Report to the Illinois Wildlife Preservation Fund on the:

Reproductive Ecology, Home Range and Dispersal of the River Cooter, *Pseudemys concinna*, in Illinois.

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INTRODUCTION

Illinois currently has four species of turtles listed as endangered or threatened: spotted turtle (*Clemmys guttata*), river cooter (*Pseudemys concinna*), alligator snapping turtle *(Macroclemys temminckii*), and Illinois mud turtle (*Kinosternon flavescens*)(Herket, 1992 and 1994). There have been several studies on the ecology of the spotted turtle, *Clemmys guttata*, (Mauger, 1988; Wilson, 1994) and Illinois mud turtle, *Kinosternon flavescens*, (Moll and Brown, 1976; Cooper 1977; Brown and Moll, 1979, Sweet *et al*, 1985; Moll 1988) in Illinois. However, there has been little work conducted on the ecology of the remaining two species. Both the river cooter and alligator snapping turtle inhabit relatively inaccessible habitats and it wasn't until 1991 (Moll and Morris, 1991) that the river cooters' existence in Illinois was reaffirmed. Between 1994-96, 77 *P. concinna* have been marked and released at Round Pond, Gallatin Co. IL (Dreslik and Moll, 1996), and eight individuals have been recaptured in successive years. Utilizing this population, the reproductive ecology, seasonal movements, and habitat utilization of this state endangered species will be studied. This information is necessary for determining

the population's viability and developing conservation/management strategies aimed at protecting this rare Illinois turtle.

Studying an organism's reproductive ecology can elucidate life history traits and provide information on nest and juvenile mortality. Currently, the only published records on the nesting and reproduction of *Pseudemys concinna* are general accounts of clutch size, egg size, nest construction and incubation time (see Ernst, 1994 et al. for review). Little attention has been paid to nesting success, hatching success or nest predation rates.

Freshwater turtles are capable of moving long distances (Plummer and Shirer, 1975 and Vogt, 1980) with the movement patterns related to sex (Plummer and Shirer, 1975) and the onset of sexual maturity (Moll and Legler, 1971). Overland travel of turtles has been well documented (Gibbons, 1970) and home ranges of some aquatic turtles encompass more than one body of water (Sexton, 1959; Gibbons and Greene, 1978). Understanding of these patterns in *Pseudemys concinna* will afford insight into the spatial arrangement and habitat usage of this species in Illinois.

The primary objective of this three year study is to obtain information on reproductive, dispersal and home range ecology for the endangered river cooter, *Pseudemys concinna*. Results of this study will contribute to understanding *Pseudemys concinna*'s life history and prove invaluable in developing conservation/management strategies aimed at the preservation of this endangered species.

MATERIALS AND METHODS.

Study Sites. The study will be centered at Round Pond, Gallatin county, which is located approximately 3.5 km west of the Ohio River and is about 30 hectares in surface area. A sand beach stretches along Round Pond's southern shore and the remaining shoreline is floodplain forest. The irregular edges of the pond provide several shallow coves and bays. The predominant emergent aquatic vegetation is spatterdock, *Nuphar luteum*, and during annual floods, the Ohio River connects to this and the other lakes directly via a network of sloughs. The remaining bodies of water in the vicinity (Hulda Lake, Big Lake, Fish Lake, Feher Lake and Long Pond) are similar in habitat.

General Methodology. Turtles will be trapped using unbaited fyke nets, trammel nets, dip nets and by hand. Traps will be checked twice daily at Round Pond and once per day at the other sites. Trammel nets will only be used during the day and checked every two hours. All captured turtles will be: weighed (with pull spring scales and/or electronic balances), sexed (using secondary sexual characteristics) and aged by annuli counts on the left pectoral scute (Zug, 1991). The following morphological characteristics will be measured using metric calipers: carapace length (CL), carapace width (CW), shell height (SH), plastral length (PL), length of the left pectoral scute at the seam (LPECT) and all annuli on the left pectoral scute. Turtles will be held overnight in a 20 liter bucket to retrieve feces. Stomach contents and feces will be stored in 10% formalin for later study. Reproductive females will have their inguinal pockets palpated to determine the presence of eggs. All adult females and 12 adult males will be radio-tagged, transmitters will be encased in paraffin or beeswax and adhered to the rear of the carapace with dental acrylic, and individuals will be located twice per day over the study period and once per week during the Fall, Winter and early Spring. Nesting females will be located and, following

oviposition, the nest will be excavated and the eggs will be weighed, counted and measured. The nest will then be reconstructed with HOBO temperature data loggers, set for one hour intervals, placed in the bottom and top of the nest. Nests will be marked with engineers flagging one meter to the north and will be checked twice daily for disturbance during the first month.

The following environmental measurements will be taken hourly on site with data loggers: water temperature at the one and three meter levels, humidity, barometric pressure, ultraviolet radiation, light and air temperature. At each trap daily water depth at each fyke net, air speed and direction, and current velocity will also be estimated.

Reproductive Ecology. Major nest predators will be determined through direct observation. Determination of the relationship between predation rates, time of nesting and distance to a forest edge (determined as a forest edge either parallel to a field or water) will be made using regression analysis. Approximately one month prior to hatchling emergence, a 0.25 meter high fence will be placed around nests to capture the young (Congdon *et al*, 1987) and all juveniles captured will be marked, weighed, measured and released. The nest will then be excavated and all non-hatched eggs will be counted to determine hatching success; nest success will be determined by the emergence of at least one individual. I will analyze the variation of clutch size, egg mass and size, frequency of nesting and incubation period between years and individuals using ANOVA procedures. The length of incubation period, nest success and juvenile sizes will then be correlated to each of the environmental factors and nest temperatures using correlation and regression analyses. I will calculate correlation coefficients of female size (CL, PL, PPW and weight) to egg size and weight clutch size and hatchling size.

Dispersal Patterns and Home Range. All turtles captured outside Round Pond that were originally marked in Round Pond will be considered emigrants and all turtles that were marked in other lakes and recaptured in Round Pond will be deemed immigrants. A grid of buoys will be placed in the lake and each buoy will be referenced to a nearby benchmark to determine its global coordinates. Once a turtle is located I will take three GPS readings from a Garmin GPS 40, and a distance and compass bearing from three of the buoys. Home range data will then be entered into a GIS program to analyze patterns of habitat use and spatial arrangement. Centers of activity for radio tagged turtles will be calculated at the 90% level and the total home ranges will be estimated by plotting all points utilizing the minimum polygon method (Mohr, 1947).

PRELIMINARY RESULTS

Funding for the 1997 field season was below the amount needed to provide for the project ($1,000 from the Wildlife Preservation Fund and $1,000 from the Chelonian Research Foundation). The money received from the Chelonian Research Foundation was for a population genetic study, but because this money was issued to me directly, and the Wildlife Preservation Fund money issued to Eastern Illinois University, and had to be spent before June 20th, Dr. Moll and I used the Preservation Fund money for chemicals for the genetic study. I will use the Chelonian Research Foundation money for the monitoring of the *P. concinna* population this summer.

Because funding fell short of the required, no transmitters could be purchased this year. I will only be able to monitor the population this summer. I will attempt to X-ray gravid females captured to, at least, gain an understanding of clutch size, and frequency. Also, since females cannot be radio-tracked, I will have to monitor the sandy beach on the southern shore to look for

nesting females. The project will be pushed back a year and its expected completion date is now the summer of 2000. Full results will be sent upon the completion of this field season.

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Turtles of Round Pond

	SPECIES	SEX	DOC	MOC	TOC	WEIGHT	CL	CW	SH	PL
[redacted]	APMU	U	5/24/94	5	13:20	0.00	173.00	158.00	31.00	123.00
6:00	APSP	M	5/14/95	2	19:00	527.00	188.00	172.00	41.00	132.00
Black	APSP	M	8/12/95	2	19:00	270.00	144.00	129.00	0.00	108.00
Green	APSP	M	8/30/96	2	12:00	499.00	174.00	153.00	42.00	124.00
N/A	APSP	F	6/ 4/94	6	08:00	5,050.00	374.00	304.00	97.00	270.00
N/A	APSP	M	6/ 4/94	2	18:00	525.00	185.00	161.00	45.00	129.00
N/A	APSP	J	6/16/94	2	20:00	0.00	130.00	106.00	28.00	81.00
Orange	APSP	M	8/13/95	2	13:00	502.00	186.00	159.00	44.00	131.00
1L	CHPI	M	6/16/94	2	20:00	230.00	122.00	94.00	41.00	114.00
2L	CHPI	M	6/16/94	2	20:00	265.00	132.00	96.00	42.00	124.00
3L	CHPI	F	8/30/96	2	18:30	423.00	146.00	110.00	53.00	135.00
10L	CHSE	F	5/19/94	2	13:30	0.00	204.00	228.00	122.00	228.00
10L	CHSE	F	8/29/96	2	13:34	5,000.00	262.00	234.00	117.00	198.00
10L11R	CHSE	M	8/ 4/96	2	14:00	5,000.00	276.00	228.00	116.00	198.00
10L12R	CHSE	U	8/ 5/96	2	10:00	3,900.00	256.00	209.00	108.00	168.00
10R	CHSE	M	5/29/94	2	15:00	4,500.00	252.00	226.00	114.00	192.00
11L	CHSE	F	5/26/94	2	11:20	3,200.00	246.00	204.00	117.00	176.00
11L	CHSE	F	6/27/95	2	08:00	3,100.00	258.00	214.00	120.00	195.00
11R	CHSE	M	5/31/94	2	10:45	6,250.00	281.00	240.00	124.00	206.00
12L	CHSE	J	5/28/94	2	17:15	0.00	149.00	121.00	65.00	109.00
12L10R	CHSE	F	6/28/95	2	08:00	6,100.00	316.00	259.00	135.00	230.00
12L11R	CHSE	J	8/14/95	2	13:00	418.00	127.00	99.00	56.00	95.00
12L12R	CHSE	U	8/14/95	2		723.00	151.00	125.00	72.00	109.00
[redacted]9R	CHSE	M	5/12/95	2	12:00	1,566.00	198.00	171.00	89.00	142.00
[redacted]	CHSE	M	6/ 4/94	2	18:00	0.00	185.00	155.00	84.00	132.00
8L	CHSE	M	5/19/94	2	13:30	0.00	226.00	188.00	99.00	164.00
8L	CHSE	M	5/11/95	2	12:00	2,500.00	230.00	199.00	104.00	171.00
8L8R	CHSE	M	6/ 4/94	2	18:00	0.00	302.00	264.00	132.00	212.00
8L8R	CHSE	F	6/10/94	2	11:30	3,000.00	229.00	192.00	102.00	167.00
8R	CHSE	M	5/29/94	2	15:00	5,000.00	283.00	226.00	127.00	167.00
8R	CHSE	M	5/10/95	2	18:00	5,200.00	287.00	236.00	128.00	193.00
8R	CHSE	M	8/30/96	2	12:00	6,750.00	307.00	255.00	132.00	216.00
9L	CHSE	M	5/19/94	2	13:30	8,500.00	309.00	252.00	127.00	227.00
9L	CHSE	M	5/11/95	2	12:00	6,500.00	313.00	255.00	132.00	231.00
9L9R	CHSE	U	8/14/95	2	17:30	3,100.00	243.00	187.00	106.00	189.00
9R	CHSE	J	5/29/94	2	15:00	1,250.00	188.00	152.00	80.00	134.00
N/A	CHSE	M	6/11/95	2	14:45	0.00	190.00	160.00	76.00	143.00
10L	GROU	M	6/27/95	2	08:00	138.00	109.00	84.00	42.00	96.00
10R	GROU	F	5/20/94	2	11:30	135.00	100.00	83.00	44.00	89.00
12R	GROU	M	5/28/94	2	17:00	180.00	117.00	92.00	46.00	107.00
1R	GROU	F	9/ 1/96	2	13:30	445.00	159.00	130.00	55.00	145.00
3L	GROU	F	8/29/96	2	08:00	268.00	136.00	109.00	47.00	123.00
8L	GROU	M	5/19/94	2	13:30	85.00	91.00	73.00	35.00	825.00
8L8R	GROU	M	6/ 4/94	2	17:00	75.00	99.00	73.00	35.00	85.00
9L	GROU	J	5/12/95	1	13:00	6.00	34.00	35.00	17.00	30.00
9L	GROU	M	6/29/95	2	08:00	130.00	109.00	86.00	40.00	93.00
9L10L	GROU	J	8/14/95	2	13:00	83.00	72.00	34.00	72.00	34.61
9R10R	GROU	F	5/ 8/95	2	17:30	143.00	109.00	90.00	47.00	97.00
11R	GRPS	M	5/24/94	5	13:14	243.00	137.00	99.00	46.00	117.00
[redacted]2R	PSCO	F	5/29/94	2	15:00	280.00	133.00	107.00	50.00	130.00
11L8R	PSCO	F	5/29/94	2	15:00	230.00	121.00	101.00	46.00	115.00
11L9R	PSCO	M	5/29/94	2	15:00	160.00	111.00	93.00	43.00	101.00
11L9R	PSCO	J	6/11/94	2	14:30	160.00	111.00	94.00	42.00	102.00

