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project

## THE STATUS OF THE RIVER COOTER (*Pseudemys concinna*) IN ILLINOIS.

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### INTRODUCTION

The status of the River Cooter, *Pseudemys concinna*, in Illinois is in question. It was feared extirpated in the state as recently as 1981 (Morris and Smith, 1981). Garman (1890) first reported the species in Illinois and numerous reports followed on *Pseudemys concinna*'s presence in oxbows and sloughs of southern Illinois. Cahn (1937) reported *P. concinna* in six southern Illinois counties; Alexander, Hardin, Jackson, Massac, Randolph, and Union, and Smith (1961) reported them in Jersey. There was no mention of *P. concinna*'s presence in the southeastern counties of White, Wabash and Gallatin, which oppose reported Indiana counties (Minton, 1972), until a status survey conducted by Moll and Morris (1991) confirming their presence.

Cahn (1937) wrote *P. concinna*'s habits were poorly known and it was too rare in Illinois to study, except over extended periods. Smith (1961) wrote that the turtle was "very rare" and restricted to large rivers and adjacent lakes in extreme southern Illinois counties.

Moll and Morris (1991) reaffirmed *Pseudemys concinna*'s existence in Illinois by reporting several recent collections and observations within the state. Based on their findings, they concluded the optimal habitats for the species are the sloughs and oxbows in White and Gallatin Counties.

Our study centered in Gallatin and White Counties, Illinois (however, to date, only Gallatin County sites were surveyed). The following oxbow lakes, ponds and sloughs of the Ohio River backwater were surveyed: Round, Horseshoe, Clark, Beaver and Long ponds, Fehrer, Big, Fish and Black Lakes and Bickett's Ditch. Objectives of this study were;

- 1) Search for *P. concinna* populations in the backwaters of the Wabash and Ohio rivers in White and Gallatin counties.
- 2) Intensively study the most promising sites and obtain population estimates.
- 3) Provide management recommendations and a suitable site for a long term study.

#### STUDY SITES

The study area is a chain of back-water lakes and ponds located along the Ohio River in Gallatin County, Illinois. The chain begins with Fehrer Lake (14.57 hectares) in the North and extends to Fish Lake (23.08 hectares) in the South. Others include: Black Lake (8.5 hectares), Round Pond (29.76 hectares), and Long Pond (5.67 hectares). Black Lake's habitat consists mainly of a dense colony of lily pads flanking a deep open channel. Big Lake is a large open body of water and Bickett's Ditch is a field runoff ditch to the North of Round Pond. Long Pond has a dense colony of lily pads running along its eastern and

northern shores while Fish Lake is a long shallow open water lake. Most of these lakes connect with the Ohio River during Spring floods.

## MATERIALS & METHODS

The lakes were surveyed for River cooters from 17 May 1994 to 15 April 1994. Each of the eight sites were observed for a minimum of three periods with spotting scopes and binoculars. Sites where we observed *Pseudemys concinna* were trapped with fyke, baited hoop and trammel nets. Round Pond, the most suitable site, was intensely studied to obtain a basal population estimate. The population was estimated using the Petersen estimator (with Bailey and Chapman modifications) the Lincoln/Peterson Index, and the Schnabel mark/recapture method.

Petersen Estimate

Bailey's Mod.

Chapman's Mod.

$$N = \frac{r(n)}{m}$$

$$N_B = \frac{r(n+1)}{m}$$

$$N_C = \frac{(r+1)(n+1)}{(m+1)}$$

Where: N is the population estimate, r is the number of turtle captured and marked in the initial period, and m is the number of marked turtles captured in the second period.

The initial capture period occurred from 18 May 1994 - 2 June 1994 and the second capture period occurred from 4 April 1994 - 15 April 1994. The regional population of *P. concinna* was calculated using the Round Pond population density in turtles per hectare, as a base.

