lava lizards. The work presented here also stresses the importance of careful consideration for any new roads that might be added to the landscape of the Galápagos. A lively debate recently surfaced among political leaders and scientists around a proposed new road that would circle Santa Cruz and increase tourist access. This study provides documentation for possible population-level effects due to this kind of increased development.

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Book Review: *Turtles of the World* by Franck Bonin, Bernard Devaux and Alain Dupré (translated by Peter C. H. Pritchard). 2006. 416 pp. Johns Hopkins University Press, Baltimore. ISBN 0-8018-8496-9. Hardcover. $50.00*

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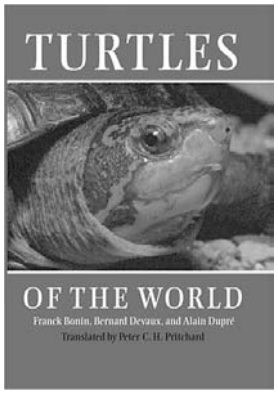

Why yet another turtle book? Pritchard addresses this in his introductory Translator's Note. First, our knowledge of turtles is constantly advancing and new updated texts are desirable to inform and up date readers. Second, different authors have different approaches, opinions and emphases so while over time books on this topic have not just built on what has been offered in the past but they provide fresh insights.

The book is well laid out, both visually and in overall organization. It begins with a short translator's note followed by introductory comments about the general biology of turtles. These include brief discussions on evolutionary history, chelonian skeletons and organs, senses, sexual dimorphism, metabolism, behavior, and threats. The bulk of the text consists of species profiles with the accounts being organized by family and subfamily. The individual accounts include: Scientific name (followed by the author and date of the published description); Common name; Distribution (including a map); Description; Subspecies (where appropriate); Natural History; and Protection. Color photographs are available for nearly all species. The book ends with a short list of references and an index. The index is only to the scientific names, and then only to primary names as used in the book. Thus, looking up *Clemmys* leads to a single species—*guttata*. Readers unfamiliar with specific generic revisions may find the index frustrating.

The last portion of the introductory material deserves comment. Under the topic of "Threats to Protection" the authors express their strong commitment to conservation and distaste for turtles in captivity. I was pleased to see someone finally state in print that the proliferation of zoos and menageries was taking its toll on wild chelonian populations. Not that there are not other factors that are important to consider, but at least the issue of public institutions' desire for captive turtles has now been added to the list. With two-thirds of the world's turtles now threatened or endangered I was pleased to see that turtle conservation issues are one of the focus points of this book. Conservation interest in turtles has now surpassed academic ones. Hopefully the day is not too far off that their exploitation resulting from globalization will be curtailed. The authors provide some thoughtful information on their perception of conservation issues and because of their belief that turtles belong in the wild the book is not written for people interested in keeping turtles in captivity but for those who appreciate them in nature. The irony is that the ethical disgrace of trafficking turtles for the pet trade will likely be enhanced by this book as collectors, importers, dealers, and hobbyists shop through color photographs of species they have not seen before, and become aware of newly described taxa that can be marketed.

The individual distribution maps provide a good visual image of the range of each species. It is interesting to see what a large percentage of the world's turtles have extremely narrow distributions. The large format color photographs are what separates this book from all others. The photos are of high quality with the majority being of ones photographed in the wild. The photographs in themselves are worth the price of the book. Nearly all the species are illustrated and it is refreshing to see the text, photos and distribution maps all on the same page. This is much more user friendly than tracking down numbered plates or maps located in some other section.

