

A COMPARISON OF NATIVE AND INTRODUCED IMMATURE ALLIGATORS IN NORTHEAST LOUISIANA

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ABSTRACT

A telemetric study was conducted on immature alligators (Alligator mississippiensis) in two north Louisiana lakes, Black Bayou Lake and Wham Brake Reservoir, from 10 April, 1975, through 4 December, 1975. Twenty-three alligators, 11 native and 12 introduced from a coastal marsh habitat were fitted with color-coded neck-collar radio transmitters and their daily movements followed with a directional receiver. Minimum home range sizes varied from 0.8 to 321 hectares for all animals with no significant difference being found between range sizes of local and introduced alligators.

Various studies have documented alligator movements and habitat preferences in Louisiana coastal marshes (Chabreck, 1965; Joanen and McNease, 1970, 1972; McNease and Joanen, 1974). Louisiana has relocated approximately 5,000 alligators during the past ten years. This study was initiated to study habitat selection and movements of native as compared to introduced alligators and to evaluate the suitability of using marsh alligators for restocking in non-marsh habitats.

Major objectives of this study were to:

1. Monitor daily and seasonal movements of native and introduced alligators.
2. Relate movements to habitat preferences.
3. Determine the minimum home ranges of individual alligators.
4. Compare daily movements, minimum home ranges and habitat preferences of native alligators with those introduced from a coastal marsh habitat.

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MATERIALS AND METHODS

Telemetry Equipment

Transmitters and receivers used were identical to those described by McNease and Joanen (1974). Transmitters were color-coded for ease in identifying animals in the field, especially for differentiating between native and introduced alligators.

Method of Capturing and Marking

All alligators used in this study were tagged as described by Chabreck (1963). Alligators were captured by outboard or airboat with a cable snare or by hand.

An attempt to instrument equal numbers of native and introduced alligators proved difficult as native alligators on both lakes were very wild and difficult to approach. No attempt was made to analyze data according to sex since most of the test animals were males. McNease and Joanen (1974) reported a non-significant difference when home range sizes for immature male and female alligators inhabiting marsh habitats were subjected to an analysis of variance.

Transmitter Attachments

Transmitters were attached and activated several hours prior to releasing the alligators. Two methods were used to attach transmitters.

Method 1. Transmitters were attached to eight alligators by tying the radio and its belt base to the dorsal neck scutes. The collar belting was cut off so that it extended about 2.5 centimeters from the sides of the component box, two 3.5 millimeter holes were punched in each end of the belting and the belting was tied to the neck through holes punched under the base of the four large dorsal neck scutes with an ice pick. This method of attachment proved undesirable as recaptured alligators showed signs of the holes not healing, the attachment cord tearing out and heavy infestation by leeches. Three of these alligators lost their transmitters.

Method 2. Fifteen alligators were instrumented with neck collars fitted as described by McNease and Joanen (1974) with the exception of tying the collar to the neck scutes. Each transmitter could be attached in five minutes in this manner.

Tracking Procedure

One hundred twelve field monitoring trips were made during this study. Forty-six percent of the trips were made in spring, 36 percent in summer and 18 percent in the fall. No transmitters were functional during the winter months.

No nighttime readings were accomplished during this study. Most nights were utilized in attempting to capture additional alligators for the study. Locations were determined primarily with the aid of an airboat and since transmitter signal strength varied from 4 kilometers to only a few meters, no attempt was made to locate the alligators by triangulation. All locations were determined by following the transmitted signal directly to the alligator or to within a few meters if vegetation prevented closer approach.

Transportation employed to monitor the alligators included outboard boats, airboats and fixed wing aircraft.

Climatological Data

Basic climatological data were collected from the National Oceanic and Atmospheric Administration, Monroe FAA Airport. A thirty-day continuous reading Ryan temperature recorder monitored daily water temperature fluctuations at a depth of approximately 30 centimeters.