Captured turtles were permanently marked by notching their marginal scutes (Cagle 1939). The following measurements were taken: to the nearest mm: carapace length (CL), carapace width (CW), plastral length (PL), and shell height (SH). Anterior plastral width

(APW), posterior plastral width (PPW), and each plastral scute length, along the mid-ventral seam was determined to the nearest .1 mm with metric vernier calipers. Turtles were weighed to the nearest 10 grams using pull spring scales and sex was determined using the secondary sex characters (i.e., elongated fore-claws and vent extension beyond the posterior carapace margin for males). All turtles with a carapace length above that of the smallest determined male (111 mm), which were not males, were deemed immature females. Below this measurement, turtles were categorized as juveniles. Adult females exceeded 200 mm in carapacial length.

Species diversity was estimated and evened using the Simpson and Shannon-Wiener indices.

Simpson Index

$$D = \sum_{i=1}^s \frac{1}{P_i^2}$$

$$E = D/S$$

Shannon-Wiener Index

$$H' = \sum_{i=1}^s P_i \ln(P_i)$$

$$J = H'/\ln S$$

Where: S is the number of species present and  $P_i$  is the relative abundance of the species.

## RESULTS

### Regional Status

Four new localities in Gallatin County were found during the course of the survey: Round Pond, Black Lake, Bickett's Ditch and Long Pond. Most of the trapping effort was concentrated at Round Pond and 46 River cooters were collected (Appendix A provides data on all captured River cooters). On 17 June 1994 an immature female, *Pseudemys concinna* captured in a fyke net placed on the southern shore of Big Lake confirming Moll and Morris

(1991). In Black Lake, 17 June 1994, a male *P. concinna* was taken in a fyke net placed in the open channel and four other *P. concinna* were identified basking on logs. Since Fehrer Lake is connected to Black and Big Lakes, it likely also has a *P. concinna* population. However, we were unable to sample or scan, this privately owned land because the property owner was inaccessible. On the shallow western banks of Bickett's Ditch, I viewed three *P. concinna* basking, one of which was a large female. Three dead *P. concinna* and photographs of living specimens will be deposited with the Illinois Natural History Survey.

### **Populational Status**

Since our recaptures were low we relied on the Bailey and Chapman modifications of the Petersen index, to calculate turtles per hectare. Estimates using the Schnabel, Petersen and the Lincoln/Peterson indices are included for comparison in Table 1. Table 1 also includes estimates of turtles per hectare in Round Pond using all five methods of estimation. Assuming the density of turtles in Round Pond was typical to the other ponds, the population of *Pseudemys concinna* in this 122.88 hectares of water is estimated as: Petersen, 454.66, with Bailey's modification,  $401.82 \pm 125.34$  and with Chapman's modification,  $416.56 \pm 109.36$  (See Table 2). However, due to the low frequency of recapture more study is needed to confirm these estimates.

### **Sex and Adult - Juvenile Ratios and Size results for *Pseudemys concinna***

The male to female ratio of the Round Pond population was 1:1.6 and the juvenile and immature ratio to adult was 1:0.69. A comparison of PL and CLs for juveniles, female immatures, males and females are shown in Figures 1 and 2 respectively.

### Species Composition

During the sampling period nine species of chelonians were captured and/or observed in Round Pond. The species were listed in order of abundance (greatest to least) were: *Trachemys scripta*, *Pseudemys concinna*, *Chelydra serpentina*, *Graptemys ouachitensis*, *Strenotherus odoratus*, *Apalone spinifera*, *Graptemys pseudogeographica*, *Chrysemys picta*, and *Apalone muticus*. Each species was then ranked, one being the most abundant and nine the least, and a rank abundance curve was plotted (see Figure 3 & Table 4). The relative percentages of species composition for Round Pond, Long Pond, Big Lake and Black Lake are summarized in Table 4. Using the Simpson and Shannon-Wiener species diversity indices we calculate species diversity (D and H' respectively) and evenness (E and J respectively). Diversity and evenness for Simpson and Shannon-Wiener were: 2.0831, .2315, 1.1113 and .5058 respectively.

The results of this study are currently being analyzed for a dissertation by Dreslik. A copy of the work will be submitted to the Illinois Endangered Species Protection Board as the final report.