Turtles of Round Pond

	SPECIES	SEX	DOC	MOC	TOC	WEIGHT	CL	CW	SH	PL
[redacted]10R12R	PSCO	J	8/ 5/96	2	10:00	192.00	0.00	0.00	0.00	0.00
12L11R12R	PSCO	M	8/ 5/96	2	10:00	427.00	155.00	124.00	55.00	144.00
12L3R	PSCO	F	5/29/94	2	15:00	280.00	140.00	112.00	58.00	125.00
12L3R9R	PSCO	F	8/ 4/96	2	17:00	2,500.00	269.00	195.00	94.00	244.00
12L8R	PSCO	F	5/31/94	2	10:45	263.00	127.00	103.00	49.00	120.00
1L	PSCO	M	5/18/94	2	14:50	805.00	209.00	153.00	64.00	180.00
1L10L3R	PSCO	M	6/11/94	2	14:30	335.00	148.00	114.00	55.00	134.00
1L10L8R	PSCO	J	6/11/94	2	14:30	100.00	92.00	81.00	43.00	84.00
1L11L10R	PSCO	F	6/14/94	2	18:00	2,500.00	268.00	193.00	98.00	253.00
1L11L11R	PSCO	M	6/14/94	2	18:00	450.00	160.00	131.00	67.00	154.00
1L11L12R	PSCO	F	6/15/94	2	14:00	380.00	149.00	116.00	51.00	137.00
1L11L12R	PSCO	F	5/15/95	2	18:00	406.00	152.00	119.00	53.00	140.00
1L11L2R	PSCO	F	6/14/94	2	18:00	210.00	121.00	98.00	44.00	114.00
1L11L3R	PSCO	F	6/14/94	2	18:00	220.00	116.00	97.00	43.00	107.00
1L11L8R	PSCO	F	6/14/94	2	18:00	1,070.00	218.00	161.00	78.00	198.00
1L11L9R	PSCO	M	6/14/94	2	18:00	460.00	0.00	0.00	0.00	0.00
1L11L9R	PSCO	M	5/14/95	2	18:00	488.00	179.00	134.00	57.00	156.00
1L2L	PSCO	M	5/29/94	2	15:00	800.00	207.00	156.00	68.00	183.00
1L2L	PSCO	M	8/29/96	2	19:30	957.00	215.00	161.00	69.00	191.00
1L2L10R	PSCO	F	6/ 1/94	2	10:20	290.00	145.00	114.00	51.00	135.00
1L2L10R	PSCO	F	5/15/95	2	18:00	338.00	147.00	115.00	51.00	136.00
1L2L11R	PSCO	J	6/ 1/94	2	10:20	140.00	110.00	90.00	40.00	97.00
1L2L1R10R	PSCO	M	8/29/96	2	08:00	672.00	189.00	138.00	62.00	171.00
[redacted]L1R11R	PSCO	M	8/29/96	2	10:00	811.00	201.00	153.00	64.00	180.00
[redacted]L3R10R	PSCO	F	8/29/96	2	19:30	322.00	133.50	113.00	51.00	127.50
1L2L3R9R	PSCO	M	8/29/96	2	19:30	1,056.00	221.00	161.00	0.00	196.00
1L2L8R	PSCO	F	6/ 1/94	2	10:20	0.00	299.00	219.00	93.00	283.00
1L2L9R	PSCO	F	6/ 1/94	2	10:20	345.00	144.00	115.00	53.00	134.00
1L2L9R	PSCO	F	8/13/95	2	17:30	487.00	164.00	126.00	59.00	152.00
1L3L12R	PSCO	F	6/10/94	2	11:30	240.00	125.00	106.00	57.00	116.00
1L3L1R12R	PSCO	J	8/30/96	2	18:30	172.00	104.00	88.50	43.00	101.00
1L3L2R3R	PSCO	F	8/30/96	2	18:30	415.00	157.00	123.00	56.00	148.00
1L3L3R8R	PSCO	M	8/31/96	2	12:30	658.00	181.00	141.00	62.00	164.00
1L3L3R9R	PSCO	J	8/31/96	2	12:30	117.00	94.00	82.00	40.00	89.00
1L3L8R11R	PSCO	F	8/31/96	2	12:30	349.00	150.00	117.00	54.00	134.00
1L3L8R12R	PSCO	F	9/ 1/96	2	17:30	1,550.00	245.00	188.00	85.00	234.00
1L3L9R10R	PSCO	F	9/ 1/96	2	14:00	2,005.00	278.00	205.00	96.00	262.00
1L8L10R	PSCO	J	6/10/94	2	11:30	155.00	110.00	91.00	43.00	100.00
1L8L11R	PSCO	F	6/10/94	2	11:30	340.00	142.00	120.00	52.00	133.00
1L8R	PSCO	M	5/28/94	2	17:00	425.00	152.00	120.00	53.00	147.00
1L9L1R	PSCO	J	6/10/94	2	11:30	180.00	115.00	96.00	43.00	113.00
1L9L2R	PSCO	M	6/10/94	2	11:30	405.00	158.00	126.00	53.00	142.00
1L9L3R	PSCO	F	6/10/94	2	11:30	1,810.00	200.00	144.00	78.00	185.00
1L9L8R	PSCO	F	6/11/94	2	14:30	645.00	181.00	136.00	62.00	168.00
1R2R9L	PSCO	J	8/15/95	2	14:00	112.00	94.00	82.00	37.00	85.00
2L	PSCO	J	5/18/94	2	17:20	170.00	109.00	91.50	42.00	100.00
2L2R	PSCO	F	5/19/94	2	13:30	595.00	166.00	133.00	63.00	157.00
2L3L2R	PSCO	F	6/ 4/94	2	17:00	265.00	136.00	113.00	50.00	124.00
2L3L2R	PSCO	F	5/ 5/95	2	20:00	339.00	141.00	115.00	53.00	128.00
[redacted]R	PSCO	M	5/19/94	2	13:30	680.00	178.00	143.00	64.00	161.00
2L8R	PSCO	M	8/31/96	2	12:30	748.00	191.00	150.00	64.00	171.00
3L	PSCO	J	5/18/94	2	17:20	160.00	108.00	91.00	43.00	94.00
3L10R	PSCO	J	5/20/94	2	11:30	230.00	117.89	100.00	47.00	109.00

Turtles of Round Pond

	SPECIES	SEX	DOC	MOC	TOC	WEIGHT	CL	CW	SH	PL
[illegible]2L12R	PSCO	F	6/17/94	2	17:30	0.00	210.00	162.00	71.00	194.00
3L3R	PSCO	F	5/20/94	2	13:30	0.00	189.00	138.00	67.00	174.00
3L8L10R	PSCO	M	6/ 4/94	2	17:00	240.00	130.00	108.00	47.00	123.00
3L8L11R	PSCO	J	6/ 4/94	2	17:00	125.00	103.00	90.00	39.00	93.00
3L8L3R	PSCO	M	6/ 4/94	2	17:00	915.00	206.00	157.00	67.00	183.00
3L8L8R	PSCO	F	6/ 4/94	2	17:00	410.00	160.00	122.00	58.00	148.00
3L8L9R	PSCO	F	6/ 4/94	2	17:00	255.00	134.00	112.00	47.00	126.00
8L	PSCO	M	5/28/94	2	17:00	590.00	181.00	146.00	62.00	166.00
8L10L1R	PSCO	F	5/10/95	2	18:00	390.00	144.00	115.00	56.00	136.00
8L10L2R	PSCO	F	5/10/95	2	18:00	265.00	129.00	103.00	49.00	120.00
8L10L3R	PSCO	F	5/10/95	2	18:00	3,250.00	214.00	221.00	125.00	292.00
8L11L2R	PSCO	F	5/12/95	2	12:00	167.00	107.00	94.00	42.00	102.00
8L11L9R	PSCO	J	5/12/95	2	18:00	78.00	82.00	72.00	36.00	75.00
8L12L10R	PSCO	M	5/15/95	2	18:00	960.00	220.00	160.00	67.00	191.00
8L12L11R	PSCO	J	5/15/95	2	18:00	262.00	124.00	104.00	48.00	118.00
8L9L12R	PSCO	F	5/ 8/95	2	17:30	225.00	121.00	103.00	47.00	119.00
8L9L1R	PSCO	F	6/17/94	2	17:30	0.00	316.00	216.00	109.00	286.00
8L9L2R	PSCO	F	6/17/94	2	17:30	0.00	255.00	318.60	85.00	219.00
8R	PSCO	F	5/27/94	2	15:00	0.00	271.00	191.00	92.00	246.00
9L10L1R	PSCO	M	5/ 8/95	2	17:30	655.00	196.00	143.00	62.00	176.00
9L10L2R	PSCO	F	5/ 8/95	2	17:30	2,500.00	311.00	227.00	104.00	281.00
9L11L11R	PSCO	F	5/14/95	2	19:00	3,100.00	322.00	221.00	112.00	291.00
9L11L12R	PSCO	F	5/14/95	2	19:00	2,250.00	292.00	192.00	110.00	266.00
[illegible]1R	PSCO	J	5/28/94	2	17:00	150.00	114.00	96.00	41.00	100.00
[illegible]1R	PSCO	F	8/14/95	2	18:00	333.00	143.00	116.00	49.00	126.00
9L12L11R	PSCO	F	6/20/95	2	08:00	2,500.00	308.00	212.00	108.00	283.00
9L12L1R	PSCO	M	5/16/95	2	18:30	854.00	199.00	152.00	77.00	179.00
9L12R	PSCO	M	5/28/94	2	17:00	510.00	174.00	133.00	58.00	156.00
10L	STOD	M	6/ 4/94	2	17:00	105.00	91.50	69.00	36.50	67.00
10L10R	STOD	F	6/29/95	2	08:00	209.00	111.00	77.00	48.00	89.00
10R	STOD	F	6/14/94	2	18:00	150.00	93.00	70.00	41.00	76.00
11L	STOD	M	6/10/94	2	11:30	141.00	99.00	69.00	41.00	72.50
11L10R11R	STOD	F	5/25/94	2	15:00	190.00	107.00	72.00	57.00	80.00
11R	STOD	M	6/17/94	2	11:00	145.00	96.00	70.00	39.00	75.00
2L11L	STOD	F	5/11/95	2	12:00	221.00	113.00	78.00	45.00	81.00
8L	STOD	M	5/ 7/95	2	18:00	165.00	107.00	73.00	41.00	80.00
8L11R	STOD	F	8/15/95	2	14:00	172.00	107.00	74.00	43.00	77.00
9L10L11L11R	STOD	F	6/ 4/94	2	17:00	205.00	106.00	73.00	44.00	77.00
9L10R	STOD	M	8/15/95	2	14:00	141.00	97.00	66.00	37.00	68.00
9L10R	STOD	F	8/16/95	2	13:00	156.00	102.00	70.00	45.00	77.00
9L11L	STOD	M	5/12/95	2	12:00	118.00	93.00	64.00	40.00	68.00
9L9R	STOD	F	6/28/95	2	08:00	150.00	101.00	69.00	42.00	70.00
10L	TSSC	F	6/27/95	2	16:00	544.00	166.00	129.00	61.00	157.00
10L	TSSC	F	8/30/96	2	12:00	964.00	196.00	148.00	71.00	183.00
10L10R	TSSC	F	5/29/94	2	15:00	0.00	223.00	167.00	83.00	210.00
10L11L10R	TSSC	F	6/28/95	2	16:00	1,512.00	224.00	164.00	87.00	209.00
10L11L11R	TSSC	M	6/28/95	2	16:00	419.00	143.00	114.00	52.00	132.00
10L11L12R	TSSC	M	6/28/95	2	16:00	220.00	116.00	97.00	46.00	111.00
10L11L1R	TSSC	F	6/27/95	2	16:00	302.00	131.00	102.00	52.00	124.00
[illegible]11L2R	TSSC	F	6/28/95	2	08:00	1,302.00	221.00	165.00	78.00	202.00
10L11L3R	TSSC	F	6/28/95	2	16:00	1,476.00	223.00	155.00	88.00	202.00
10L11L3R	TSSC	F	9/ 1/96	2	13:30	1,405.00	224.00	156.00	88.00	203.00
10L11L8R	TSSC	M	6/28/95	2	16:00	646.00	172.00	128.00	62.00	157.00

