Management Implications of an Adult Female Alligator Telemetry Study

Dave Taylor, *Louisiana Department of Wildlife and Fisheries, Minden, LA 71055*

Abstract: From June 1981 to June 1982, a radio-telemetry study was conducted on 9 adult (≥1.8 m) female alligators (*Alligator mississippiensis*) within a cypress (*Taxodium distichum*) lake in northwestern Louisiana. Minimum home range size varied from 0.8 to 256 ha ($\bar{x} = 56$ ha) while average daily distance traveled varied from 2.3 to 238 m ($\bar{x} = 20$ m). Data collected through additional monitoring throughout 3 nesting and hunting seasons indicated a low nesting effort averaging 28% per year, a low degree of visibility during night counts, and a low proportion of transmittered females were harvested (10%).

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 38:222-227

Adult female alligators generally occupy a small home range with small daily movement patterns. No previous studies have been done regarding this segment of the population within a densely vegetated cypress lake habitat within Louisiana.

Telemetry studies of alligator movements by Joanen and McNease (1970) within Louisiana coastal marsh indicated minimum home ranges of 2.5 to 16 ha ($\bar{x} = 8.3$ ha) for 4 adult female alligators. Taylor et al. (1977, unpubl. rep.) found the minimum home range size of 11 adult female alligators introduced into a north-central Louisiana lake to range from 4.1 to 210 ha ($\bar{x} = 128$ ha). Taylor et al. (1976), studied the movements of 23 immature alligators, both local and introduced, in 2 cypress lake habitats in northeastern Louisiana and found their minimum home range sizes to vary from 0.8 to 321 ha ($\bar{x} = 94$ ha).

In June 1981, a 1-year telemetry study of 9 adult female alligators was begun on Clear-Smithport Lake in DeSoto Parish in northwestern Louisiana. Additional monitoring of these alligators was conducted during the courtship and nesting periods as well as during the hunting seasons the following 2 years. The primary objectives of this study were to determine the minimum home range and average daily distance moved for adult female alligators, determine

when and where courtship and nesting occurred, determine the effects of harvest on this population segment, and determine the detectibility of this population segment during night counts.

Thanks are extended to all personnel who participated in the study. Special thanks are extended to Marvin Haynie, enforcement agent, for his off-duty time and extra efforts collecting data during the 3 alligator seasons.

Methods

Clear-Smithport Lake is located in DeSoto Parish approximately 49 km south of Shreveport, Louisiana, and 48 km east of the Louisiana-Texas border. This lake consists of 1,180 ha containing sparse to dense vegetation of baldcypress, willow (*Salix nigra*), buttonbush (*Cephalanthus occidentalis*), water elm (*Planeria aquatica*), water hyacinth (*Eichhornia crassipes*), alligator weed (*Alternathera philoxeroides*), American lotus (*Nelumbo lutea*), duckweed (*Lemna minor*), giant cutgrass (*Zizaniopsis* sp.), water pennywort (*Hydrocotyle* sp.), and smartweed (*Polygonum* sp.). Maximum water depth is 3.1 m with an average depth of approximately 1 m at pool stage. Water fluctuation ranges from 0.3 m below pool stage during extremely dry weather to 0.3 m above pool stage during periods of excessive rainfall. Total surface area of open water is approximately 118 ha or 10% of the total area. Most of the lake is accessible only by airboat.

Beginning in April 1981, 9 adult female alligators 1.8 m to 2.3 m in length (Table 1) were captured by use of outboard boat, airboat, spotlights, harpoons, and cable snares. An additional female (2.5 m) was captured and instrumented but not included due to transmitter failure early in the study. The harpoon points were handmade and were inserted into the alligators with both long-bow and arrows as well as hand-thrown harpoons approximately 3 m by 25 mm in diameter. The harpoon point was attached to a 4-liter plastic jug by a 6 mm nylon cord approximately 5 m in length. Points, when properly constructed and inserted beneath the skin, held animals up to 3.7 m in length

Table 1. Length, weight, and length of time monitored for adult female alligators, Clear-Smithport Lake, Louisiana, 1981–83.