### DISCUSSION

Round Pond appears to be a rich community of turtles. *P. concinna* was found to be the second most abundant species within this pond and judging from the population estimate of 110 (for Petersen) and from the number of immature turtles collected, the population appears to be reproducing well. Since these estimates are based on so few recaptures further work needs to be completed to provide stronger estimates.

## LITERATURE CITED

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**TABLES**



Table 1: Population and turtles/ hectare estimations of *Pseudemys concinna* in the Gallatin County, Illinois backwater, Round Pond (29.77 ha.), using the Petersen index with Bailey and Chapman's modifications for low recaptures, the Schnabel and Lincoln/Peterson indices.

Method	Estimation	Turtle/Hectare
Petersen Estimate	110	3.70
Bailey's Modification	97.43 ± 30.31	3.27 ± 1.02
Chapman's Modification	100.86 ± 26.43	3.39 ± 0.89
Schnabel Mark/Recapture	161.714	5.43
Lincoln/Peterson Index	230 ± 78.486	7.73 ± 2.637

Table 2: Regional population estimate of *Pseudemys concinna* using the Petersen Estimate with Bailey and Chapman's modifications.

Locality	Hectares	Petersen	Bailey	Chapman
Round Pond	29.76	110	97.43 ± 30.31	100.86 ± 26.43
Long Pond	5.67	20.98	18.54 ± 5.78	19.22 ± 5.05
Big Lake	41.3	152.81	135.05 ± 42.13	140.01 ± 36.76
Black Lake	8.5	31.45	27.8 ± 8.67	28.82 ± 7.57
Fehrer Lake?	14.57	53.91	47.64 ± 14.86	49.39 ± 12.97
Fish Lake?	23.08	85.40	75.47 ± 23.54	78.24 ± 20.54
Totals	122.88	454.66	401.82 ± 125.34	416.56 ± 109.36

Table 3: The relative percentages of species composition for the Gallatin County, Illinois, sites of: Round Pond, Long Pond, Big Lake and Fish Lake.

Site	Total	<i>T.s.</i>	<i>P.c.</i>	<i>C.s.</i>	<i>G.o.</i>	<i>S.o.</i>	<i>A.s.</i>	<i>G.p.</i>	<i>C.p.</i>	<i>A.<sup>m</sup></i>
Round Pond	234	154	46	10	9	7	3	2	2	1
		65.91%	19.66%	4.27%	3.85%	2.99%	1.28%	0.85%	0.85%	0.43%
Long Pond	11	6	4	1						
		54.55%	36.36%	9.09%						
Big Lake	3		1	2						
			33.33%	66.67%						
Black Lake	3	2	1							
		66.67%	33.33%							

Table 4: A rank abundance table for chelonian species captured at Round Pond, Gallatin County, Illinois.

Species	# Captured	Ln	Rank
<i>Trachemys scripta</i>	154	5.0369	1
<i>Pseudemys concinna</i>	46	3.8286	2
<i>Chelydra serpentina</i>	10	2.3025	3
<i>Graptemys ouacitensis</i>	9	2.1972	4
<i>Strenotherus odoratus</i>	7	1.9459	5
<i>Apalone spinifera</i>	3	1.0986	6
<i>Graptemys pseudogeographica</i>	2	0.6931	7
<i>Chrysemys picta</i>	2	0.6931	8
<i>Apalone muticus</i>	1	0.0000	9

Table 5: Species diversity calculations for all species captured at Round Pond, Gallatin County, Illinois.  $P_i$  is the relative abundance of the species.