Turtles of Round Pond

	SPECIES	SEX	DOC	MOC	TOC	WEIGHT	CL	CW	SH	PL
[redacted]11L9R	TSSC	F	9/ 1/96	2	13:30	435.00	153.00	148.00	54.00	146.00
10L11L9R	TSSC	F	6/28/95	2	16:00	235.00	120.00	99.00	46.00	115.00
10L11L9R	TSSC	F	8/31/96	2	12:30	423.00	153.00	122.00	55.00	147.00
10L11R	TSSC	F	5/29/94	2	15:00	505.00	153.00	124.00	69.00	147.00
10L12L10R	TSSC	M	8/13/95	2	17:30	1,166.00	211.00	158.00	79.00	192.00
10L12L11R	TSSC	F	8/13/95	2	17:30	1,084.00	203.00	152.00	76.00	184.00
10L12L12R	TSSC	M	8/13/95	2	17:30	335.00	132.00	104.00	52.00	124.00
10L12L1R	TSSC	M	6/28/95	2	16:00	1,118.00	199.00	147.00	72.00	181.00
10L12L2R	TSSC	F	6/28/95	2	16:00	638.00	166.00	129.00	62.00	161.00
10L12L3R	TSSC	F	6/29/95	2	16:00	696.00	182.00	138.00	65.00	169.00
10L12L8R	TSSC	M	8/13/95	2	11:00	644.00	179.00	136.00	64.00	166.00
10L12L9R	TSSC	J	8/13/95	2	11:00	167.00	103.00	89.00	39.00	99.00
10L12R	TSSC	F	5/29/94	2	15:00	385.00	143.50	114.00	55.50	135.00
10L1R	TSSC	F	5/29/94	2	15:00	0.00	225.00	167.00	91.00	207.00
10L1R	TSSC	F	8/ 5/96	2	17:15	1,723.00	228.00	169.00	91.00	209.00
10L1R2R	TSSC	F	8/15/95	2	14:00	468.00	156.00	122.00	56.00	146.00
10L1R3R	TSSC	J	8/16/95	2	13:00	221.00	120.00	93.00	44.00	105.00
10L2R	TSSC	F	5/29/94	2	15:00	0.00	222.00	170.00	87.00	208.00
10L3R	TSSC	M	5/29/94	2	15:00	0.00	197.00	151.00	72.00	176.00
10L8R	TSSC	M	5/29/94	2	15:00	400.00	144.00	111.00	55.00	134.00
10L9R	TSSC	M	5/29/94	2	15:00	315.00	130.00	104.00	53.00	122.00
10R	TSSC	M	5/19/94	2	13:30	375.00	140.00	110.00	51.00	127.00
10R	TSSC	M	6/28/95	2	16:00	477.00	158.00	121.00	55.00	144.00
[redacted]	TSSC	M	5/19/94	2	13:30	1,050.00	213.00	157.00	78.00	196.00
[redacted]10R	TSSC	M	5/31/94	2	10:45	750.00	182.00	141.00	64.00	162.00
11L10R12R	TSSC	M	8/ 4/96	1	10:00	561.00	168.00	129.00	58.00	156.00
11L10R12R	TSSC	M	8/ 4/96	2	10:00	561.00	168.00	129.00	58.00	156.00
11L11R	TSSC	F	5/31/94	2	10:45	1,750.00	243.00	173.00	85.00	220.00
11L12L10R	TSSC	F	8/15/95	2	17:30	1,449.00	232.00	160.00	83.00	208.00
11L12L10R	TSSC	F	9/ 1/96	2	13:30	1,465.00	233.00	161.00	84.00	210.00
11L12L11R	TSSC	J	8/15/95	2	17:30	216.00	114.00	95.00	43.00	106.00
11L12L12R	TSSC	M	8/15/95	2	17:30	305.00	137.00	107.00	47.00	127.00
11L12L1R	TSSC	M	8/13/95	2	17:30	896.00	192.00	139.00	67.00	176.00
11L12L1R	TSSC	M	8/ 5/96	2	10:00	950.00	197.00	143.00	74.00	183.00
11L12L2R	TSSC	F	8/14/95	2	13:00	493.00	155.00	124.00	62.00	146.00
11L12L3R	TSSC	F	8/14/95	2	13:00	289.00	131.00	106.00	47.00	124.00
11L12L8R	TSSC	F	8/15/95	2	13:00	990.00	200.00	148.00	72.00	187.00
11L12L8R	TSSC	F	8/ 4/96	2	10:00	1,197.00	212.00	155.00	75.00	199.00
11L12L9R	TSSC	F	8/15/95	2	17:30	496.00	168.00	129.00	58.00	147.00
11L12R	TSSC	F	5/31/94	2	10:45	635.00	173.00	132.00	70.00	159.00
11L1R	TSSC	M	5/29/94	2	15:00	239.00	124.00	99.00	45.00	117.00
11L1R2R	TSSC	F	8/16/95	2	13:00	1,393.00	227.00	159.00	85.00	209.00
11L1R2R	TSSC	F	8/30/96	2	18:30	1,492.00	218.00	161.00	85.00	211.00
11L1R3R	TSSC	J	8/16/95	2	13:00	194.00	114.00	92.00	43.00	111.00
11R	TSSC	F	5/19/94	2	13:30	675.00	183.00	142.00	66.00	170.00
12L	TSSC	M	5/18/94	2	13:30	0.00	203.00	156.00	67.00	181.00
12L10R	TSSC	F	5/31/94	2	14:30	950.00	199.00	149.00	73.00	189.00
12L10R11R	TSSC	M	8/ 5/96	2	10:00	995.00	209.00	150.00	79.00	191.00
12L11R	TSSC	M	5/31/94	2	14:30	295.00	122.00	103.00	51.00	117.00
[redacted]12R	TSSC	M	6/ 1/94	2	10:20	325.00	136.00	112.00	50.00	124.00
12L12R	TSSC	M	8/15/95	2	14:00	449.00	152.00	123.00	56.00	149.00
12L1R	TSSC	F	5/31/94	2	10:45	405.00	145.00	115.00	55.00	133.00
12L1R10R	TSSC	F	8/ 4/96	2	10:00	1,226.00	211.00	158.00	77.00	199.00

Turtles of Round Pond

	SPECIES	SEX	DOC	MOC	TOC	WEIGHT	CL	CW	SH	PL
[redacted]1R11R	TSSC	F	8/ 4/96	2	10:00	290.00	123.00	104.00	48.00	117.00
12L1R12R	TSSC	F	8/ 4/96	2	10:00	390.00	144.00	115.00	50.00	137.00
12L1R12R	TSSC	F	8/31/96	2	12:30	378.00	147.00	116.00	52.00	139.00
12L1R2R	TSSC	J	8/16/95	2	13:00	181.00	108.00	89.00	43.00	101.00
12L1R3R	TSSC	F	8/ 4/96	2	10:00	1,849.00	238.00	172.00	96.00	222.00
12L1R8R	TSSC	M	8/ 4/96	2	10:00	651.00	177.00	130.00	61.00	163.00
12L1R9R	TSSC	F	8/ 4/96	2	10:00	518.00	158.00	121.00	57.00	148.00
12L2R	TSSC	M	5/31/94	2	10:45	290.00	131.00	117.00	48.00	122.00
12L2R10R	TSSC	F	8/ 4/96	2	10:00	610.00	167.00	131.00	63.00	155.00
12L2R10R	TSSC	F	9/ 1/96	2	13:30	604.00	167.00	131.00	63.00	156.00
12L2R11R	TSSC	F	8/ 4/96	2	10:00	645.00	167.00	133.00	61.00	156.00
12L2R11R	TSSC	F	9/ 1/96	2	14:00	653.00	169.00	134.00	61.00	158.00
12L2R12R	TSSC	F	8/ 4/96	4	10:00	271.00	122.00	113.00	46.00	119.00
12L2R8R	TSSC	F	8/ 4/96	2	10:00	461.00	146.00	121.00	58.00	136.00
12L2R8R	TSSC	F	8/31/96	2	12:30	469.00	147.00	122.00	68.00	139.00
12L2R9R	TSSC	F	8/ 4/96	2	10:00	908.00	189.00	148.00	68.00	173.00
12L3R	TSSC	M	5/31/94	2	10:45	620.00	170.00	128.00	58.00	158.00
12L3R10R	TSSC	F	8/ 4/96	2	17:00	1,884.00	236.00	172.00	90.00	216.00
12L3R11R	TSSC	F	8/ 4/96	2	17:00	739.00	182.00	142.00	61.00	171.00
12L3R12R	TSSC	M	8/ 4/96	2	17:00	586.00	172.00	128.00	59.00	156.00
12L3R8R	TSSC	F	8/ 4/96	2	10:00	426.00	143.00	114.00	55.00	139.00
12L8R11R	TSSC	F	8/ 4/96	2	17:00	362.00	140.00	117.00	51.00	130.00
12L8R12R	TSSC	M	8/ 4/96	2	17:00	228.00	121.00	99.00	44.00	110.00
[redacted]8R9R	TSSC	M	8/ 4/96	2	17:00	1,130.00	212.00	159.00	73.00	186.00
[redacted]9R	TSSC	J	5/31/94	2	14:30	105.00	91.00	77.00	36.00	83.00
12L9R10R	TSSC	F	8/ 5/96	2	10:00	314.00	132.00	107.00	51.00	124.00
12L9R11R	TSSC	F	8/ 5/96	2	10:00	347.00	133.00	110.00	52.00	129.00
12L9R12R	TSSC	F	8/ 5/96	2	10:00	239.00	116.00	96.00	46.00	113.00
12R	TSSC	M	5/17/94	2	13:30	0.00	141.00	107.00	0.00	126.00
1L10L	TSSC	F	5/19/94	2	13:30	290.00	129.00	104.00	51.00	121.00
1L10L10R	TSSC	F	6/11/94	2	14:45	0.00	138.00	114.00	54.00	137.00
1L10L11R	TSSC	M	6/11/94	2	14:45	325.00	135.00	110.00	58.00	127.00
1L10L11R	TSSC	M	5/16/95	2	15:00	324.00	138.00	111.00	49.00	130.00
1L10L12R	TSSC	M	6/11/94	2	14:45	360.00	137.00	108.00	50.00	125.00
1L10L12R	TSSC	M	5/12/95	2	06:00	340.00	137.00	108.00	50.00	126.00
1L10L1R	TSSC	F	6/11/94	2	14:45	345.00	139.00	112.00	51.00	133.00
1L10L1R	TSSC	F	9/ 1/96	2	13:30	720.00	178.00	136.00	62.00	166.00
1L10L2R	TSSC	M	6/11/94	2	14:45	0.00	123.00	100.00	45.00	116.00
1L10L9R	TSSC	M	6/11/94	2	14:45	0.00	183.00	139.00	64.00	165.00
1L10R	TSSC	J	5/19/94	2	13:30	0.00	111.00	95.00	42.00	104.00
1L11L11R12R	TSSC	M	8/31/96	2	12:30	875.00	194.00	150.00	76.00	178.00
1L11L1R	TSSC	M	6/11/94	2	14:45	225.00	118.00	98.00	42.00	112.00
1L11R	TSSC	M	5/19/94	2	13:30	0.00	183.50	103.00	49.50	123.00
1L11R12R	TSSC	F	9/ 1/96	2	14:00	704.00	173.00	136.00	76.00	164.00
1L12R	TSSC	M	5/19/94	2	13:30	0.00	124.00	99.50	46.00	113.50
1L12R	TSSC	F	8/ 4/96	2	17:00	768.00	182.00	141.00	64.00	167.00
1L1R	TSSC	F	5/19/94	2	13:30	0.00	157.00	122.00	57.00	151.00
1L1R	TSSC	F	5/16/95	2	15:00	633.00	165.00	128.00	60.00	158.00
1L1R2R	TSSC	J	8/13/95	2	17:30	196.00	107.00	91.00	43.00	103.00
[redacted]R3R	TSSC	J	8/16/95	2	13:00	176.00	108.00	91.00	44.00	102.00
1L2L10R11R	TSSC	F	8/30/96	2	18:30	1,219.00	206.00	156.00	75.00	196.00
1L2L10R12R	TSSC	F	8/31/96	2	12:30	579.00	166.00	128.00	66.00	154.00
1L2L11R12R	TSSC	F	8/31/96	2	12:30	1,257.00	220.00	163.00	77.00	206.00