This is not a book that should be judged by its cover, or colorful layout and design. Let's pick one turtle species and examine the text. Because I am familiar with them I will choose bog turtles. The recently revised name *Glyptemys muhlenbergii* is correctly applied. While the distribution map provided is basically right the written account of the distribution could hardly be less correct: "This species occupies two separated areas in the northwestern United States. The first encompasses western Massachusetts, western Connecticut, and eastern New York. The second to the southwest includes Pennsylvania, New Jersey, Delaware and Maryland. This turtle also occurs in southern Virginia and extreme northern Georgia." Under the description the authors note the shell "has good growth annuli visible." This is not true of modest aged adults who often have their shells worn smooth. Under natural history we are told that it lives in "stagnant and muddy waters, and small ponds with dense vegetation," "is most active during the warmest hours of the day," "it seems to need more heat than other members of the genus" (there is only one other member, the wood turtle), "suns on tree limbs," hibernates "in damp crevices along river banks," "estivates in July and August," and "mating has not been observed very often." Under the category of Protection we are told that it is an Appendix 1 CITES protected species and is listed as endangered by the Turtle Conservation Fund. There is no mention that it is protected by the U.S. Fish and Wildlife Service under the Endangered Species Act, U.S. wetland laws and regulations, or

that bog turtles receive full protection in every state in which they occur. The issues here are a combination of the use of early and extremely out of date sources, incomplete information, in the case of compass direction—simple editorial oversights, and I would assume translation problems. Regarding the erroneous English language wetland terminology used in the book, even in this country most people never get it right. Biologists who should know better use words like swamp, marsh and bog almost interchangeably. In this case the translation of the primary accounts from English to French and then back to English for this edition of the book surely contributed to the confusion regarding wetland habitat descriptions.

Let's try another one. Zhou's box turtle, *Cuora zhoui*, is an Asian species of considerable conservation concern that I have been working with for the five years. While the book's distribution account of this species clearly states that this species has been discovered in markets of China, as far as I am aware it still has never been encountered by any naturalists in the wild. Yet the book maps out the species' range, presumably based on the location of the markets. But with out knowing regional trade routes what can this proposed distribution actually mean? By most accounts it is considered as extinct in the wild, yet this book states that "The scarcity of this turtle makes its conservation challenging." Under Natural History the authors describe the species' habitat, elevational distribution and behavior. Has something new been learned? Without references it is difficult to separate speculation from fact, and hedge terms like "is believed to," and "probably" do not appear in the text. Other accounts for species with which I am also familiar were more accurate but the exercise raises the obvious question as to how many other individual accounts contain extensive problematic text.

Considering that the intent of this book is to cover all of the world's turtles my other concerns seem minor but worth mentioning.

For the most part references backing up specific statements are lacking. This is understandable in a book of this type; to include them would require a literature cited section that could double the length of the book. Nevertheless, while a few individual statements are credited to particular authors, there are many that would have benefited from supporting documentation. Of particular annoyance are frequent literature citations within the text that are not referenced in the book.

Chelonian systematics seems to always be in a state of flux, and a number of species names, and reassignments to new or different genera were often unfamiliar to me. This is obviously one of the benefits of owning a new up to date book. The *Testudo graeca* complex is now a mosaic of species; there are six recognized subspecies of this tortoise and an additional ten full species that were formerly recognized as types of *graeca*. Many of these were described as recently as the '90s and two as recently as 2002. Yet other "*graeca*" species recently described as full species such as *Testudo whitei* are not mentioned. I am not questioning the authors' judgment; I am just confused and the way the text is presented there is no way to track down the original sources. Several turtles that are considered by many to be hybrids are treated as species. For two, *Cistoclemmys* (*Cuora*) *serrata* and *Sacalia pseudocellata*, while the authors indicate that they may be hybrids, the way this is conveyed in the text is inconsistent. The treatment of two recently discovered species of giant tortoises (*Dipsochelys*) long believed to be extinct I think is handled well considering that their validity has been questioned by some researchers. However, it is interesting to see how these taxa treated so conservatively compared to the same authors' treatment of the *Testudo*. A new species of Asian box turtle (*Cuora cyclornata*) was not included in this publication but this is understandable as the description was published in the same year as the book under review. And then what became of the Chinese broad-headed pond turtle, *Chinemys megalocephala*, a species of conservation concern that may be extinct in the wild? It is not covered in the book, and there is no indication whether, or why, it was combined under some other species. My point here is that a book such as this with global coverage must deal with dynamic taxonomy and in the end determine what to include, what to leave out, and the recombination of names is often a judgment call. The authors recognize that there are differences of opinion, and no one will ever get it exactly right, and therefore we can look to future turtle books. That said, the book would have benefited greatly from an appendix that could refer the reader to references to taxonomic changes as compared to published benchmarks such as King and Burke's 1989 *Crocodilian, Tuatara, and Turtle Species of the World*, or Iverson's 1992 checklist. Traditional morphology and nomenclature, fossil evidence, cladstics, and molecular analysis are all good tools and they need not always reach the same end point. People become overly concerned with biological names. In the case of what is presented in this book, the world's turtle fauna is now rather well known, and between the descriptions, the distribution maps, and the photographs there should not be any confusion as to which turtle is being discussed.