	<i>T.s.</i>	<i>P.c.</i>	<i>C.s.</i>	<i>G.o.</i>	<i>S.o.</i>	<i>A.s.</i>	<i>G.p.</i>	<i>C.p.</i>	<i>A.m.</i>
$P_i$	.6609	.1974	.0429	.0343	.0300	.0129	.0086	.0086	.0043
$P_i^2$	.43679	.03897	.00184	.00118	.00090	.00017	.00007	.00007	.00002
$\ln(P_i)$	-.4142	-1.623	-3.149	-3.373	-3.507	-4.351	-4.756	-4.756	-5.449
$P_i \ln(P_i)$	-.2737	-.3203	-.1351	-.1157	-.1052	-.0561	-.0409	-.0409	-.0234

**FIGURES**

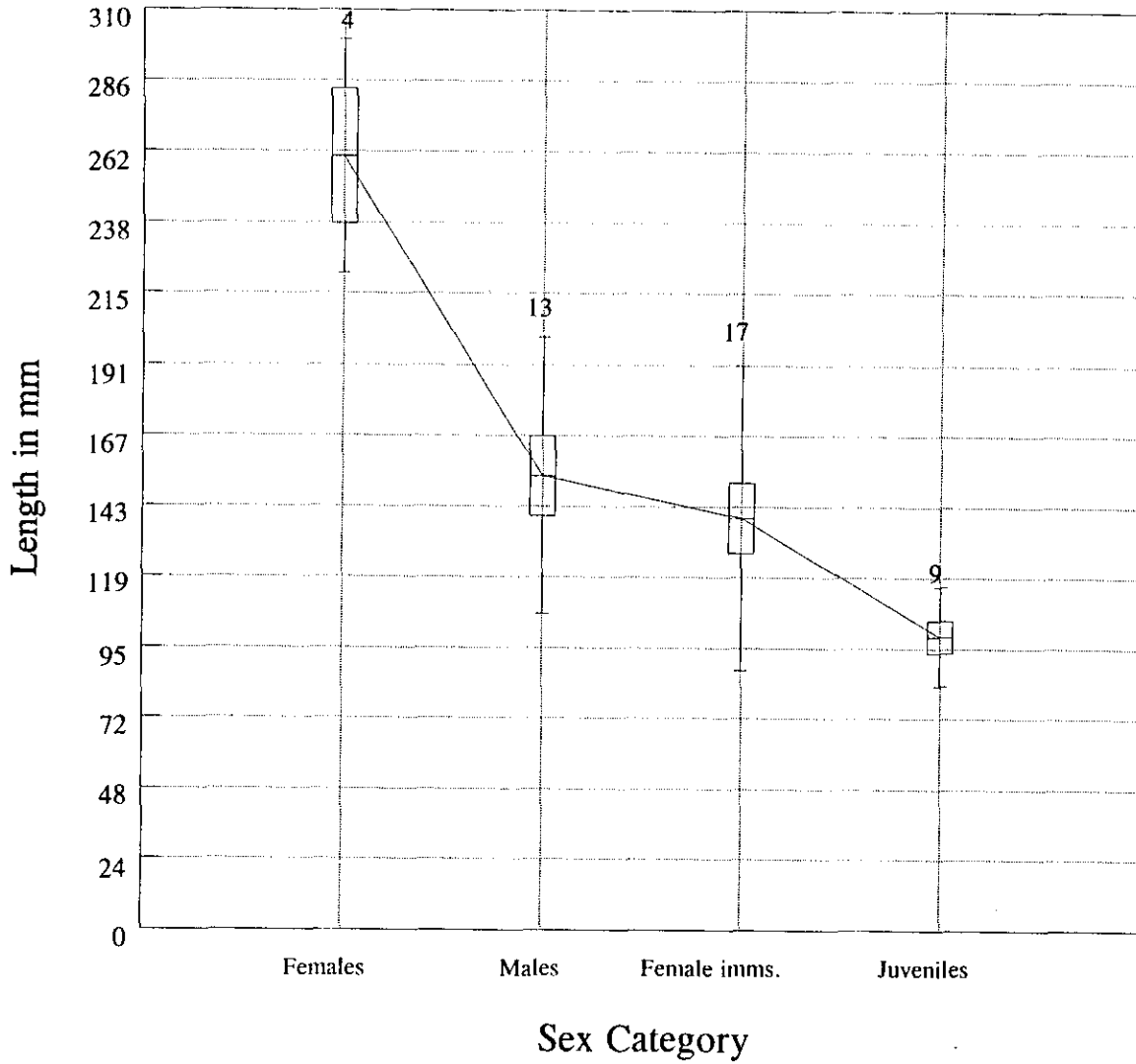


Figure 1: A comparison of the plastral length ranges of female, female immature, juvenile and male *Pseudemys concinna* in Round Pond, Gallatin County, Illinois. Sample size (N) is indicated by the numbers above each column.