Unit no.	Date instrumented	Total length (m)	Weight (kg)	Date of last radio contact
1	21 Apr 81	1.82	19.5	1 Sep 83
2	4 May 81	1.87	20.9	15 Oct 83
3	6 May 81	1.91	22.7	15 Oct 84
5	25 May 81	2.09	36.4	3 Jun 82
6	10 Jun 81	2.05	27.3	23 Dec 83
7	17 Jun 81	2.14	36.8	1 Sep 83
8	17 Jun 81	1.79	20.5	15 Oct 83
9	27 Jun 81	1.87	20.5	20 May 84
10	25 Jun 81	2.31	45.9	23 Dec 83

with few animals escaping. Advantages of this capture method over the more commonly used locking snare include the ability to capture alligators while the boat is in motion, while the alligator is swimming or sinking beneath the surface of the water, and while the alligator is in dense aquatic vegetation. Alligators were weighed, measured for total length, sexed, marked by tail-notching and web-tags, and radio-telemetry transmitters (Teleonics, Mesa, Ariz.) were attached by use of a neck collar.

Activities were monitored at irregular intervals to determine home range size, average daily distance moved, and habitat preference. Data were also collected on activity patterns during courtship, nesting location, activities during incubation and brooding, susceptibility to harvest during the open alligator season, activities during the winter months, and detectibility during night counts.

Results and Discussion

Between 16 June 1981 and 3 June 1982, 231 radio locations were obtained on 9 adult female alligators by following the emitted signal with a directional antenna and receiver to the animal's exact location. Using this method, speculation as to where they were or in what vegetative type they were living was eliminated. Minimum home range size varied from 0.8 to 256 ha ($\bar{x} = 56$ ha) and average daily distance traveled ranged from 2.3 to 238 m ($\bar{x} = 20$ m) (Table 2). Average daily distances traveled by season were: 0.45 to 3.4 m ($\bar{x} = 1.4$ m) during winter (Dec.–Feb.), 2.4 to 74.9 m ($\bar{x} = 26.6$ m) during spring (Mar.–May), 2.1 to 237.6 m ($\bar{x} = 46.4$ m) during summer (June–Aug.), and 0.0 to 15.6 m ($\bar{x} = 3.1$ m) during fall (Sept.–Nov.).

The minimum home range area by season of the year could not be determined due to only linear movement by most of the animals. This is possibly a function of location sample size.

Throughout the courtship and breeding seasons of 1981, 1982, and 1983, there was no evidence of female alligators moving to open water for breeding purposes. They occupied the same dense vegetation throughout the year and, in most instances, there was no open water in the vicinity. Occasionally, adult males were sighted near the transmittered females. In some cases, deeper sloughs with stands of cypress trees were present. These trees blocked encroachment by aquatic plants and breeding may have occurred in these situations.

In 1981, 3 of the females, ranging in size from 2.1 to 2.3 m, nested with only 1 of the nests hatching successfully. The remaining 2 nests were predated by raccoons (*Procyon lotor*). In 1982, only 1 of 8 remaining females under observation nested and she was the 2.3-m animal which had nested in 1981. In 1983, 3 females nested. Their sizes when measured in 1981 were 1.87 m, 1.9 m, and 1.87 m. Nesting sites in 1981 were located 1 to 50 m from the water's

Table 2. Minimum home range and average daily movements by season for adult female alligators, Clear-Smithport Lake, Louisiana, 1981–82.

Unit no.	N locations	Minimum home range (ha)	Season	Radio days	Average daily movement (m)	Period monitored
1	27	0.8	Summer	84	6.2	16 Jun 81
			Fall	76	1.2	to
			Winter	90	1.3	3 Jun 82
			Spring	75	2.4	
2	28	64.0	Summer	78	20.5	16 Jun 81
			Fall	82	1.1	to
			Winter	90	21.5	3 Jun 82
			Spring	84	21.5	
3	27	86.7	Summer	90	238.0	25 May 81
			Fall	82	15.6	to
			Winter	79	3.4	3 Jun 82
			Spring	74	74.9	
5	21	256.0	Summer	90	238.0	25 May 81
			Fall	81	1.1	to
			Winter	90	0.8	3 Jun 82
			Spring	84	49.3	
6	28	11.6	Summer	78	2.1	16 Jun 81
			Fall	82	1.6	to
			Winter	90	1.1	3 Jun 82
			Spring	84	21.0	
7	23	7.7	Summer	72	25.4	22 Jun 81
			Fall	82	0.0	to
			Winter	90	0.4	3 Jun 82
			Spring	84	2.7	
8	27	41.8	Summer	72	25.2	22 Jun 81
			Fall	82	6.6	to
			Winter	90	1.3	3 Jun 82
			Spring	84	23.1	
9	24	32.3	Summer	69	75.3	15 Jun 81
			Fall	82	3.3	to
			Winter	90	1.7	3 Jun 82
			Spring	84	33.1	
10	26	4.0	Summer	58	3.2	6 Jul 81
			Fall	82	2.7	to
			Winter	90	0.4	3 Jun 82
			Spring	84	6.2	