The common English names used in this book are generally in tune with the established literature but several stand out as odd—East Indian box turtle for *Cuora amboinensis*; red-nosed tortoise for *Indotestudo elongata*; Mexican giant tortoise for *Gopherus flavomarginatus,* or as minor but obvious typos such as yellowfoot tortoise. On occasion the text does not match. Under *Manouria emys* the authors provide the common name Asian brown tortoise, while in the text they state "This species is found in Burma (hence the vernacular names), . . . "

While uneven coverage in individual accounts is to be expected based on the lack of biological information on any number of species, the text appears to have an Old World bias. For example the Hermann's tortoise account covers two-and-a-half pages and this does not include the additional one-page accounts of the eastern Hermann's tortoise, *Testudo boettgeri*, and the Hercegovina tortoise, *T. hercegovinensis*, which until recently were each considered subspecies of *T. hermanni*. On the other hand, the comparatively wide ranging, and equally well-studied North American desert tortoise is covered in about one-and-a-quarter pages.

The distribution maps, while providing a quick visual reference to the portions of the world, continent, or country a given species occurs, are not particularly accurate. The range of the

turtle is indicated with a light green that masks political boundaries in the areas being indicated. For North American species state boundaries are illustrated, but the provinces in Canada are not shown. Nor are the states of Mexico indicated. For the European pond turtle, the most widely ranging turtle in the Old World, and a species with an interesting distribution, international boundaries are not even indicated. In looking at several North American species where the distributions have been well known for many decades it is clear that at least some maps are inaccurate. The narrow and complex range of the bog turtle is not well illustrated, while wood turtles are shown to range south to the North Carolina state line and throughout the eastern half of Ohio. The common map turtle's range is shown to include nearly all of the Piedmont of the eastern and southern United States and in Mississippi drainages west into Texas and the Dakotas. People interested in more precise distributions of turtles would benefit from consulting regional field guides or Iverson's 1992 checklist of the turtles of the world.

The photographs for the most part are excellent but in a few cases not as useful as they might be for species identification. To the untrained the most of 17 species of African mud turtles in the genus *Pelusios* look remarkably similar and the diagnostic features of the ventral surface are, except for one species, not illustrated. And then there are minor annoyances such as a diamondback terrapin photographed against a backdrop of water hyacinths.

In conclusion this is a useful text providing a good overview of the world's turtles and a current assessment of the ever-shifting taxonomic assessment at the species level. The arrangement of well-reproduced photographs, distribution maps and text provides the reader with good broad-brush account of each turtle. *Turtles of the World* fits nicely into a growing niche for natural history oriented books as a popular style reference providing a good overview of its subject. However, for those with serious interest this book should not be used as a primary reference for any particular species. The information on the natural history of many species is little more than generalities. The coverage lacks consistency, and because of the near lack of crediting sources for information it is not possible to confirm the accuracy of specific statements. In most cases, and particularly for North America, regional texts have more detailed factual and reliable information. If your interest in turtles is limited to a single region or genus you do not need a copy of this book. While this book does provide a lot of new and up to date information I don't think anyone will be discarding their copies of Ernst and Barbour's 1989 *Turtles of the World* or Pritchard's 1979 *Encyclopedia of Turtles*.