STUDY AREA

This study was conducted in northeastern Louisiana on Black Bayou Lake and Wham Brake Reservoir, containing 610 and 2,025 hectares respectively. Black Bayou Lake, with a mean elevation of 21 meters, average depth of 2 meters, and a fluctuation of 0.6 meter, contains four habitat types: open water, stands of cypress trees (*Toxodium distichum*), water hyacinth (*Eichornia crassipes*) floats, and areas of willow (*Salix nigra*) and/or buttonwillow (*Cephalanthus occidentalis*). Open water occupied 67 percent of the Black Bayou Lake study area; aquatic vegetation, primarily water hyacinths with scattered areas of alligator weed (*Alternanthera philoxeroides*) and American lotus (*Nelumbo lutea*) covered 20 percent; dense stands of cypress trees standing in water comprised 10 percent of the lake; and willows and buttonwillow in association with aquatics and scattered cypress made up 3 percent. Recreational use on Black Bayou was heavy from spring through fall, the period of the year when alligators were most active.

Wham Brake Reservoir, a paper mill black water settling basin with a mean elevation of 21 meters and average water depth of 2.5 meters, experiences an annual drawdown of 1 meter. The four habitat types occupied by alligators on Wham Brake were: open water, floating logs and duckweed (*Lemna minor*), floats of aquatic vegetation and stands of cattails (*Typha* sp.). Open water with scattered stumps, snags and cypress trees occupied 80 percent of the Wham Brake Reservoir. Large floats of emergent aquatics, primarily alligator weed, covered 10 percent of the reservoir and shifted directions with changes in wind direction. Shallow water marsh areas comprised 6 percent of the lake. A dense stand of cattail made up 2 percent of the area. Log-duckweed rafts constantly shifted directions

Table 1. Length, weight and radio time for immature alligators, 1975.

<i>Date Instrumented</i>	<i>Location</i>	<i>Total Length (m)</i>	<i>Weight (kg)</i>	<i>Date Last Radio Contact</i>	<i>Radio Days</i>
4/10/75	Black Bayou	1.41	8.62	8/15/75	127
4/10/75	Black Bayou	1.05	2.95	5/31/75	51
4/10/75	Black Bayou	1.08	3.74	6/19/75	70
4/10/75	Black Bayou	1.62	12.25	7/16/75	97
4/10/75	Black Bayou	1.63	11.11	8/15/75	127
4/17/75	Black Bayou	1.12	3.86	7/08/75	82
6/02/75	Black Bayou	1.35	5.90	8/29/75	79
6/25/75	Black Bayou	1.39	7.60	8/01/75	*38
7/08/75	Black Bayou	1.10	3.29	10/13/75	97
7/30/75	Black Bayou	1.40	7.82	9/12/75	44
8/29/75	Black Bayou	1.70	—	12/04/75	97
8/29/75	Black Bayou	1.65	—	12/04/75	97
9/25/75	Black Bayou	1.57	11.79	9/27/75	2
9/25/75	Black Bayou	1.49	9.98	10/10/75	*16
10/03/75	Black Bayou	1.31	7.71	10/13/75	10
5/27/75	Wham Brake	1.82	19.96	8/20/75	85
6/08/75	Wham Brake	1.57	10.66	9/12/75	96
6/15/75	Wham Brake	1.70	14.97	11/04/75	142
6/24/75	Wham Brake	1.50	11.68	8/20/75	57
6/24/75	Wham Brake	1.42	8.28	9/04/75	72
6/24/75	Wham Brake	1.45	7.71	9/21/75	89
7/30/75	Wham Brake	1.65	12.70	10/31/75	93
7/30/75	Wham Brake	1.35	7.26	10/27/75	89

*Recapture

with wind changes and occupied 2 percent of the area. Public use on Wham Brake was light during the period of the year when alligators were active.

RESULTS AND DISCUSSION

Twenty-three (23) immature alligators, 11 local and 12 introduced, were studied using radio transmitters during the 238-day period of April 10, 1975, through December 4, 1975 (Table 1). Six hundred sixty-eight (668) individual locations were obtained during a period of 112 days on the two separate lakes.

Transmitter life varied from 10 to 142 days and averaged 83 days.

Environmental Factors

It was impossible to determine whether an alligator was on a bank or vegetation, floating on top of the water, or submerged by the type of signal received; therefore, responses to various climatic conditions could only be detected by visual sightings. Transmitters emitted signals which were received even when the animal was completely submerged on the lake bottom.

Basking on aquatic vegetation was observed on several occasions during spring with very few immature alligators being sighted at night. As water temperatures warmed in summer and cooled rapidly in fall, diurnal sightings of immature alligators ceased but nocturnal sightings increased significantly (Table 2).