Turtles of Round Pond

	SPECIES	SEX	DOC	MOC	TOC	WEIGHT	CL	CW	SH	PL
[redacted]2L12R	TSSC	M	6/ 4/94	2	17:00	540.00	177.00	138.00	59.00	152.00
1L2L1R	TSSC	F	6/ 1/94	2	10:20	1,475.00	221.00	166.00	85.00	197.00
1L2L1R12R	TSSC	M	8/29/96	2	13:15	787.00	188.00	141.00	63.00	165.00
1L2L1R2R	TSSC	F	8/28/96	2	19:00	703.00	174.00	137.00	64.00	163.00
1L2L1R3R	TSSC	M	8/28/96	2	19:00	464.00	152.00	114.00	55.00	137.00
1L2L1R8R	TSSC	M	8/28/96	2	19:00	596.00	173.00	127.00	59.00	161.00
1L2L1R9R	TSSC	F	8/29/96	2	08:00	335.00	133.00	107.00	51.00	130.00
1L2L2R	TSSC	M	6/ 1/94	2	10:20	290.00	126.00	103.00	50.00	118.00
1L2L2R10R	TSSC	J	8/29/96	9	?	221.00	118.00	98.00	45.00	110.00
1L2L2R11R	TSSC	J	8/29/96	2	19:30	133.00	94.00	81.00	39.00	89.00
1L2L2R12R	TSSC	F	8/29/96	2	19:30	349.00	134.00	109.00	49.00	127.00
1L2L2R3R	TSSC	J	8/29/96	2	13:15	229.00	117.00	96.00	44.00	109.00
1L2L2R8R	TSSC	F	8/29/96	2	13:15	1,327.00	216.00	155.00	82.00	195.00
1L2L2R9R	TSSC	M	8/29/96	2	13:15	284.00	126.00	101.00	47.00	117.00
1L2L3L10R	TSSC	F	6/ 4/94	2	17:00	975.00	193.00	152.00	72.00	184.00
1L2L3R	TSSC	F	6/ 1/94	2	10:20	1,475.00	226.00	164.00	81.00	207.00
1L2L3R11R	TSSC	M	8/30/96	2	12:00	476.00	160.00	125.00	56.00	153.00
1L2L3R12R	TSSC	M	8/30/96	2	12:00	400.00	147.00	113.00	53.00	136.00
1L2L8R10R	TSSC	F	8/30/96	2	12:00	450.00	152.00	119.00	54.00	145.00
1L2L8R11R	TSSC	M	8/30/96	2	12:00	289.00	128.00	105.00	36.00	116.00
1L2L8R12R	TSSC	M	8/30/96	2	12:00	658.00	176.00	134.00	61.00	157.00
1L2L8R9R	TSSC	M	8/30/96	2	12:00	311.00	131.00	106.00	48.00	123.00
1L2L9R10R	TSSC	F	8/30/96	2	18:30	1,245.00	215.00	157.00	87.00	196.00
[redacted]L9R11R	TSSC	F	8/30/96	2	18:30	1,454.00	233.00	174.00	81.00	218.00
[redacted]2L9R12R	TSSC	F	8/30/96	2	18:30	1,001.00	196.00	154.00	69.00	187.00
1L2R	TSSC	F	5/19/94	2	13:30	0.00	164.00	131.00	61.50	154.00
1L3L10L1R	TSSC	F	9/ 1/96	2	14:00	1,042.00	205.00	151.00	78.00	189.00
1L3L10R	TSSC	M	6/10/94	2	11:30	420.00	149.00	114.00	55.00	138.00
1L3L11R	TSSC	F	6/10/94	2	11:30	460.00	150.00	121.00	55.00	145.00
1L3L11R	TSSC	F	5/16/95	2	15:00	490.00	157.00	125.00	57.00	151.00
1L3L11R	TSSC	F	8/28/96	2	15:00	878.00	193.00	146.00	65.00	184.00
1L3L1R	TSSC	M	6/10/94	2	11:30	570.00	168.00	130.00	59.00	153.00
1L3L1R10R	TSSC	F	8/31/96	2	12:30	1,098.00	204.00	151.00	78.00	190.00
1L3L1R11R	TSSC	F	8/31/96	2	12:30	1,448.00	224.00	167.00	82.00	207.00
1L3L1R2R	TSSC	M	8/31/96	2	12:30	817.00	190.00	146.00	66.00	174.00
1L3L1R3R	TSSC	F	8/31/96	2	12:30	400.00	144.00	114.00	52.00	138.00
1L3L1R8R	TSSC	M	8/31/96	2	12:30	597.00	169.00	122.00	60.00	154.00
1L3L1R9R	TSSC	J	8/31/96	2	12:30	124.00	90.00	78.00	47.00	86.00
1L3L2R	TSSC	F	6/10/94	2	11:30	545.00	161.00	130.00	54.00	152.50
1L3L2R10R	TSSC	F	8/31/96	2	17:30	486.00	151.00	123.00	56.00	142.00
1L3L2R11R	TSSC	M	8/31/96	2	17:30	456.00	159.00	118.00	55.00	147.00
1L3L2R12R	TSSC	F	9/ 1/96	2	14:00	810.00	184.00	138.00	68.00	172.00
1L3L2R9R	TSSC	F	8/31/96	2	17:30	1,549.00	219.00	167.00	84.00	211.00
1L3L3R	TSSC	M	6/10/94	2	11:30	485.00	168.00	123.00	56.00	143.00
1L3L3R	TSSC	F	9/ 1/96	2	14:00	1,019.00	199.00	153.00	60.00	185.00
1L3L3R11R	TSSC	F	9/ 1/96	2	14:00	1,098.00	211.00	159.00	71.00	193.00
1L3L3R11R	TSSC	M	9/ 1/96	2	14:00	442.00	151.00	118.00	54.00	148.00
1L3L3R12R	TSSC	F	9/ 1/96	2	14:00	434.00	149.00	116.00	56.00	139.00
1L3L8R	TSSC	F	6/10/94	2	11:30	425.00	142.00	128.00	54.00	139.00
[redacted]L8R10R	TSSC	J	9/ 1/96	2	13:30	81.00	0.00	0.00	0.00	0.00
1L3L8R9R	TSSC	F	9/ 1/96	2	13:30	326.00	133.00	107.00	46.00	122.00
1L3L9R	TSSC	F	6/10/94	2	11:30	555.00	165.00	128.00	61.00	152.00
1L3R	TSSC	M	5/19/94	2	13:30	380.00	146.00	104.00	54.00	134.00

Turtles of Round Pond

	SPECIES	SEX	DOC	MOC	TOC	WEIGHT	CL	CW	SH	PL
[redacted]8L12R	TSSC	F	6/10/94	2	11:30	555.00	164.00	129.00	61.00	152.00
1L8L1R	TSSC	M	6/10/94	2	11:30	275.00	131.00	101.00	48.00	121.00
1L8L2R	TSSC	F	6/10/94	2	11:30	670.00	167.00	132.00	64.00	157.00
1L8L3R	TSSC	F	6/10/94	2	11:30	335.00	135.00	107.00	49.00	125.00
1L8L3R	TSSC	F	8/31/96	2	12:30	646.00	174.00	130.00	62.00	159.00
1L8L8R	TSSC	F	6/10/94	2	11:30	640.00	170.00	133.00	62.00	157.00
1L8L9R	TSSC	M	6/10/94	2	11:30	970.00	196.00	148.00	69.00	172.50
1L9L10R	TSSC	M	6/11/94	2	14:45	0.00	215.00	168.00	72.00	188.00
1L9L10R	TSSC	F	8/28/96	2	15:00	541.00	158.00	123.00	61.00	146.00
1L9L11R	TSSC	M	6/11/94	2	14:45	0.00	190.00	144.00	68.00	172.00
1L9L12R	TSSC	M	6/11/94	2	14:45	0.00	219.00	159.00	73.00	109.00
1L9L9R	TSSC	F	6/11/94	2	14:45	450.00	153.00	121.00	57.00	142.00
1L9L9R	TSSC	F	8/31/96	2	12:30	1,047.00	213.00	158.00	73.00	190.00
1L9R	TSSC	F	5/19/94	2	13:30	0.00	177.00	136.50	65.00	166.00
1R	TSSC	F	5/18/94	2	13:30	450.00	143.00	117.00	55.00	137.00
1R	TSSC	F	8/13/95	2	17:30	686.00	177.00	137.00	63.00	164.00
1R	TSSC	F	8/30/96	2	12:00	1,002.00	191.00	149.00	72.00	180.00
1R2R3R	TSSC	J	8/15/95	2	14:00	201.00	110.00	92.00	44.00	105.00
1R2R3R8R9R	TSSC	M	6/ 1/94	2	10:20	1,110.00	207.00	151.00	77.00	188.00
2L	TSSC	J	5/17/94	1	14:50	10.00	41.00	39.00	20.00	22.00
2L	TSSC	M	8/31/96	2	12:30	703.00	183.00	125.00	62.00	163.00
2L	TSSC	J	5/ 7/95	2	13:30	65.00	73.20	64.60	30.50	66.70
2L10L10R	TSSC	M	6/14/94	2	18:00	945.00	196.00	153.00	67.00	179.00
[redacted]10L11R	TSSC	M	6/14/94	2	18:00	370.00	149.00	114.00	53.00	138.00
[redacted]10L12R	TSSC	M	6/14/94	2	18:00	360.00	144.00	112.00	52.00	131.00
2L10L1R	TSSC	F	6/14/94	2	18:00	430.00	147.00	128.00	56.00	139.00
2L10L1R	TSSC	F	5/11/95	2	12:00	488.00	153.00	121.00	59.00	145.00
2L10L2R	TSSC	M	6/14/94	2	18:00	260.00	0.00	0.00	0.00	0.00
2L10L3R	TSSC	M	6/14/94	2	18:00	560.00	163.00	120.00	58.50	149.00
2L10L8R	TSSC	J	6/14/94	2	18:00	0.00	91.00	87.00	34.00	85.00
2L10L9R	TSSC	F	6/14/94	2	18:00	1,440.00	230.00	167.00	83.00	215.00
2L10R	TSSC	F	5/20/94	2	11:30	975.00	190.00	140.00	73.00	179.00
2L11L10R	TSSC	M	6/14/94	2	18:00	630.00	166.00	132.00	63.00	158.00
2L11L11R	TSSC	M	6/14/94	2	18:00	465.00	159.00	122.00	56.00	146.00
2L11L12R	TSSC	M	6/14/94	2	18:00	255.00	126.00	102.00	45.00	119.00
2L11L1R	TSSC	F	6/14/94	2	18:00	255.00	126.00	102.00	46.00	119.00
2L11L2R	TSSC	F	6/14/94	2	18:00	0.00	143.00	117.00	53.00	133.00
2L11L3R	TSSC	F	6/14/94	2	18:00	340.00	129.00	113.00	52.00	127.00
2L11L8R	TSSC	F	6/14/94	2	18:00	360.00	137.00	112.00	53.00	126.00
2L11L8R	TSSC	F	8/ 4/96	2	17:00	823.00	183.00	142.00	62.00	166.00
2L11L9R	TSSC	F	6/14/94	2	18:00	1,690.00	240.00	173.00	90.00	223.00
2L11R	TSSC	F	5/20/94	2	11:30	0.00	209.00	152.00	79.00	189.00
2L12L10R	TSSC	F	6/14/94	2	18:00	870.00	192.00	150.00	70.00	180.00
2L12L11R	TSSC	M	6/14/94	2	18:00	0.00	169.00	132.00	56.00	151.00
2L12L12R	TSSC	F	6/14/94	2	18:00	440.00	150.00	117.00	55.00	144.00
2L12L12R	TSSC	J	6/15/94	2	15:00	75.00	81.00	77.00	34.00	77.00
2L12L1R	TSSC	M	6/14/94	2	18:00	215.00	116.00	95.00	42.00	109.00
2L12L1R12R	TSSC	J	6/14/94	2	18:00	200.00	110.00	89.00	44.00	103.00
2L12L2R	TSSC	M	6/14/94	2	18:00	220.00	122.00	100.00	44.00	114.00
[redacted]2L3R	TSSC	F	6/14/94	2	18:00	295.00	130.00	109.00	49.00	123.00
2L12L8R	TSSC	F	6/14/94	2	18:00	1,745.00	232.00	174.00	86.00	211.00
2L12L9R	TSSC	F	6/14/94	2	18:00	1,135.00	208.00	158.00	89.00	192.00
2L12R	TSSC	F	5/20/94	2	11:30	0.00	222.00	166.00	82.00	207.00