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Book Review: *Kenny Salwey's Tales of a River Rat: Adventures along the Wild Mississippi* by Kenny Salwey. 2005. 256 pp. Voyageur Press, St. Paul, Minnesota. Hardcover $19.95*

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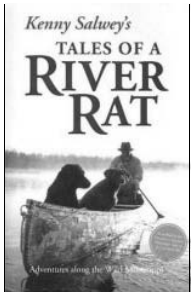

This book is a new set of essays and yarns from the subject of *The Last River Rat* (Bestul and Salwey, 2001), a book I reviewed in these pages several years ago (Cochran, 2002). Since then, Kenny Salwey has been featured in a 2005 Discovery Channel documentary, *Mississippi: Tales of the Last River Rat*. This new book, like the first, is centered in the vast Whitman Swamp along the Mississippi River in Buffalo County, Wisconsin, with excursions into the adjacent bluffs and valleys. Unlike Salwey's first volume, this book is not organized by tracking the seasons throughout the year, and some of the tales seem more whimsical. However, the themes of living with nature and understanding the cycles of the natural world remain important. A number of reptile and amphibian species are mentioned in passing (tree frog, leopard frog, toad, snapping turtle, bull snake, garter snake, water snake), and a few are illustrated, but unlike the first book, there are no extensive discussions of herpetological subjects. However, rattlesnakes (including a two-headed timber rattlesnake embryo) are discussed on pages 48-51, and one of my questions from the first book is answered: Salwey has encountered only three massasaugas during his years in the swamps.

I'd advise anyone who hasn't read Salwey's first book to get that one first. If you've read it and liked it, you'll probably like this one too.

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Bull. Chicago Herp. Soc. 42(8):137-138, 2007

Showtime

by John Archer
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Most of us happily show off our animals whenever we get the chance. We can easily spend an afternoon showing an interested person our collection, even if the collection consists of a single animal. As the attendance at our annual June show-and-tell meeting demonstrates, we like sharing our animals with other people. That's one of the reasons we belong to the CHS. What's the point of having cool critters if no one else knows about them? And the desire to let others know about our animals fits closely with one of the stated missions of the society, to educate the public about reptiles and amphibians. One of the primary ways that we accomplish this is by bringing our animals to some of the numerous live-animal shows that the society is asked to do.

Having done these shows for a few years, and having worked with ReptileFest numerous times, I think I've gained a few insights into the dos and don'ts of presenting your animals to the public. I don't know everything, and I don't pretend that my way is the only way, but I'm the one writing the article. If you want to express your views, write your own article. Remember that I'm striving for the ideal. I have never done a perfect show, nor do I think that you'll achieve that after you've read this article, but if I can prevent you from making some of the larger mistakes, you'll be ahead of the game the next time you stand in front of a crowd of people asking questions and wanting to handle your very special bearded dragon.

The shows that I'm referring to are not the type where you'd stand on a stage with a hands-free mike and wow the crowd with your great stories and terrific animals. I don't do those kind, and they require skills I probably don't have. I'm not even talking about giving school presentations or performing in front of your local boy scout troop. Those types of shows usually require more than one animal, a script or a lot of practice, and stage presence than most of us lack. I leave those shows to the Bavirshas or Jim Nesci or Dick Buchholz. The shows I'm talking about are closer to demonstrations, where I stand around with an animal in my hand or next to their cage and wait for people to come to me. The CHS does these for museums, park districts, libraries, and other venues and they are essentially miniature ReptileFests. I'll discuss four major aspects of these shows: you; the animal; the audience; and the setting.

You

You're probably smarter than you think you are. You may not know the scientific name for the blue-tongued skink, or how many chambers an amphibian's heart has, but you do know your animal and your interactions with it. Don't lie if you don't know the answer to a question. But the two most frequently asked questions are "Does it bite?" and "Is it poisonous?" I bet you know the answers to both of those. And you know more about YOUR animal than anyone else. People want to know how you interact with it, how you care for it, and what you find fascinating about it. Of course, you may not be as smart as you think you are and the person you're talking with may not be as stupid as you think they are, so don't condescend. Talking down to someone or putting them in their place can back fire when your audience turns out to be a professor of herpetology at Kansas State University. Besides, none of us like to be reminded of how ignorant we are. You're not there to show how much you know; you're there to help others understand and maybe respect these animals. And, especially for the younger show people, never try and scare people with your animals or make fun of those who are afraid. Everyone is afraid of something.