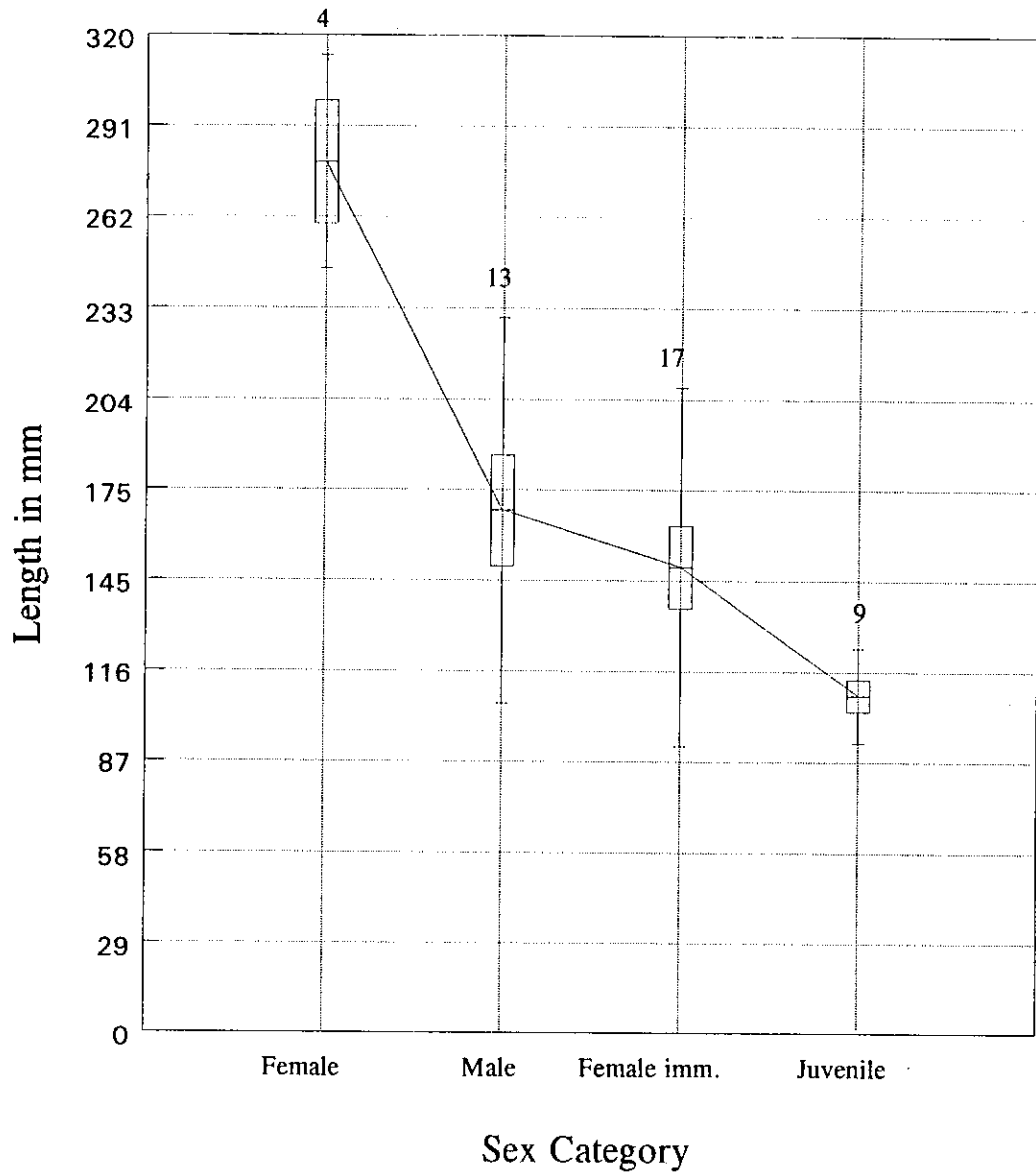


Figure 2:

A comparison of the carapace length ranges of female, female immature, juvenile and male *Pseudemys concinna* in Round Pond, Gallatin County, Illinois. Sample size (N) is indicated by the numbers above each column.

