

1 **Relationship between frog size and body mass in the Sierra Nevada yellow-legged**
2 **frog, *Rana sierrae***

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7

8 **Abstract**

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24 **Introduction**

25 Body mass is a fundamental parameter in ecology because it is related to several important
26 attributes of individuals and populations, including species metabolic rates (Gillooly et al.
27 2001, Brown et al. 2004) and population abundance (Peters and Wassenberg 1983). As stated
28 by Feldman and Meiri (2012), among vertebrates, body mass is commonly recorded in birds
29 and mammals, but is less often recorded in amphibians. As a result, in amphibians, body
30 size (as snout-vent length) is available for many species, but body mass data are often lacking
31 (Santini et al. 2018 pp. 13–14).

32 In this study, we report body length and mass recorded from more than 3000 post-metamorphic
33 Sierra Nevada yellow-legged frogs (*Rana sierrae*), and describe the relationship between these
34 two variables.

Methods and Materials

As part of a long-term study of amphibians in the Sierra Nevada (Knapp et al. 2003), we captured 3131 post-metamorphic *R. sierrae* (hereafter, “frogs”) from Mesa Lake, Sierra National Forest, during the period 2000-2015 (Figure 1). Frogs were captured during the summer active season using hand nets. We measured frog snout-vent length to the nearest millimeter using digital calipers and frogs were weighed to the nearest gram using a spring scale. To describe the relationship between length and weight, we plotted $\log_{10}(\text{frog weight})$ against $\log_{10}(\text{frog length})$.]

Results

The relationship between frog length and mass was linear on a \log_{10} scale and showed little scatter around the regression line (Figure 2).

Discussion

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62 **Tables**

Table 1: A subset of the data used in this study. Length and mass are expressed in millimeters and grams, respectively.

site_id	visit_date	life_stage	length	mass
70550	2014-06-24	adult	52	16
70550	2014-07-16	adult	54	19
70550	2014-07-16	adult	61	26
70550	2006-09-14	adult	52	18
70550	2006-08-31	adult	53	16
70550	2009-07-06	adult	67	36
70550	2010-08-13	adult	68	38
70550	2012-06-16	adult	72	43
70550	2012-07-15	adult	69	41
70550	2012-08-29	adult	71	44
70550	2013-06-28	adult	64	27
70550	2006-08-13	adult	54	16
70550	2007-07-01	adult	57	20
70550	2007-07-31	adult	58	25
70550	2006-08-31	adult	54	18

63 **Figures**

Figure 1: (A) Mesa Lake where the study was conducted. (B) An adult Sierra Nevada yellow-legged frog (*Rana sierrae*).

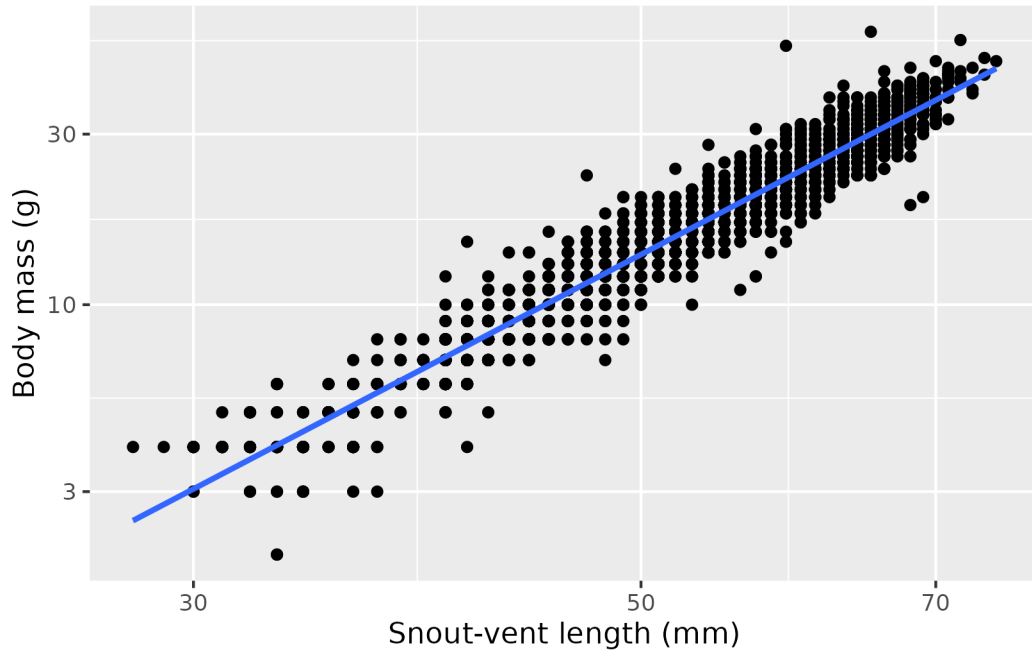


Figure 2: Relationship between length and body mass in post-metamorphic *R. sierrae*. Axes are on a \log_{10} scale.

References

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