Check your appearance before you leave for the show. Maybe today is not the day to wear your "Bloodwatch, Vampires at War" T-shirt. Nor would it be good to grab something from the bottom of the laundry basket. Casual is OK, but this may not be the best time for in-your-face clothing. Also keep in mind that few of the animals that we casually drape over our shoulders can be housebroken, so a spare shirt may come in handy. And you'll be talking to people at a close distance. Maybe skipping the garlic pizza for lunch is a good idea.

Listen to what your audience has to say. Almost everyone has an animal story that they want to share. Let them. You may learn something, but more importantly, as ambassadors for our animals, listening allows us to connect with our audience. I rarely will directly contradict some of the wilder tales I hear. I use terms like "unlikely" when someone swears they had a gaboon viper in their basement, and I try not to correct all the technicalities that the speaker has gotten wrong. I'm not trying to turn these folks into herpetologists, and good biologists will rarely state definite facts, especially when they involve animal behavior. Besides, with the popularity of reptiles increasing, and knowing how easily these animals escape, who am I to say that it wasn't a gaboon viper?

The animal

Perhaps the first thing that your audience will notice is your animal's appearance, but that doesn't necessarily mean you should bring only your best-looking animals. A malformed, deformed or injured animal can be a valuable teaching tool, demonstrating how people abuse or mistreat animals. The animal should be healthy, however. Shows are stressful enough for the animals when they are healthy, and you should make sure they stay healthy. This may mean bringing heat pads or ice blocks (for amphibians) to keep your animals as comfortable as possible. Make sure that your animal gets breaks from being handled. They can get really tired from being passed from person to person. Animals that appear in public should have a temperament that can handle crowds. An excitable or worse, a biting animal, should be left at home. My animals' safety is the most important thing to me at a show. And while I don't yell at children who mishandle my turtle, I will gently correct them and I expect everyone who touches or holds my animals to follow my rules. They are MY

animals. Also, if the animals are handled correctly, I worry less about the safety of the people.

If you have animals that are in cages, make sure that the cage looks attractive and is kept clean. People judge us on what they see. I have a sign that states that the display cages are not the cages the animals live in. I made it after it was pointed out to me that the public might assume that it's alright to keep a ten-inch tiger salamander in a two-and-a-half-gallon aquarium all the time. And make some attractive labels or signs for the cages. A scrawled name on a scrap of paper is better than no name, but a neatly printed sign makes a much better impression.

The audience

Watch the people who come by. I bring out different animals for different groups. Small turtles are rarely happy being mauled by a group of toddlers, but a tortoise might handle the attention with aplomb, or at least apathy. Baby snakes do not get handled by kids, but, if adults are nervous, they may have an easier time holding a small snake. Kid groups are always boisterous, but some group activities can easily engage them. I have amphibians, which I don't let people handle, but kids love to feed them. And I often invite a child who seems genuinely interested and responsible to help me put away my salamanders and frogs at the end of the show. Genuinely interested and responsible kids are also allowed to be one of my snake wranglers. I let them handle the snakes, giving them tips on how to pass the animal, how to watch the person taking the animal, and how to protect the animal. You may not feel comfortable doing this, but if you are, and you judge your kids correctly, it can make a kid an animal lover for life, and you can take a little break. No, you can't go to lunch, but you can stay nearby and not have to work quite so hard. Some of these kids have shown up at later shows, coming just to do my work for me. As a friend of mine once said, "Who'd of thought that there were reptile groupies?" Always respect the audience and avoid those assumptions, either good or bad, that prevent you from really understanding and connecting with them. And if you're really thinking about the audience, you'll have hand sanitizer.