edge. Nests were located at elevations of 0.3 to 3 m above the water level in vegetation consisting of Johnson grass (*Sorghum hallipense*), blackberries (*Rubus* sp.), and rattan vine (*Berchemia scandans*).

During the 3 nesting seasons (1981–83), a total of 49 new nests was discovered with most of them being constructed of soil, leaves, litter from the overstory vegetation, and often large pieces of tree trunks or limbs. Each year, several old nests were discovered which had been overlooked the previous year. Fire ants (*Formicidae*) commonly occupied alligator nests and in 1 instance, 14 hatchlings were killed by ants during hatching. Predation by raccoons occurred on 15 of the 49 nests.

Effects of Harvest

During September 1981, 60 alligators were harvested by baited hook-and-line from Clear-Smithport lake during the open alligator season. Fifty-eight were adults, 12 were adult females. Fishing for these animals was, by necessity, done along the edge of the open water areas; therefore, none of the transmittered females were caught. During September 1982, a total of 69 alligators was harvested from the lake in the same manner. Of these, 67 were adults and 30 were adult females. Again, none of the 10 females with transmitters were caught nor were they living in close proximity to any place where alligator hunters traveling by outboard boat and motor could harvest them. During September and early October 1983, 59 alligators were harvested with 48 being adults, 22 of which were adult females. One transmittered female was caught.

Night Counts

From 1981 to 1983, night counts were made to determine the minimum number and size-class composition of adult alligators ($\geqslant$1.8 m). In 1981, a maximum of 30 adult alligators were identified in 1 night. During September 1981, 58 adult alligators were harvested. In 1982, a maximum of 37 adult alligators were identified in any 1 night count while 67 adults were harvested the following September. A total of 125 adult alligators was harvested during the 2 alligator seasons following the count of 30 adults. Assuming that 125 adults were present before hunting, 1981, then the 30 counted would have represented <25% of those actually present. If it is assumed that .5 of the adults were harvested during this 2-year period, then the 30 sighted would represent only about one-eighth of the number present. The 3-year total harvest of 64 adult females was accomplished while harvesting 163 adults and only 1 of 10 transmittered females. In addition, many nights were spent capturing and marking alligators on this lake and only 1 transmittered animal was sighted.

Conclusions

Adult female alligators occupied small home ranges, their average daily movements were minimal, and they did not move to open water for courtship and breeding purposes. Nesting occurred as far as 50 m from the water's edge, nest material consisted of whatever was available, fire ants commonly occupied alligator nests, and predation by raccoons was commonplace. Night counts conducted between June 1981 and September 1984 detected only 1 of these transmittered females. Additionally, only a small percentage of the adults present were seen on any 1 night.

The management implications of these findings are that alligator tag allotments should be based upon a carefully calculated harvest rate of the adult male segment of the population as described by Taylor and Neal (1984), since

adult females and immature alligators (1.2–1.8 m) are not accessible to harvest in proportion to their occurrence within the population using present hunting methods. Additional research is needed on the relationship between the numbers of adult alligators sighted and the number of adults actually present.

Literature Cited

Joanen, T. and L. McNease. 1970. A telemetric study of nesting female alligators on Rockefeller Refuge, Louisiana. Proc. Annu. Conf. Southeast. Assoc. Game and Fish Comm. 24:175–193.

Taylor, D., T. Joanen, and L. McNease. 1976. A comparison of native and introduced immature alligators in northeast Louisiana. Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies. 30:362–370.

——— and W. Neal. 1984. Management implications of size-class frequency distribution in Louisiana alligator populations. Presented to the Wildl. Soc. Bul. for publ. (In press).