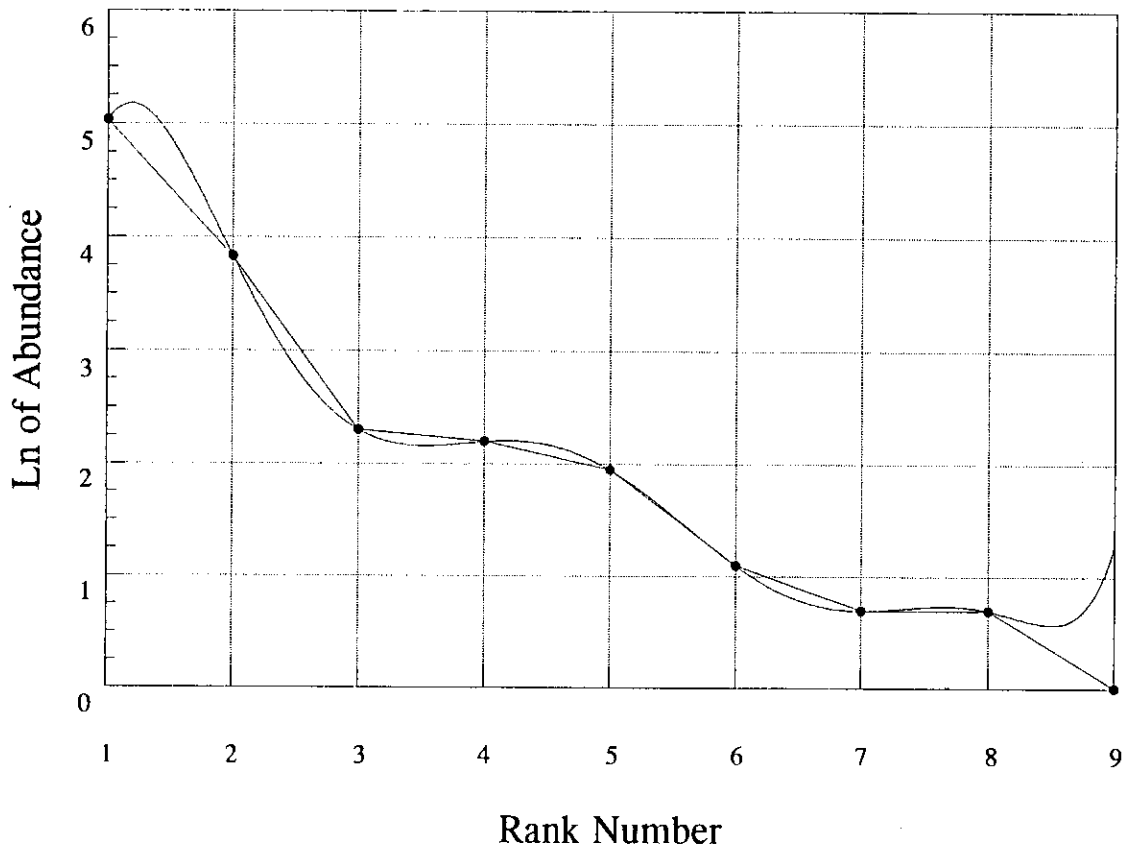


Figure 3:

A rank abundance curve for chelonian species captured in Round Pond, Gallatin County, Illinois, with 1 = *Trachemys scripta*, 2 = *Pseudemys concinna*, 3 = *Chelydra serpentina*, 4 = *Graptemys ouachitensis*, 5 = *Strenotherus odoratus*, 6 = *Apalone spinifera*, 7 = *Graptemys pseudogeographica*, 8 = *Chrysemys picta* and 9 = *Apalone muticus*.