The venue

You need to know the conditions that you and your animals will have to cope with. Where's the parking? How far do I have to transport my animals, and how will I do that? Is the show indoors or out? Do you have access to electricity or water? Is there a trash can (what do you do when your animals defecate)? Is there a special theme to this event? Museum shows are different from Chicago Park District shows, and both are totally different from the "expos" — different crowds, different facilities, different treatment from the host of the event. I have a box that I take to every show that contains tape, scissors, paper, heating pads, spare bulbs, zip ties, extra cage furniture, spare shirt, etc. I admit that I even have a general check list that I review as I'm packing. I don't want to show up at an unheated event in the middle of January without some way of keeping my animals warm, and while most venues can supply you with many items, it's always faster and easier if you already have everything you'll need when you arrive.

I could write much more, and I repeat that I don't have all the answers, but if there are those among you who are considering showing your animals, I hope I have given you the basics. The main reason I do shows is because they're fun. The more I learn about my animals, the more fun I have teaching others. Learning new information allows me to expand on my answers when people ask questions, and keeps me from repeating myself and becoming bored. I'm constantly learning from other society members around me at shows. Many snakes really do feel like basketballs, as Mike Scott asserts, and that's a much better analogy than a wallet. Being alongside people like Jenny Vollman, Bob Bavirsha or Rich Crowley provides a huge opportunity not only to learn how to better present your animals, but also to learn more about herpetology in general.

Anyone who has done a show will tell you that they are a lot of work. They take time and energy from you and your animals. So why do I do them? Because I get to watch as a toddler bursts into the room and freezes as she sees the ten-foot python sliding across the floor. She slowly approaches, and with a look of awe on her face, she gently extends a hand and strokes the snake's back. No fear in this two-year-old, just a recognition of shared life. Or I watch as a south side teenager taller than me overcomes his fear and winds up holding my milksnake up to his girlfriend, proudly explaining that "This snake won't hurt you. It's a good snake." I get to swap snake stories with a 92-year-old grandmother who has kept many reptiles and amphibians over the years, as I recognize first to my surprise that this lady likes these animals, and then realize that we are a very diverse group that is impossible to physically qualify. Schoolkids shriek and scream as my slothful tiger salamander makes a lightning-fast grab at the mealworm one of them is holding, then all clamor to be the next to feed him. Snakes aren't slimy; amphibians are. Get out there and teach people that.

Unofficial Minutes of the CHS Board Meeting, July 13, 2007

The meeting was called to order at 7:35 P.M. Board members Rich Crowley, Kira Geselowitz, Deb Krohn, Steve Sullivan, Jenny Vollman and Erik Williams were absent. A quorum was not present.

Officers' Reports

Recording Secretary: In Kira's absence, Cindy Rampacek read the minutes of the June 15 board meeting.

Treasurer: Andy Malawy reviewed the June financial reports, and declared that the numbers for ReptileFest '07 are now final.

Membership Secretary: Mike Dloogatch reported a slight increase in membership during the month of June. We seem to be getting more members. Postage has increased substantially for *Bulletin*s being sent outside the U.S. The Periodicals postage rate can no longer be used for these if there are fewer than 200 in the mailing. We now must send them first class. Mike is looking into joining a mailing pool to reduce costs. The extra postage fee may have to be increased for non-U.S. members to offset. Postage also went up for our domestic mailings, but nowhere near as dramatically.

Corresponding Secretary: A letter was sent to Amazon.com from the CHS expressing displeasure over the sale of dog fighting paraphernalia.

Sergeant-at-arms: Jason Hood reported attendance for the June Show & Tell meeting was 62.

Committee Reports

Nominating committee: One member yet to be appointed.

Shows: Anyone interested in staffing shows, please contact Jenny Vollman with your availability.

Raffle: Once again ZooMed items were a hit. We are considering resuming an occasional silent auction.

General meetings: Dan Nathan will give a short presentation on iguanas in July. Cindy Rampacek volunteered for an August short on the works of the IRCF. Jason Hood and Cindy will contact area veterinarians about Dr. Douglas Mader speaking at our August general meeting. Many ideas were discussed in regard to increasing attendance at the general meetings.