Turtles of Round Pond

	SPECIES	SEX	DOC	MOC	TOC	WEIGHT	CL	CW	SH	PL
[redacted]12R1R	TSSC	M	8/ 4/96	2	10:00	358.00	141.00	111.00	50.00	131.00
2L1R	TSSC	F	5/19/94	2	13:30	0.00	177.50	139.50	62.50	166.00
2L1R2R	TSSC	J	8/15/95	2	17:30	189.00	111.00	92.00	43.00	106.00
2L1R3R	TSSC	M	8/16/95	2	13:00	1,134.00	208.00	154.00	79.00	183.00
2L3L10R	TSSC	F	6/ 4/94	2	17:00	950.00	200.00	152.00	73.00	183.00
2L3L11R	TSSC	M	6/ 4/94	2	17:00	650.00	185.00	137.00	57.00	161.00
2L3L11R	TSSC	M	5/ 9/95	2	15:30	659.00	186.00	137.00	58.00	167.00
2L3L1R	TSSC	M	6/ 4/94	2	17:00	425.00	154.00	119.00	57.00	142.00
2L3L2R3R	TSSC	F	6/ 4/94	2	17:00	2,510.00	258.00	186.00	96.00	231.00
2L3L3R	TSSC	F	6/ 4/94	2	17:00	1,175.00	214.00	165.00	88.00	202.00
2L3L8R	TSSC	F	6/ 4/94	2	17:00	1,775.00	231.00	172.00	86.00	213.00
2L3L9R	TSSC	F	6/ 4/94	2	17:00	1,550.00	226.00	167.00	85.00	205.00
2L3L9R	TSSC	F	8/28/96	2	12:30	1,657.00	234.00	172.00	86.00	211.00
2L8L10R	TSSC	M	6/14/94	2	18:00	545.00	178.00	122.00	47.00	146.50
2L8L11R	TSSC	M	6/14/94	2	18:00	320.00	137.00	110.00	59.00	129.00
2L8L12R	TSSC	F	6/14/94	2	18:00	1,470.00	229.00	165.00	84.00	212.00
2L8L12R	TSSC	F	5/11/95	2	06:00	874.00	186.00	142.00	69.00	177.00
2L8L1R	TSSC	J	6/14/94	2	18:00	115.00	91.00	82.00	38.00	85.00
2L8L1R	TSSC	M	8/15/95	2	17:00	248.00	124.00	104.00	44.00	114.00
2L8L2R	TSSC	M	6/14/94	2	18:00	745.00	185.00	140.00	63.00	166.00
2L8L3R	TSSC	F	6/14/94	2	18:00	1,595.00	232.00	171.00	87.00	211.00
2L8L8R	TSSC	M	6/14/94	2	18:00	945.00	199.00	140.00	65.00	166.00
2L8L9R	TSSC	M	6/14/94	2	18:00	310.00	142.00	107.00	49.00	139.00
[redacted]8R	TSSC	F	5/20/94	2	11:30	1,060.00	211.00	161.00	68.00	197.00
[redacted]8R	TSSC	F	8/15/95	2	14:00	1,128.00	205.00	158.00	76.00	193.00
2L9L10R	TSSC	F	6/14/94	2	18:00	1,490.00	222.00	167.00	85.00	207.00
2L9L11R	TSSC	J	6/14/94	2	18:00	210.00	114.00	94.00	44.00	105.00
2L9L11R	TSSC	F	8/13/95	2	17:30	356.00	135.00	108.00	52.00	125.00
2L9L11R	TSSC	F	8/28/96	2	15:00	923.00	193.00	151.00	70.00	176.00
2L9L12R	TSSC	M	6/14/94	2	18:00	235.00	121.00	106.00	44.00	111.00
2L9L1R	TSSC	F	6/14/94	2	18:00	635.00	169.00	132.00	64.00	162.00
2L9L2R	TSSC	M	6/14/94	2	18:00	485.00	160.00	126.00	57.00	148.00
2L9L2R8R	TSSC	F	8/ 4/96	2	17:00	408.00	147.00	115.00	52.00	137.00
2L9L2R8R	TSSC	F	8/31/96	2	12:30	440.00	151.00	117.00	140.00	53.00
2L9L3R	TSSC	F	6/14/94	2	18:00	1,095.00	207.00	156.00	74.00	193.00
2L9L8R	TSSC	M	6/14/94	2	18:00	680.00	176.00	131.00	63.00	161.00
2L9L8R	TSSC	M	5/11/95	2	12:00	716.00	178.00	132.00	63.00	160.00
2L9L9R	TSSC	F	6/14/94	2	18:00	1,170.00	206.00	157.00	74.00	192.00
2L9L9R	TSSC	F	5/14/95	2	19:00	1,175.00	211.00	160.00	76.00	196.00
2L9R	TSSC	F	5/20/94	2	11:30	1,025.00	195.00	146.00	73.50	176.00
2R	TSSC	F	5/19/94	2	13:30	840.00	181.00	138.00	69.00	168.00
2R	TSSC	F	8/30/96	2	18:30	1,227.00	208.00	156.00	89.00	193.00
2R3R9R	TSSC	M	9/ 1/96	2	14:00	1,243.00	210.00	152.00	78.00	189.00
3L	TSSC	F	5/19/94	2	13:30	1,250.00	201.00	147.00	75.00	190.00
3L10R	TSSC	F	5/25/94	2	13:20	305.00	133.00	110.00	49.00	126.00
3L11R	TSSC	F	5/25/94	2	15:20	1,450.00	227.00	160.00	84.00	210.00
3L12R	TSSC	F	5/26/94	2	11:20	1,525.00	239.00	177.00	82.00	219.00
3L13R	TSSC	F	5/14/95	2	19:00	395.00	152.00	123.00	55.00	133.00
3L1R	TSSC	M	5/20/94	2	11:30	215.00	117.00	97.00	44.00	102.56
[redacted]R	TSSC	M	8/15/95	2	14:00	316.00	134.00	108.00	49.00	122.00
3L1R2R	TSSC	J	8/15/95	2	14:00	201.00	110.00	92.00	44.00	105.00
3L1R3R	TSSC	J	8/16/95	2	13:00	155.00	97.00	83.00	41.00	91.00
3L2R	TSSC	F	5/20/94	2	11:30	0.00	200.00	152.00	80.00	187.00

Turtles of Round Pond

	SPECIES	SEX	DOC	MOC	TOC	WEIGHT	CL	CW	SH	PL
[redacted]8L12R	TSSC	F	6/10/94	2	07:00	825.00	183.00	140.00	69.00	175.00
3L8L12R	TSSC	F	8/15/95	2	14:00	1,040.00	201.00	151.00	73.00	189.00
3L8L12R	TSSC	F	8/30/96	2	18:30	1,186.00	208.00	157.00	75.00	195.00
3L8L1R	TSSC	F	6/ 4/94	2	17:00	1,010.00	204.00	153.00	73.00	190.00
3L8L2R	TSSC	F	6/ 4/94	2	17:00	1,275.00	207.00	161.00	83.00	193.00
3L8R	TSSC	F	5/20/94	2	11:30	435.00	134.00	113.00	56.00	129.00
3L8R	TSSC	F	8/29/96	2	08:00	743.00	181.00	141.00	67.00	167.00
3L9L10R	TSSC	M	6/17/94	2	20:00	0.00	180.00	134.00	62.51	166.00
3L9L11R	TSSC	M	6/17/94	2	20:00	365.00	142.00	113.00	51.00	131.00
3L9L2R	TSSC	F	6/16/94	2	15:00	600.00	163.00	128.00	57.00	156.00
3L9L3R	TSSC	M	6/17/94	2	10:00	0.00	197.00	146.00	0.00	176.00
3L9L8R	TSSC	F	6/17/94	2	10:00	0.00	217.00	167.00	81.00	201.00
3L9L9R	TSSC	M	6/17/94	2	10:00	0.00	183.00	137.00	64.00	166.00
3L9R	TSSC	J	5/20/94	2	11:30	168.00	104.50	86.00	46.00	99.00
3L9R	TSSC	F	8/29/96	2	13:15	668.00	172.00	133.00	61.00	160.00
3L9R11R	TSSC	F	8/ 4/96	3	17:00	1,466.00	212.00	169.00	90.00	200.00
3R	TSSC	M	5/19/94	2	13:30	825.00	194.00	141.00	69.00	174.00
4L8L3R	TSSC	M	6/ 4/94	2	17:00	340.00	140.00	112.00	49.00	130.00
4L8L3R	TSSC	M	8/13/95	2	17:30	488.00	155.00	121.00	54.00	143.00
8L10L10R	TSSC	M	5/10/95	2	18:00	391.00	149.00	123.00	49.00	138.00
8L10L11R	TSSC	F	5/11/95	2	12:00	692.00	175.00	140.00	65.00	160.00
8L10L11R	TSSC	F	8/13/95	2	11:00	934.00	198.00	154.00	72.00	179.00
8L10L11R	TSSC	F	8/16/95	2		880.00	200.00	155.00	72.00	180.00
[redacted]0L12R	TSSC	F	5/11/95	2	18:00	345.00	135.00	108.00	51.00	132.00
[redacted]0L12R	TSSC	M	8/29/96	2	09:00	1,087.00	211.00	157.00	72.00	185.00
8L10L8R	TSSC	M	5/10/95	2	18:00	309.00	137.00	106.00	59.00	126.00
8L10L9R	TSSC	F	5/10/95	2	18:00	591.00	168.00	138.00	57.00	158.00
8L10R	TSSC	F	5/27/94	2	15:00	330.00	131.00	111.00	50.50	125.00
8L11L10R	TSSC	M	5/12/95	2	18:00	615.00	185.00	149.00	69.00	164.00
8L11L11R	TSSC	F	5/14/95	2	19:00	712.00	180.00	136.00	65.00	166.00
8L11L12R	TSSC	M	5/14/95	2	19:00	361.00	142.00	112.00	54.00	132.00
8L11L1R	TSSC	M	5/12/95	2	12:00	145.00	110.00	84.00	41.00	93.00
8L11L3R	TSSC	J	5/12/95	1	13:00	5.00	29.00	29.00	15.00	27.00
8L11L8R	TSSC	J	5/12/95	1	13:00	8.00	36.00	33.00	17.00	33.00
8L11R	TSSC	F	5/28/94	2	17:00	1,400.00	222.00	164.00	84.00	202.00
8L12L12R	TSSC	M	5/16/95	2	15:00	746.00	186.00	137.00	63.00	169.00
8L12L1R	TSSC	F	5/14/95	2	19:00	587.00	170.00	132.00	63.00	158.00
8L12L2R	TSSC	F	5/14/95	2	19:00	659.00	177.00	133.00	63.00	161.00
8L12L3R	TSSC	M	5/15/95	2	18:00	707.00	178.00	141.00	62.00	166.00
8L12L8R	TSSC	F	5/15/95	2	18:00	1,289.00	216.00	161.00	79.00	197.00
8L12L9R	TSSC	M	5/16/95	2	07:00	892.00	197.00	139.00	68.00	171.00
8L12R	TSSC	F	5/28/94	2	17:00	500.00	157.00	123.00	56.00	147.00
8L1R	TSSC	F	5/26/94	2	11:20	1,575.00	226.00	165.00	89.00	213.00
8L1R2R	TSSC	F	8/15/95	2	14:00	901.00	194.00	143.00	67.00	178.00
8L1R3R	TSSC	J	8/16/95	2	13:00	174.00	105.00	89.00	41.00	100.00
8L2R	TSSC	F	5/26/94	2	11:20	715.00	183.00	143.00	68.00	172.00
8L2R	TSSC	F	5/12/95	2	06:15	873.00	189.00	146.00	69.00	177.00
8L2R	TSSC	F	5/16/95	2	15:00	864.00	0.00	0.00	0.00	0.00
8L3R	TSSC	M	5/26/94	2	11:20	425.00	158.00	119.00	57.00	146.00
[redacted]R	TSSC	F	8/ 5/96	3	10:00	693.00	173.00	131.00	61.00	157.00
8L8R	TSSC	F	5/26/94	2	11:20	1,650.00	231.00	166.00	86.00	212.00
8L9R	TSSC	F	5/27/94	2	15:00	1,800.00	245.00	173.00	82.00	224.00
9L	TSSC	M	5/19/94	2	13:30	300.00	135.00	104.00	48.00	123.00