**APPENDIX A**



## *Pseudemys concinna* Markings, Sexes and Base Measurements

Marking	Sex	CL	CW	PL	APW	PPW	SH	Weight
1L	♂	209	153	180	86.00	88.00	64	805g
2L	Juv.	109	91.5	100	48.00	50.00	42	170g
3L	Juv.	108	91	99	53.00	52.00	43	160g
8L	♂	181	146	166	76.43	80.98	62	590g
8R	♀	271	191	246	115.55	117.11	92	-----
1L-8R	♂	152	120	147	60.87	66.44	53	425g
2L-2R	♀im.	166	133	157	75.67	78.32	63	595g
2L-3R	♂	178	143	161	77.76	80.87	64	680g
3L-3R	♀m.	189	138	174	80.32	82.50	67	-----
3L-10R	Juv.	118	100	109	53.35	54.00	47	230g
9L-11R	Juv.	114	96	100	50.52	52.65	41	150g
9L-12R	♂	174	133	156	76.54	77.15	58	500g
1L-2L	♂	207	156	183	83.50	88.67	68	800g
11L-2R	♀im.	133	107	130	59.11	63.54	50	280g
11L-3R	♀im.	140	112	125	57.12	61.89	58	280g
11L-8R	♀im.	121	101	115	51.94	54.01	46	230g
11L-9R	♂	111	93	111	50.45	54.11	43	160g
12L-8R	♀im.	127	103	120	59.78	59.94	49	263g
1L-2L-8R	♀	299	219	283	132.00	140.00	93	----
1L-2L-9R	♀im.	144	115	134	65.12	64.43	53	345g
1L-2L-10R	♀im.	145	114	135	61.23	62.76	51	290g
1L-2L-11R	Juv.	110	90	97	48.87	48.12	40	140g
1L-3L-12R	♀im.	125	106	116	59.43	61.87	57	240g
1L-8L-10R	Juv.	110	91	100	48.98	51.67	43	155g
1L-8L-11R	♀im.	142	120	133	66.12	60.78	52	340g
1L-9L-1R	Juv.	115	96	113	54.12	54.98	43	180g
1L-9L-2R	♂	158	126	142	68.12	70.94	53	405g
1L-9L-3R	♀	200	144	185	87.98	86.12	78	1810g
1L-9L-8R	♀im.	181	136	168	82.32	84.01	62	645g
1L-10L-3R	♂	148	114	134	65.23	69.89	55	335G
1L-10L-8R	Juv.	92	81	84	45.32	47.42	43	100g
1L-11L-2R	♀im.	121	98	114	51.96	54.98	44	210g
1L-11L-3R	♀im.	116	97	107	55.01	56.23	43	220g
1L-11L-8R	♀	218	161	198	92.94	95.56	78	1070g
1L-11L-9R	♂	----	----	----	73.86	77.54	----	460g
1L-11L-10R	♀	268	193	253	103.25	102.94	98	1134g
1L-11L-11R	♂	160	131	154	70.34	73.45	67	450g
1L-11L-12R	♀im.	149	116	137	68.65	62.71	51	380g
2L-3L-2R	♀im.	136	113	124	61.54	64.98	50	265g

*Pseudemys concinna* (cont.)

Marking	Sex	CL	CW	PL	APW	PPW	SH	Weight
3L-8L-3R	♂	206	157	183	86.43	90.56	67	915g
3L-8L-8R	♀im.	160	122	148	69.56	65.77	58	410g
3L-8L-9R	♀im.	134	112	126	62.99	63.12	47	255g
3L-8L-10R	♂	130	108	123	58.34	62.76	47	240g
3L-8L-11R	Juv.	103	90	93	46.65	48.34	39	125g

Table of Means

Sex	CL	CW	PL	APW	PPW	SH	Weight
Females	279.33	201.00	260.67	116.93	120.02	94.33	1134
Female Imms.	149.84	118.32	139.26	66.78	67.55	56.11	427.79
Males	167.83	131.67	153.33	65.26	68.42	153.33	476.15
Juveniles	108.78	91.83	99.44	49.87	51.02	42.33	156.7