Old Business

Kentucky trip: September 14–15—visits to Louisville Zoo and Kentucky Reptile Zoo. Anyone interested please email Jason Hood < snakesunlimited@sbcglobal.net> by September 10.

New Business

We will be offering the Spot books by mail through ads in the *Bulletin* and on the website. We are also looking at offering our T-shirts on the website.

Round Table

• Member-at-large Deb Krohn gave birth to 6 lb, 8 oz, Nicholas Spencer Krohn on June 18.

The meeting was adjourned at 9:41 P.M.

Respectfully submitted by Cindy Rampacek

Advertisements

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, 6115 SW 137th Avenue, Archer FL 32618, (352) 495-9024, E-mail: GrmtRodent@aol.com.

For sale: from **The Mouse Factory**, producing superior quality, frozen feeder mice and rats. We feed our colony a nutrtionally balanced diet of rodent chow, formulated especially for us, and four types of natural whole grains and seeds. Mice starting from: pinks, $.17 each; fuzzies, $.24 each; hoppers, $.30 each; weanling, $.42; adult, $.48. Rats: starting with pinks at $.45 each, to XL at $1.80 each. Discount prices available. We accept Visa, MC, Discover or money orders. PO Box 85, Alpine TX 79831. Call **toll-free** at (800) 720-0076 or visit our website: < http://www.themousefactory.com> .

For sale: **high quality frozen feeders**. Over a decade of production and supply. Seven sizes of mice availabe: small newborn pinks up to jumbo adults. Prices start at $25 per 100. Feeders are separate in the resealable bag, not frozen together. Low shipping rates. Free price list. Kelly Haller, 4236 SE 25th Street, Topeka KS 66605, (913) 234-3358 evenings and weekends.

For sale: Graptemys.com T-shirts, 100% cotton, pre-shrunk, pigment-dyed shirts with the Graptemys.com embroidered logo. These are very high quality shirts with that stylish faded look. Sizes S-M-L-XL-XXL. Colors: Pacific blue, nautical red, brick red, plum, granite, khaki green and putty. All profits made from these shirts goes directly to in situ *Graptemys* research. $20 each with $3.00 shipping. Email: chris@graptemys.com or call (239) 437-4148 to order. You can look at the shirts at http://www.graptemys.com/shirts.htm

For sale: books. *Amphibians and Reptiles of Texas* by James R. Dixon, 1987, 434 pp., 20 b&w photos, 18 figs. (drawings), 156 range maps, 32-page bibliography of complete references of Texas herpetology literature from 1852 to 1982, keys to Texas herpetofauna, softbound, $15; *The British Amphibians and Reptiles* by Malcolm Smith, 1973, 322 pp., 18 color and 33 b&w photos, 88 figs., excellent reference on the natural history of Britain's species, hardbound, $20; *Natural History of Snakes* by H. W. Parker, 1965, 95 pp., 6 b&w plates, 18 figs., softbound, $9; *Birds of Pine-Oak Woodland in Southern Arizona and Adjacent Mexico* by Joe T. Marshall, Jr., 1957, 125 pp., 26 figs. (b&w photos, drawings), 2 color plates, excellent descriptions of habitats of this interesting herp area, hardbound, $30. All books are in excellent condition. $2.50 postage and handling for orders under $25, free for orders $25 and over. William R. Turner, 7395 S. Downing Circle W., Centennial CO 80122; phone (303) 795-5128; e-mail: toursbyturner@aol.com.

For sale: Jungle carpet pythons hatchlings from trophy bloodlines (parents are vivid yellow on jet black and colorfast with age), $200 each or $300 for 1.1 pair. You can check out my collection at http://moreliapython.googlepages.com/. E-mail John for pictures or more information: junglejohn@tds.net.

Herp tours: Adventure trips to **Madagascar**! Journey somewhere truly unique to seek and photograph nature on the world's least-studied mini-continent. For maximum herp fun and discovery, join Bill Love as we go where few people will ever venture in their lives. Let his experience assure a comfortable tour finding the most colorful and bizarre species on the planet! Get all the details at Blue Chameleon Ventures' comprehensive new website: < http://www.bluechameleon.org> , E-mail: bill@bluechameleon.org, or call (239) 728-2390.