Turtles of Round Pond

ID	SPECIES	SEX	DOC	MOC	TOC	WEIGHT	CL	CW	SH	PL
[illegible]10L10R	TSSC	M	5/ 9/95	2	13:30	195.00	118.00	96.00	43.00	107.00
9L10L11R	TSSC	M	5/10/95	2	12:05	1,215.00	232.00	167.00	73.00	202.00
9L10L12R	TSSC	F	5/10/95	2	12:05	665.00	168.00	131.00	63.00	159.00
9L10L13R	TSSC	F	5/10/95	2	12:05	887.00	194.00	146.00	70.00	179.00
9L10L3R	TSSC	J	5/ 9/95	2	15:30	82.00	79.00	72.00	35.00	73.00
9L10L8R	TSSC	J	5/ 9/95	2	15:30	73.00	75.00	67.00	35.00	72.00
9L10L9R	TSSC	M	5/ 9/95	2	13:30	546.00	163.00	130.00	61.00	148.00
9L10R	TSSC	F	5/28/94	2	17:00	575.00	165.00	131.00	62.00	157.00
9L11L12L10R	TSSC	J	5/16/95	2	15:00	8.00	32.00	33.00	17.00	32.00
9L11L1R	TSSC	F	5/16/95	2	15:00	648.00	167.00	130.00	63.00	156.00
9L12L10R	TSSC	F	6/27/95	2	08:00	601.00	171.00	133.00	61.00	161.00
9L12L12R	TSSC	F	6/27/95	2	12:00	451.00	146.00	120.00	57.00	137.00
9L12L2R	TSSC	M	5/17/95	2	08:00	347.00	140.00	112.00	52.00	128.00
9L12L2R	TSSC	M	8/14/95	2	17:30	438.00	152.00	119.00	55.00	137.00
9L12L3R	TSSC	F	5/17/95	2	08:00	1,320.00	206.00	164.00	84.00	195.00
9L12L8R	TSSC	F	5/17/95	2	08:00	0.00	145.00	117.00	55.00	140.00
9L12L8R	TSSC	F	8/31/96	2	12:30	866.00	188.00	147.00	68.00	178.00
9L12L9R	TSSC	F	5/17/95	2	08:00	682.00	172.00	134.00	63.00	165.00
9L1R	TSSC	F	5/28/94	2	17:00	0.00	222.00	171.00	85.00	205.00
9L1R3R	TSSC	J	8/16/95	2		151.00	102.00	88.00	39.00	95.00
9L2R	TSSC	F	5/28/94	2	17:00	760.00	177.00	137.00	60.00	166.00
9L3R	TSSC	M	5/28/94	2	17:00	310.00	138.00	109.00	49.00	120.00
9L8R	TSSC	F	5/28/94	2	17:00	0.00	189.00	149.00	71.00	177.00
[illegible]9R	TSSC	M	5/28/94	2	17:00	215.00	119.00	98.00	42.00	108.00
[illegible]	TSSC	F	5/19/94	2	13:30	1,125.00	209.00	159.00	74.00	197.00
N/A	TSSC	F	6/10/94	4	11:30	0.00	164.00	130.00	61.00	156.00

Catalogue of American Amphibians and Reptiles.

Seidel, M.E. and M.J. Dreslik. 1996. *Pseudemys concinna.*

Pseudemys concinna (LeConte)
River Cooter

Testudo concinna Le Conte, 1830:106. Type-locality, "... rivers of Georgia and Carolina, where the beds are rocky," not "below Augusta on the Savannah, or Columbia on the Congaree," restricted to "vicinity of Columbia, South Carolina" by Schmidt (1953:101). Holotype, undesignated, see Comment.

Testudo floridana Le Conte, 1830:100 (part). Type-locality, "... St. John's river of East Florida ..." Holotype, undesignated, see Comment.

Emys (Testudo) concinna: Bonaparte, 1831:355.

Terrapene concinna: Bonaparte, 1831:370.

Emys annulifera Gray, 1831:32. Type-locality, not given, designated as "Columbia [Richland County], South Carolina" by Schmidt (1953:101). Holotype, undesignated, but Boulenger (1889:84) listed the probable type as a young preserved specimen in the British Museum of Natural History (BMNH) from "North America."

Clemmys concinna: Fitzinger, 1835:124.

Clemmys floridana: Fitzinger, 1835:124 (part).

Emys floridana: Duméril and Bibron, 1835:285 (part).

Emys concinna: Duméril and Bibron, 1835:289.

Emys hieroglyphica Holbrook, 1836:47. Type-locality, "... western waters ... Cumberland river." Holotype, undesignated; presumed holotype (ANSP 217) now lost (Adler, *in* Holbrook, 1976).

Emys mobilensis Holbrook, 1838:53. Type-locality, "Alabama ... numerous in the neighbourhood of Mobile [Mobile County] ..." Holotype, Academy of Natural Sciences, Philadelphia (ANSP) 242 (Malnate, 1971) (examined by authors).

[*Emys*] *labyrinthica* Duméril and Duméril, 1851:13. Type-locality, "Wabash-River (États-Unis)." Holotype, undesignated.

Pseudemys concinna: Gray, 1855 (1856a):197. First use of present combination. Nomenclatural priority of Gray (1855 [1856b]) corrected by Webb (1995).

Pseudemys hieroglyphica: Gray, 1855 (1856b):34.

Ptychemys concinna: Agassiz, 1857:432.

Ptychemys mobilensis: Agassiz, 1857:433.

Ptychemys Hoyi Agassiz, 1857:433. Type-locality, "south-western Missouri," restricted to "vicinity of Springfield [Greene County], Missouri," by Schmidt (1953:101). Holotype, undesignated.

Ptychemys hieroglyphica: Agassiz, 1857:434.

Clemmys mobilensis: Strauch, 1862:32.

Clemmys hieroglyphica: Strauch, 1862:33.

Pseudemys mobiliensis: Gray, 1863:182.

[*Emys*] *orthonyx* Wied-Neuwied, 1865:23. Type-locality, "New-Orleans [Orleans Parish, Louisiana]." Holotype, undesignated.

Trachemys annulifera: Gray, 1873:47.

Pseudemys mobilensis: Yarrow, 1882:32.

Chrysemys hieroglyphica: Boulenger, 1889:76.

Chrysemys concinna: Boulenger, 1889:83.

Chrysemys mobiliensis: Boulenger, 1889:85.

Clemmys mobiliensis: Strauch, 1890:80.

Chrysemys labyrinthica: Hay, 1892:566.

Pseudemys labyrinthica: Baur, 1893:222.

Pseudemys floridana: Baur, 1893:223 (part).

Pseudemys texana: Brimley, 1907:77 (part).

Chrysemys floridana: Ditmars, 1907:37 (part).

Chrysemys texana: Hurter and Strecker, 1909:21 (part).

Pseudemys vioscana Brimley, 1928:66. Type-locality, "Lake Des Allemands [St. John the Baptist Parrish], La." Holotype, National Museum of Natural History (USNM) 79632, dry adult male collected April 1927 by Percy Viosca Jr. (examined by authors).

Pseudemys elonae Brimley, 1928:67. Type-locality, "... pond in Guilford County, North Carolina, not far from Elon College, in the Cape Fear drainage ..." Holotype, USNM 79631, dry adult male collected October 1927 by D.W. Rumbold and F.J. Hall (examined by authors).

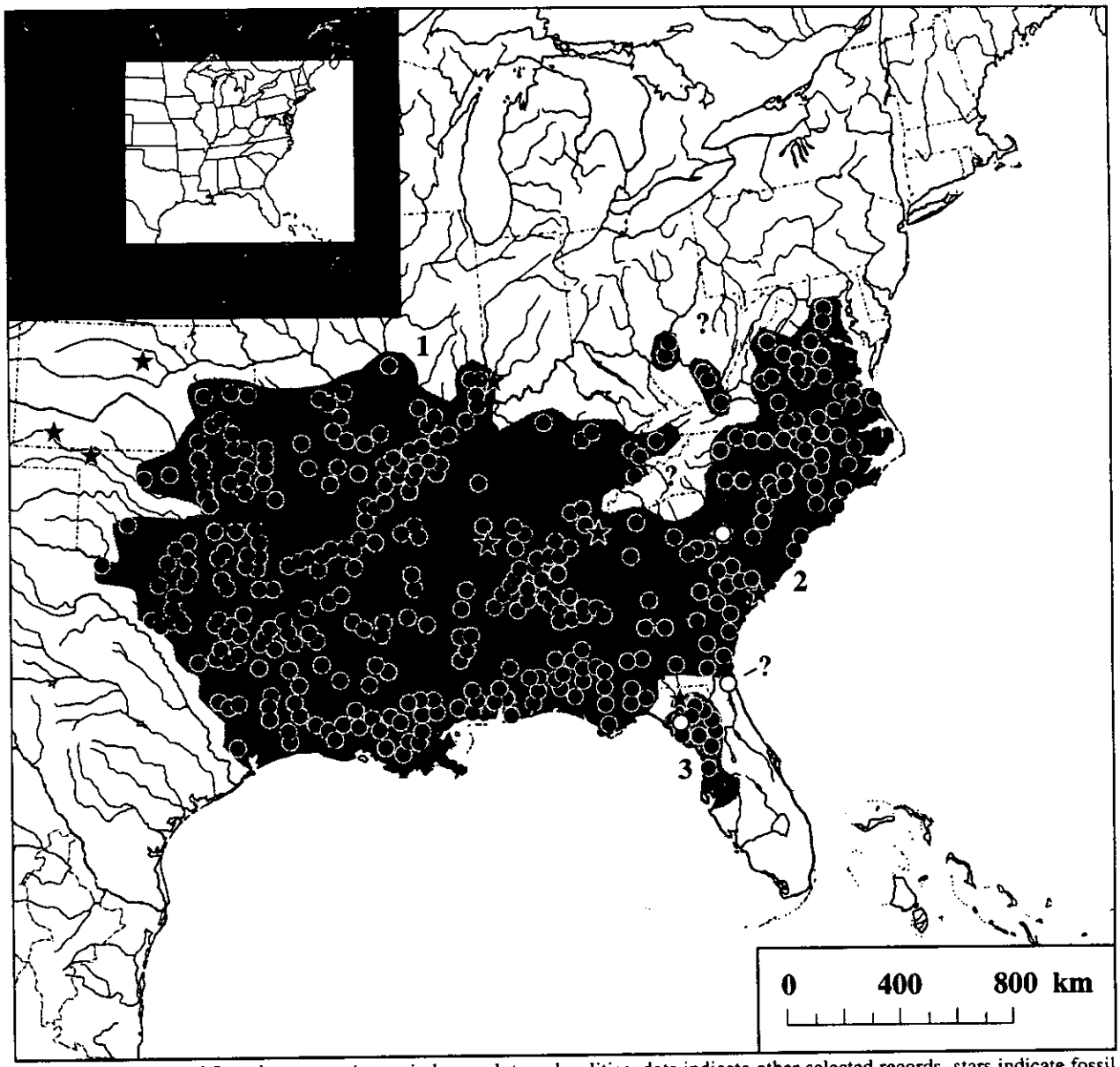
Figure 1. Adult male *Pseudemys concinna* from Lake Cumberland, Franklin County, Kentucky (top); juvenile from Gallatin County, Illinois (center); plastral view of two individuals from Gallatin County, Illinois (bottom).

Chrysemys (Pseudemys) concinna: Lindholm, 1929:280.
Pseudemys virginica: Pasteels, 1957a:219. *Ex errore.*
Pseudemys floridiana: Battersby, 1958 (1960):92. *Ex errore.*

• **Content.** Three subspecies, *Pseudemys concinna concinna*, *P. c. floridana*, and *P. c. suwanniensis* are recognized here, but alternative interpretations for the taxonomy of *P. concinna* have been published. See Comment.

• **Definition.** *Pseudemys concinna* is a large emydine turtle, adult carapace to 30 cm in males and 43 cm in females. The carapace is oval in dorsal view, with straight or curved sides. Longitudinal rugosities usually are present along the sides, and the posterior border of the carapace is serrated and medially notched. A median keel is pronounced in young individuals, but in adults it is reduced and restricted to the posterior vertebrals or absent. In dorsal view, the anterior midline is emarginate with the cervical scute not extending as far forward as the adjacent marginals. The cutting edge of the upper jaw is either smooth or slightly notched with short cusps present in some populations. Males have long, thick tails with the vent posterior to the rim of the carapace. Females have shorter tails with the vent anterior to the carapacial rim. The foreclaws of males are elongate compared to those of females.

