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Exploitation of the Alligator Snapping Turtle, *Macroclemys temminckii*, in Louisiana: A Case Study

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The alligator snapping turtle (*Macroclemys temminckii*) is a large (to 80 cm carapace length, 113 kg) freshwater turtle that ranges throughout the Gulf Coastal Plain and the lower and central portions of the Mississippi River Valley of the United States (Ernst et al., 1994; Lovich, 1993). Because of the large adult size of the species, the relative ease with which specimens can be collected by experienced trappers, and high local demand, *Macroclemys* has long been exploited as a source of meat. George (1987) and Pritchard (1989) reviewed information on the status of the species provided by turtle trappers and state wildlife biologists. Although much of this information was fragmentary and anecdotal the data suggest that *Macroclemys* populations have declined drastically throughout much of the species' range. Though protected to varying degrees by several states, George (1987) and Pritchard (1989) concluded that the species should receive range-wide protection from the federal government as a threatened species under the Endangered Species Act. The alligator snapping turtle is currently a candidate for protection under the Endangered Species Act and is classified as Category 2. Designation as Category 2 indicates that the U.S. Fish and Wildlife Service considers listing as endangered or threatened to be "possibly appropriate," but "conclusive data on biological vulnerability and threat are not currently available to support proposed rules" (Federal Register, 1991).

Methods. — Although the alligator snapping turtle is widely assumed to be declining, there are few published accounts quantifying levels of exploitation (Pritchard, 1989). Our purpose in this note is to document the catch processed by a single turtle buyer in south central Louisiana from 1984–1986. Although the commercial use of *Macroclemys* in Louisiana was not illegal at the time of the study, the buyer requested anonymity.

Results. — During the three years for which we have records 17,117 kg (live weight) of alligator snappers were purchased by the buyer (Fig. 1). The mean weight processed per year was 5706 kg (1984 = 5556 kg; 1985 = 5146 kg; 1986 = 6416 kg). The provenance of most *Macroclemys* was assumed to be Louisiana, but some were collected in other states. For example, the total for 1984 includes 676 kg collected near Hollygrape, Arkansas in July and 838 kg collected near Greenville, Mississippi in August. The highest catch for all years occurred between April and August. The number of trappers per month who sold turtles to the buyer ranged from 2–17. An estimate of effort expended per trapper is the weight of turtles purchased during a month divided by the number of trappers who sold animals. Monthly effort ranged from 13–451 kg/trapper ($\bar{x}$ = 130.2, SD = 100.1). There was a statistically significant correlation (r = 0.724, $P < 0.001$) between natural log transformed live weight in kg purchased per month and the number of trappers (Fig. 2). The observed relationship suggests that the rate of harvest increases in a predictable linear fashion as the number of trappers increases.

Discussion. — Congdon et al. (1993) convincingly demonstrated that long-lived organisms like turtles have life history traits that severely constrain the ability of populations to respond to chronic disturbances such as overexploitation. Such traits include delayed sexual maturity and high and variable nest mortality. In their analysis, population stability of turtles was most sensitive to changes in adult or juvenile survival and less sensitive to changes in age at sexual maturity, nest survival, or fecundity. They concluded that the concept of sustained harvest could not be applied to populations of long-lived animals.

Our data are alarming in light of the findings of Congdon et al. (1993) in that they indicate a potentially large harvest of alligator snapping turtles in Louisiana and adjacent states. Data are unavailable on the mean weight of turtles purchased, but an estimate of the numbers of individuals harvested can be calculated. Although we did not record data on the weight of individual turtles purchased, we visually estimated their mean weight to be roughly 14 kg based on our experience with the species. Our figure is very close to the inferred median weight shown in Dobie (1971; Fig. 9) for commercially harvested *Macroclemys* in Louisiana. As-

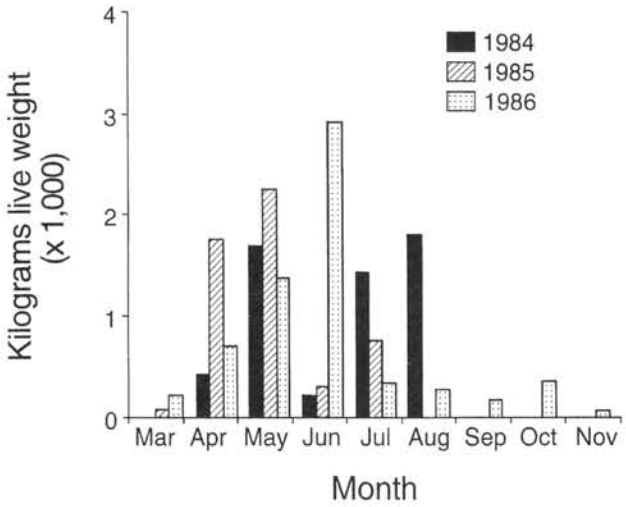

Figure 1. Catch of alligator snapping turtles processed by a single buyer in south central Louisiana.