Herp tours: The beautiful Amazon! Costa Rica from Atlantic to Pacific! Esquinas Rainforest Lodge, the Osa Peninsula, Santa Rosa National Park, and a host of other great places to find herps and relax. Remember, you get what you pay for, so go with the best! GreenTracks, Inc. offers the finest from wildlife tours to adventure travel, led by internationally acclaimed herpers and naturalists. Visit our website < http://www.greentracks.com> or call (800) 892-1035, E-mail: info@greentracks.com

Virtual Museum of Natural History at www.curator.org: Free quality information on animals—emphasis on herps—plus expedition reports, book reviews and links to solid information. Always open, always free.

Line ads in this publication are run free for CHS members—$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to: Michael Dloogatch, 6048 N. Lawndale Avenue, Chicago IL 60659, (773) 588-0728 evening telephone, (312) 782-2868 fax, E-mail: MADadder0@aol.com

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, August 29, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Dr. Douglas Mader**, of Marathon, Florida, will speak on "Medical Marvels in Herp Medicine." You may be familiar with Dr. Mader through his monthly column, "Veterinarian Q&A," in *Reptiles* magazine. And if you've ever taken a herp to the vet, you've likely benefited from his book, *Reptile Medicine and Surgery*, which is the standard veterinary textbook on the subject.

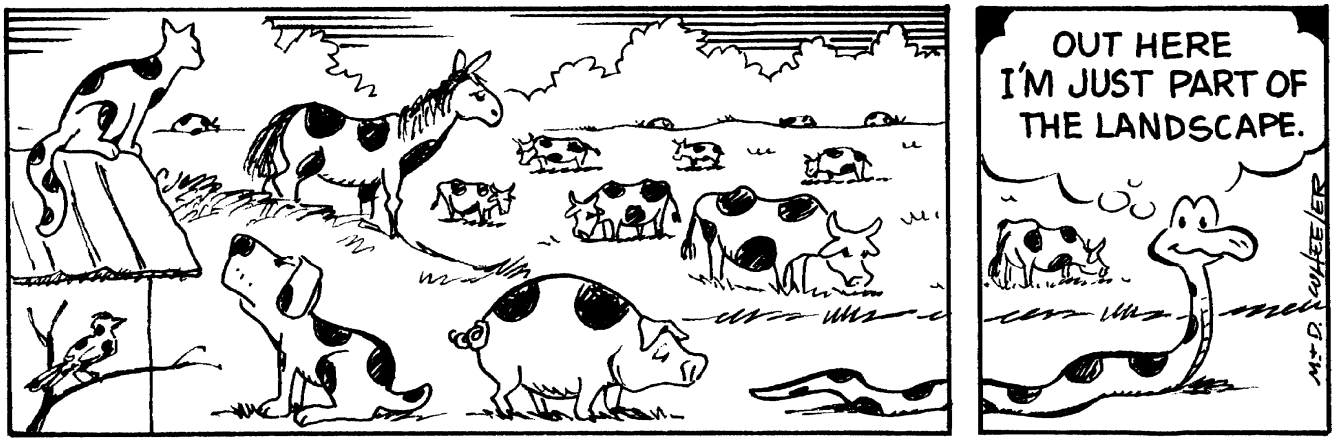
Speaking at the September 26 meeting will be **Dr. Daniel D. Beck**, professor of biology at Central Washington University in Ellensburg, Washington. As the author of *Biology of Gila Monsters and Beaded Lizards*, Dr. Beck is perhaps the foremost authority on helodermatids. The title of Dan's presentation will be "Biology of Bumpy Lizards, New Icons of the Value of Biodiversity."

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum — the **Peggy Notebaert Nature Museum**. This beautiful new building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

Board of Directors Meeting
Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held September 14. For information as to where the meeting will be held and directions, call Mike Dloogatch at (773) 588-0728.

The Chicago Turtle Club
The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the CTC website: http://www.geocities.com/~chicagoturtle.

THE ADVENTURES OF SPOT



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