Carapacial ground color is green to olive or dark brown to black. A pattern of light markings varies from narrow transverse bands to wavy reticulations. The plastron lacks a hinge and has a posterior medial notch. It is pale yellow to light orange and frequently has a symmetrical, wavy, dark figure which generally follows and diffuses outward from the scute seams. Dark markings are also present on the underside of marginal scutes and along the bridge. These markings can be absent,



Map. Distribution of *Pseudemys concinna*: circles mark type-localities, dots indicate other selected records, stars indicate fossil localities, and question marks indicate localities of uncertain validity. Zones of intergradation between *P. c. concinna* (1) and *P. c. floridana* (2) occur in many areas along their line of contact; but in other areas, especially near large rivers in the coastal plain, their ranges may overlap (see discussion in Seidel, 1994, 1995). The ultimate distribution limits of *P. c. floridana* are not presently well-defined.

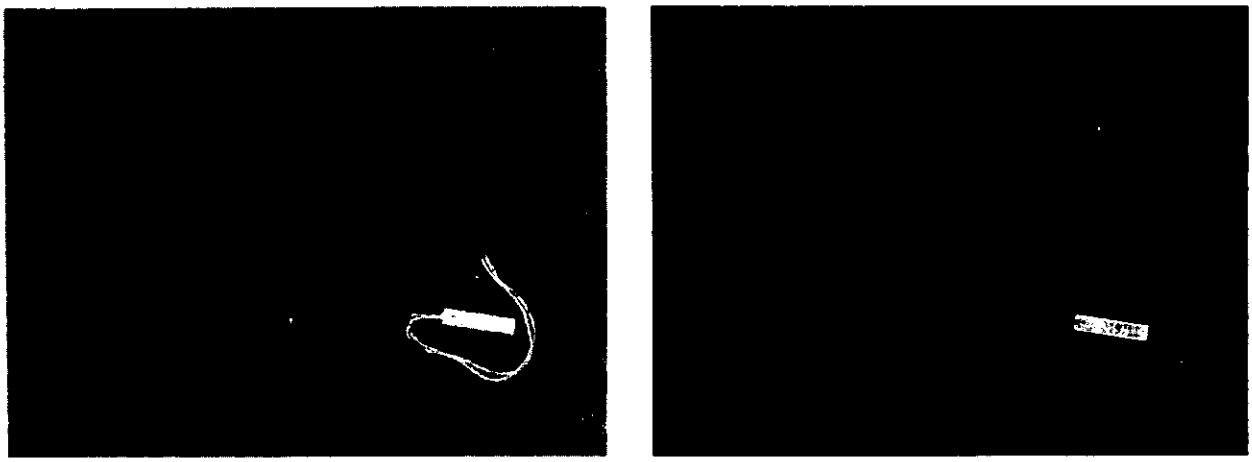


Figure 2. Carapacial (left) and plastral views of hatchlings from a single clutch of eggs from Wake County, North Carolina (North Carolina State Museum 19711). Photographs by Alvin Braswell.

greatly reduced, or highly variable in some populations. The pattern on the head consists of a variable number of longitudinal yellow stripes on a dark olive to black background. The supratemporal stripe is usually broad above and behind the tympanum. The neck, limbs, and tail are also marked with yellow stripes. Old males may be partially melanistic, with markings of the head, limbs, and shell obscured by dark brown to black vermiculations.

• **Descriptions.** Composite descriptions are in Carr (1952) and Seidel (1994). Due to the confusion regarding the taxonomy of this species, many of the descriptions are separated under *Pseudemys concinna* and *P. floridana*: Ernst and Barbour (1972), Mount (1975), Pritchard (1979), Behler and King (1988), Dundee and Rossman (1989), Conant and Collins (1991), Ernst et al. (1994), Mitchell (1994), and Palmer and Braswell (1995). Other descriptions are as follows: egg (Jackson and Jackson, 1968; Ewert, 1979b; Congdon and Gibbons, 1985; Palmer and Braswell, 1995, Jackson, 1996), embryo (Ewert, 1985), nest (Green and Pauley, 1987; Jackson, 1996), hatchlings (Seidel, 1981; Ernst et al., 1994; Palmer and Braswell, 1995; Jackson, 1966), skull (McDowell, 1964; Gaffney, 1979; Seidel, 1981; Ward, 1984), pelvic girdle and hindlimb (Zug, 1971), cervical vertebrae (Williams, 1950), cranial muscles (Ward, 1984), penis (Zug, 1966), external morphology (Seidel and Palmer, 1991; Seidel, 1994), karyotype (Forbes, 1966; Stock, 1972; Gorman, 1973; Bickham, 1975; Killebrew, 1977; Bickham and Baker, 1979; Bickham and Carr, 1983), and courtship (Cagle, 1955; Jackson and Davis, 1972a, b; Petranka and Phillippi, 1978; Carpenter, 1979; Obst, 1985).

• **Illustrations.** Color photographs or illustrations of adults and/or juveniles are in Ernst and Barbour (1972), Pritchard (1979), Martof et al. (1980), Caldwell and Collins (1981), Ashton and Ashton (1985), Green and Pauley (1987), Johnson (1987), Behler and King (1988), Sievert and Sievert (1989), Lehrer (1990), Conant and Collins (1991), Ernst et al. (1994), Mitchell (1994), Seidel (1994), and Palmer and Braswell (1995). Black and white photographs are in Pope (1939), Carr (1952), Smith (1956), Blair et al. (1957), Smith (1961), Barbour (1971), Ernst and Barbour (1972), Minton (1972), Mount (1975), Seidel (1981), Ward (1984), Ernst and Barbour (1989), and Jackson (1995). Line drawings are in Holbrook (1838), Brimley (1928), Wermuth and Mertens (1961), Dundee and Rossman (1989), Seidel and Palmer (1991), and Palmer and Braswell (1995). Line drawings of markings on the head and neck are in Carr (1935, 1952), Carr and Crenshaw (1957), and Obst (1985). Illustrations of the skull are in Ernst and Barbour (1972) and Gaffney (1979), and photographs of the egg and hatchling are in Jackson and Jackson (1968).

• **Distribution.** *Pseudemys concinna* occurs from Maryland to northern peninsular Florida and throughout the central and southern United States north to Illinois, Missouri, and Kansas and west to eastern Texas and Oklahoma. The entire ranges of *Pseudemys concinna* and *P. floridana* were presented by Davis and Rice (1883b), Neill (1954), Tinkle (1959), Conant (1958, 1975), Ward (1984), Iverson (1992), Conant and Collins (1991), and Ernst et al. (1994).

Additional distributional data are listed alphabetically by state: Alabama (Haltom, 1931; Mount, 1975), Arkansas (Parker, 1947), Florida (Carr and Goin, 1959; Blaney, 1971; McDiarmid, 1978; Ashton and Ashton, 1985; Iverson and Etchberger, 1989; Boundy, 1994; Jackson, 1995), Georgia (Martof, 1956; Camp et al., 1988; Williamson and Moulis, 1994), Illinois (Davis and Rice, 1883a; Cahn, 1937; Smith, 1961; Dancik, 1974; Moll and Morris, 1990), Indiana (Minton, 1971, 1972), Kansas (Smith, 1956; Clarke et al., 1958; Caldwell and Collins, 1981; Collins, 1993), Kentucky (Barbour, 1971; Stephens, 1985), Louisiana (Liner, 1954; Dundee and Rossman, 1989), Maryland (McCauley, 1945), Mississippi (Smith and List, 1955; Gunter, 1981), Missouri (Anderson, 1965; Nickerson and Krager, 1971; Ward, 1979; Johnson, 1982, 1987), North Carolina (Palmer and Braswell, 1995), Oklahoma (Webb, 1970; McCoy, 1975; Sievert and Sievert, 1989), South Carolina (Martof et al., 1980; Gibbons, 1990), Tennessee (Rhoads, 1895; Parker, 1939, 1948; Huheey and Stupka, 1965; Iverson, 1978; Ewert, 1979a), Texas (Strecker, 1915; Hibbitts and Hibbitts, 1994; Brown, 1950; Smith and Sanders, 1952; Guidry, 1953; Raun and Gehlbach, 1972; Conant, 1977; McAllister, 1982; Myers, 1982; Dixon, 1987, 1993; Garret and Barker, 1987), Virginia (Werler and McCallion, 1951; Buhlmann, 1989; Mitchell, 1994), and West Virginia (Bayless, 1972; Seidel and Green, 1982; Buhlmann, 1985; Green and Pauley, 1987).

• **Fossil Record.** Fossil remains of *Pseudemys concinna* are known from the Pleistocene of Bartow County, Georgia (Holman, 1967), Columbia-Gilchrist County, Florida (Jackson, 1975), Colleton County, South Carolina (Roth and Laerm, 1980), Colbert County, Alabama (Holman et al., 1990), Daviess County, Indiana (Holman, 1995), and Ellsworth, Meade, and Seward counties, Kansas (Holman, 1995). According to Holman (1995), the Pleistocene species *P. hibbardi*, described by Preston (1979) from Harper County, Oklahoma, is probably *P. concinna*. The

extinct Pliocene species, *P. williamsi* from Alachua County, Florida (Rose and Weaver, 1966), presumably is ancestral to *P. concinna* (Jackson, 1976).

• **Pertinent Literature.** General accounts are in Holbrook (1838), Ditmars (1936), Pope (1939), Carr (1952), Harless and Morlock (1979), Pritchard (1979), Smith and Brodie (1982), Obst (1985), Ernst and Barbour (1989), Conant and Collins (1991), and Ernst et al. (1994). Additional pertinent publications are listed by topic as follows: morphology (White, 1929; Williams, 1950; Chermock, 1952; Parsons, 1960, 1968; Shah, 1962; Tinkle, 1962; Jackson, 1966; Zug, 1966, 1971; Cagle, 1968; Dobie and Jackson, 1979; Ward, 1980; Gibbons and Lovich, 1990; McCoy and Jacobs, 1991; Seidel and Palmer, 1991; Seidel, 1994), systematics (Carr, 1935, 1937, 1938; Crenshaw, 1955; Carr and Crenshaw, 1957; McDowell, 1964; Weaver and Rose, 1967; Holman, 1977; Fahey, 1980; Vogt and McCoy, 1980; Smith and Smith, 1980; Ward, 1980, 1984; Fritz, 1981; Dobie, 1981; Seidel, 1981, 1994, 1995; Seidel and Smith, 1986; Ernst, 1990; Frost and Hillis, 1990; Fritz, 1991; McCoy and Jacobs, 1991; Seidel and Palmer, 1991; Jackson, 1995; Bickham et al., 1996), protein electrophoresis (Rodnan and Ebaugh, 1957; Zweig and Crenshaw, 1957; Crenshaw, 1965; Sullivan and Riggs, 1967b; Olmo et al., 1985; Seidel, 1994), nucleic acids (Bickham et al., 1996), blood chemistry and histology (Goin and Jackson, 1965; Jackson and Legendre, 1967; Sullivan and Riggs, 1967a, b, c; Jackson et al., 1970; Brown, 1971; Holcomb and Jackson, 1972; Frair, 1977), blood sampling (Avery and Vitt, 1984), physiology (Chapman and Brubaker, 1891; Southworth and Redfield, 1926; Bogert and Cowles, 1947; Shellabarger et al., 1956; Hutton et al., 1960; Belkin, 1964, 1968; Jackson and Cantrell, 1964; Hutchison et al., 1966; Brown, 1971; Nothstine et al., 1971; Weathers and White, 1971; Valentinuzzi et al., 1973; Jackson et al., 1974; Kinney et al., 1977; Kinney and White, 1977; Naeije and Crowe, 1977; White, 1978; Grigg et al., 1979; Hutchison, 1979; Bartholomew, 1982; Tracy, 1982; Ultsch, 1985; Gapp and Carraway, 1990; Gapp and Polak, 1990), behavior (Carr, 1940; Marchand, 1944; Allen, 1950; Cagle, 1955; Boyer, 1965; Crawford and Siebert, 1964; Crawford et al., 1966; Gibbons and Smith, 1968; Crawford and Adams, 1968; Ashe, 1970; Davis and Jackson, 1971; Jackson and Davis, 1972a, b; Zug, 1972; Auth, 1975; Burghardt, 1977; Carpenter and Ferguson, 1977; Hennemann, 1979; Carpenter, 1980; Carr, 1983; Gibbons et al., 1983; Fritz, 1989, 1990), general ecology (Marchand, 1945; Neill and Allen, 1954; Crenshaw, 1955; Oliver, 1955; Boyer, 1965; Pritchard and Greenhood, 1968; Gibbons and Coker, 1977; Bury, 1979; Seidel, 1982; Obst, 1985; Fahey, 1987; Wilbur and Morin, 1988; Gibbons, 1990; Buhlmann and Vaughan, 1991; Giovanetto, 1992; Meylan et al., 1992; Jackson, 1994; Buhlmann, 1995; Dreslik, 1996), feeding (Allen, 1938; Brimley, 1942-43; Mahmoud and Klicka, 1979; Lagueux et al., 1995; Teran et al., 1995; Turner, 1995), predation (Laughlin, 1959; Brown, 1979; Delany and Abercrombie, 1986; Tuberville and Burke, 1994), reproduction (Goff and Goff, 1932; Allen, 1938; Thomas, 1972; Thomas and Mount, 1973; Gibbons and Coker, 1977; Iverson, 1977; Gibbons and Nelson, 1978; Carpenter, 1980; Gibbons, 1982; Gibbons et al., 1982; Congdon and Gibbons, 1985; Turner, 1995; Jackson, 1996), development (Pasteels, 1957a, b; Ewert, 1979b, 1985, 1991), sex determination (Ewert and Nelson, 1991), growth (Jackson, 1965, 1968, 1970; Pritchard, 1980; Powell et al., 1982; Dundee, 1994; Forsman and Shine, 1995), longevity (Conant and Hudson, 1949; Snider and Bowler, 1992), biomass (Iverson, 1982; Congdon et al., 1986; Congdon, 1989), trapping (Vogt, 1980; Stone et al., 1993), movements (Gibbons, 1970; Tuberville et al., 1996), conservation (McDiarmid, 1978; Stone, 1980; Morris and Smith, 1981; Moll and Morris, 1990; Herkert, 1992; Moler and Ashton, 1992), parasites (Jackson and Fulton, 1970; Moser, 1995), and symbionts and diseases (Leidy, 1856; Proctor, 1958; Johnson, 1968; Acholonu, 1969; Ernst and Ernst, 1975, 1977, 1979; Baker, 1987; Teehan and Short, 1989; Thomas et al., 1994; Lovich et al., 1996).