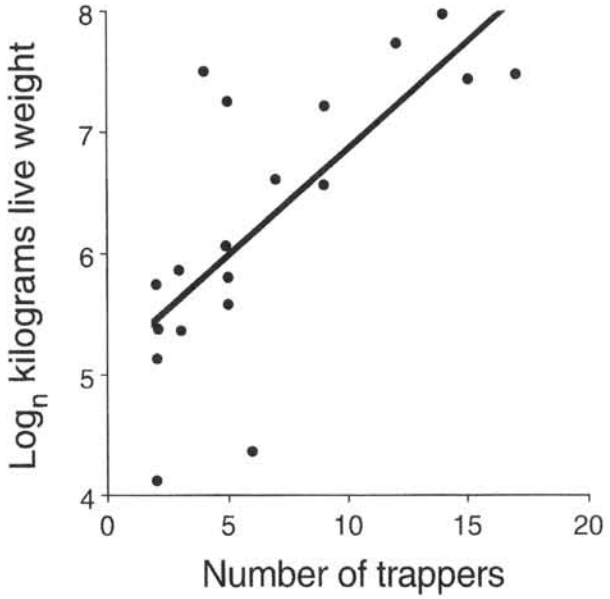

Figure 2. The relationship between total live weight of harvested alligator snapping turtles purchased each month and the number of trappers in each month. Data were log transformed to meet the assumptions of parametric statistical analysis. The model generated is: *$\log_n$ kg live weight/month = 5.098 + 0.176 (number of trappers)*. The relationship is statistically significant (refer to text for details).

suming that our weight estimate is appropriate, then approximately 1223 individuals were removed from the wild during the three years for which we have data. If we use our estimated mean annual harvest figure of 5706 kg, then approximately 408 turtles were killed annually. In reality, the numbers are probably much higher given that alligator snapping turtles have probably also been sold to other dealers or consumed privately. The Louisiana Department of Wildlife and Fisheries estimates that approximately 35 dealers are currently operating in the state with an undetermined number of smaller dealers.

In recognition of the dangers of large scale commercial trade and interstate commerce of this species, the Arkansas Department of Fish and Game recently issued an Emergency Proclamation prohibiting the capture and possession of *Macroclemys* (Buhlmann, 1993). According to representatives of the Louisiana Department of Wildlife and Fisheries, as of 1 January 1995 the state of Louisiana will impose a minimum size limit of 15 inches (38 cm) carapace length on *Macroclemys* harvested by commercial fishermen, with no limit on the number harvested. Recreational fishermen will be allowed to take four per day with no size limits. In addition, buyers will be required to report the carapace length and width of all turtles they handle commercially. It is interesting to note that dealers do not like to handle animals under 11 kg due to the small amount of meat and the large amount of effort needed to process a small turtle. As a result, the 15 inch size limit will probably do little to change the size distribution of harvested *Macroclemys*.

The economic value of the local industry we highlight can be estimated using figures reported by Pritchard (1989). He noted that in 1981 a "fish house" in Tangipahoa Parish, Louisiana paid $0.85/lb live weight for *Macroclemys* and then sold them for $1.30 to $1.40/lb live weight. Using our figures for one dealer, the mean annual harvest was worth about $10,693 at wholesale prices, and between $16,353 and $17,611 at the next markup. The product is worth even more by the time it gets to the table, since turtle meat with bones sells for up to $6.00/lb in parts of Louisiana (Pritchard, 1989). These figures suggest that there are strong economic incentives driving the exploitation of alligator snapping turtles, a scenario mirrored by the once heavily exploited diamondback terrapin (*Malaclemys terrapin*) (McCauley, 1945; Carr, 1952).

It is impossible to extrapolate our data to population trends since long-term data on alligator snapping turtle numbers are unavailable. However, given the vulnerability of turtles to overexploitation, it would seem prudent to extend additional protection to the alligator snapping turtle and similar species currently at risk. As a minimum, states within the range of *Macroclemys* should establish monitoring programs to more accurately determine regional levels of exploitation.

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