• **Etymology.** The specific name is derived from the Latin *concinnus*, meaning neat or elegant, presumably in reference to the markings on the carapace. The subspecific name *floridana* is a toponym for Florida, the state in which the purported type-locality is located. The subspecific name *suwanniensis* is also a toponym, and refers to the Suwannee River, Florida.

1. *Pseudemys concinna concinna* (Le Conte)

Testudo concinna Le Conte, 1830:106. See species synonymy.
Emys annulifera: Gray, 1831:32. See species synonymy.
Emys hieroglyphica Holbrook, 1836:47. See species synonomy.
Emys mobilensis Holbrook, 1838:53. See species synonomy.
[*Emys*] *labyrinthica* Duméril and Duméril, 1851:13. See species synonomy.
Ptychemys Hoyi: Agassiz, 1857:433 (part). See species synonomy.
[*Emys*] *orthonyx* Wied-Neuwied, 1865:23. See species synonomy.
Pseudemys vioscana Brimley, 1928:66. See species synonomy.
Pseudemys elonae Brimley, 1928:67. See species synonomy.
Pseudemys floridana concinna: Carr, 1935:147.
Pseudemys floridana mobiliensis: Carr, 1937:1.
Pseudemys concinna hoyi: Stejneger, 1938:175.
Pseudemys floridana hieroglyphica: Carr, 1938:108.
Pseudemys floridana mobilensis: Pope, 1939:210.
Pseudemys concinna concinna: Stejneger and Barbour, 1939: 163. First use of present combination.
Pseudemys concinna hieroglyphica: Stejneger and Barbour, 1939:164.
Pseudemys concinna mobilensis: Stejneger and Barbour, 1939: 164.
Pseudemys floridana hoyi: Brown, 1950:240 (part).
Pseudemys concinna mobiliensis: Pritchard, 1967:96.
Chrysemys concinna concinna: Weaver and Rose, 1967:63.
Chrysemys concinna hieroglyphica: Weaver and Rose, 1967:63.
Chrysemys floridana hoyi: Cochran and Goin, 1970:155.
Chrysemys concinna mobilensis: Cochran and Goin, 1970:155.
Pseudemys concinna metteri Ward, 1984:34. Type-locality, "Old Fort Cobb, Caddo County, Oklahoma." Holotype, USNM 7173, dry shell and fluid-preserved head and limbs, adult female collected 1 June 1868 by E. Palmer (examined by authors).

• **Definition.** Head and neck stripes are numerous, usually numbering more than eleven. A "C"–shaped mark is often present on the second pleural scute, and the plastron usually has a dark figure which nearly always fades in adults. The cutting surface of the upper jaw (tomium) is irregular or slightly notched at the midline.

2. *Pseudemys concinna floridana* (Le Conte)

Testudo floridana Le Conte, 1830:100 (part). See species synonomy.
Pseudemys floridana floridana: Carr, 1938:108.
Chrysemys floridana floridana: Cochran and Goin, 1970:154.
Pseudemys concinna floridana: Ashe, 1970:151. First use of present combination.

• **Definition.** Head and neck stripes number fewer than eleven.

Pleural scutes have one or more narrow, wavy transverse bars, and the plastron usually lacks dark markings. The cutting surface of the upper jaw is rounded and without any evidence of a notch.

3. *Pseudemys concinna suwanniensis* (Carr)

Pseudemys floridana suwanniensis Carr, 1937:4. Type-locality, "Suwannee River at Manatee Springs, Levy-Dixie County line, Florida." Holotype, University of Michigan Museum of Zoology (UMMZ) 81673, adult male, collected by A. Carr, on 12 March 1934 (not examined by authors).
Pseudemys concinna suwanniensis: Stejneger and Barbour, 1939:164. First use of present combination.
Pseudemys concinna suuranniensis: Rhodes, 1964 (1966):55. *Ex errore.*
Chrysemys concinna suwanniensis: Weaver and Rose, 1967:63.
Pseudemys suenniensis: Dadd, 1971 (1974):86. *Ex errore.*
Pseudemys sueanniensis: Nothstine et al., 1971:726. *Ex errore.*
Pseudemys suwanniensis: Seidel, 1994:128.

• **Definition.** The second pleural scute usually has a "C"–shaped mark, and the plastron has a dark figure. The ventral surface of the cervical scute is short, less than 35% of its dorsal length. The epiplastral lip is often curved, especially in females, and the ground color of the carapace, legs, and head is sooty black with light green or yellow lines.

• **Comment.** The taxonomy of *Pseudemys concinna* and that of its synonym *P. floridana* has undergone considerable revision since Le Conte's (1830) original descriptions of cooters from the southeastern United States. During the last century, the defined range was extended westward. Le Conte's original two species were partitioned into several additional species: *Emys mobilensis*, *E. hieroglyphica* (Holbrook, 1838), *Ptychemys Hoyi* (Agassiz, 1857), and *Pseudemys texana* (Baur, 1893).

More recently, Carr (1935, 1940, 1952) concluded that these forms represent a single wide-ranging polytypic species, classified them all as subspecies of *P. floridana*, and described two additional forms from Florida, *P. f. suwanniensis* (Carr, 1937) and *P. f. peninsularis* (1938). Crenshaw (1955), Carr's doctoral student, followed with a taxonomic analysis that examined *Pseudemys* primarily in Florida. He proposed that *P. floridana* and *P. concinna* be recognized as separate species. In spite of the fact that his results were not published, several popular and influential texts adopted Crenshaw's revision (e.g., Conant, 1958).

Numerous reports of intergradation or hybridization between *P. floridana* and *P. concinna* followed (Smith, 1961; Anderson, 1965; Webb, 1970; Barbour, 1971; Ernst and Barbour, 1972; Minton, 1972; Conant, 1975; Mount, 1975; Pritchard, 1979; Smith and Smith, 1980; Martof et al., 1980).

Wermuth and Mertens (1961, 1977), without explanation, listed *Trachemys scripta hiltoni* from México as a subspecies of *P. concinna*.

Fahey (1980) reported a taxonomic study of *Pseudemys* in Louisiana which concluded that *P. concinna* and *P. floridana* are conspecific (*sensu* Carr, 1952). Ward (1984) described two additional subspecies of *P. concinna* (*P. c. metteri* and *P. c. gorzugi*), elevated *P. c. texana* to species level, placed *P. c. mobilensis* and *P. f. hoyi* in synonymy, and restricted the range of *P. floridana* to east of the Mississippi River. Subsequently, *P. c. gorzugi* was elevated to a full species (Ernst, 1990).

The most recent revision (Seidel, 1994), based on a broad geographic and comprehensive analysis of morphological and molecular data, elevated *P. f. peninsularis* and *P. c. suwanniensis* to species, relegated *P. f. floridana* to a subspecies of *P. concinna*, and placed *P. c. hieroglyphica* and *P. c. metteri* in the synonymy of *P. c. concinna*.

The present taxonomic arrangement of *P. concinna* follows Seidel (1994), except for retention of *P. suwanniensis* as a subspecies. Other taxonomic interpretations are discussed in Jackson (1995) and Seidel (1995). Regardless of classification, the variable levels of divergence observed among populations of *P. concinna* do not easily fit the traditional concepts of biological species or subspecies.

Roger Bour recently located several specimens of *P. concinna* in the Muséum National d'Histoire Naturelle, Paris. These individuals were donated to the museum by John E. Le Conte and may be part of his (1830) type series. As noted by Carr (1935), Ward (1984), and Seidel (1994), a particular problem exists regarding the type-location for *P. c. floridana*. Le Conte's (1830) type-locality, "St. John's river of East Florida," without designation of a type specimen, is in a region of parapatry or sympatry for *P. c. floridana* and *P. peninsularis*, and is therefore questionable.

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An Inexpensive Method for Creating Spaghetti Tags for Marking Trionychid Turtles

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Marking techniques for turtles range from shell notching to tagging (Ferner 1979). Notching can cause infection and tags may be lost. Spaghetti tags—long, numbered strands of hollow pliable plastic inserted into an incision made in the turtle's carapace, and knotted at both ends to prevent loss—have been used successfully for marking trionychids. The main drawback in spaghetti tag use is the expense.

During the course of my study at Round Pond, Gallatin County, Illinois, USA, I devised an inexpensive method for making spaghetti tags. I purchased a three meter section of Romex wire containing eight differently colored wires within an outer sheath. After first stripping the outer sheath, I cut each of the eight wires into 10 cm lengths and removed the copper core, leaving only the colored plastic sheath. This produced 240 inexpensive tags and, by using one to four tags per turtle, a total of 4680 unique combinations can be produced. To insert the tags on the soft-shell turtles (primarily *Apalone spinifera*), I made a small incision in the perimeter of the carapace and threaded the unknotted end of the tag through. Next I square-knotted the portion fed through the incision, leaving about 1.5 cm between knots to allow for unrestricted growth. Finally, I removed the excess plastic sheath beyond the last knot.

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#3

A Note on the Foraging Behavior of the River Cooter (*Pseudemys concinna*)

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The river cooter, *Pseudemys concinna*, is a herbivorous or chiefly herbivorous species (Lageaux et al., 1995; Thomas et al., 1994; Buhlmann and Vaughan, 1991; Marchand, 1942; Allen, 1939; Parker, 1939) with its digestion being aided through a symbiotic relationship with cellulolytic bacteria in the gut (Thomas et al., 1994). In Illinois the species was also found herbivorous and to have over 98% of the fecal volume composing two genera of filamentous algae, *Cladophora* and *Oedoginium* (Dreslik, 1996). What has been lacking, however, is a general account of the foraging behavior of *P. concinna*. In this account I report on the behavior used by a small *P. concinna* from a floodplain lake in southern Illinois (Round Pond, Gallatin County).

At 1530 h on 17 May 1994, while conducting a status survey of the species, I observed a *P. concinna*, probably a male based on its elongated foreclaws, swim through a colony of spatterdock (*Nuphar luteum*) to a submerged branch (water depth was approx. 50 cm). The behavior is represented by three phases: 1) inspection; 2) posture; and 3) consumption. In the inspection phase, the *P. concinna* swam along the branch several times, apparently searching for epiphytic algae by either visual or chemosensory cues. Once the *P. concinna* found algae, it began the posture phase by swimming to face the branch, then placing its forefeet, claws facing each other, on the branch. In the final consumption phase, the turtle opened its mouth and began to tear off algae by simultaneously shaking its head and pushing the branch with its forefeet. This behavior commenced for approximately five minutes and upon its completion of feeding I attempted to catch the individual, but was unsuccessful. No determination of sex, age or body dimensions could be made.

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