Adult alligators were sighted frequently both day and nighttime during spring but none were identified during the summer months and only two were sighted at night during fall. These may have been the alligators which were spotted frequently at night but submerged too far away to identify as to size class.

Table 2. Average seasonal air and water temperature and activities exhibited by immature and adult alligators.

Season	Average Temperature		Prevalent Activities
	Ambient	Water	
Spring	22.0°C.	23.5°C.	Immatures - Some aquatic basking—no diurnal travel. Sighted infrequently at night. Adults - Some aquatic basking observed. Sighted frequently at night.
Summer	26.8°C.	30.3°C.	Immatures - None sighted during daytime Sighted frequently at night. Adults - None observed either day or night-time during summer months.
Fall	20.6°C.	16.6°C.	Immatures - Sighted frequently at night only. Adults - Only two sighted, one during day-light hours.

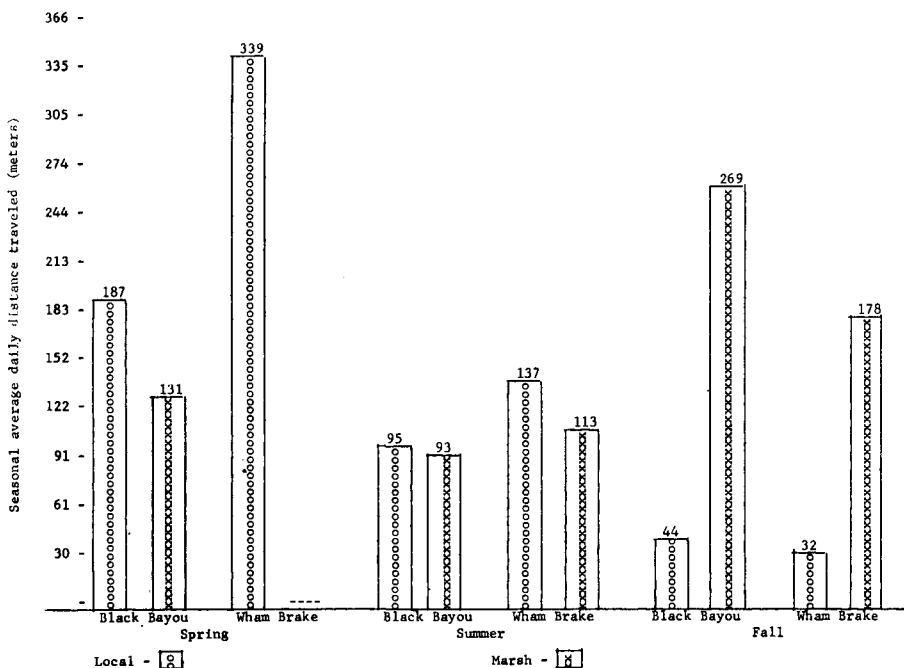


Figure 1. Average daily distance moved by season for immature alligators, 1975.

The introduced alligators in both lakes displayed an unexplainable increase in daily movements when compared to the local alligators under investigation during the fall months when water temperature began to decrease (Figure 1).

Range Size

An F-test indicated a non-significant statistical difference in minimum home range sizes between native and introduced alligators ($P > 0.05$, $F = 0.0134$, d.f. 1, 16). Generally,

alligators with larger range sizes tended to have one or more concentrated activity centers with infrequent movements outside of these heavy use areas.

Minimum home range sizes for three native Black Bayou Lake alligators (Table 3) varied from 0.8 to 15 hectares and averaged 9.2 hectares. Minimum home range sizes for six alligators introduced into Black Bayou Lake (Table 4) varied from 2.4 to 227 hectares and averaged 121 hectares. Minimum home range sizes for alligators of both origins in Black Bayou Lake ranged from 0.8 to 226.6 hectares and averaged 83.7 hectares.

Minimum home range sizes for three local Wham Brake Reservoir alligators (Table 5) varied from 78.5 to 321.3 hectares and averaged 186.4 hectares. Minimum home range sizes for five alligators introduced into Wham Brake Reservoir (Table 6) varied from 2.8 to 151.7 hectares and averaged 58.1 hectares. Minimum home range sizes for immature

Table 3. Minimum home range sizes, average daily distance traveled and habitat preference by season, Black Bayou Lake local alligators.

Alligator No.	No. Locations	Minimum Home Range	Season	Radio Days	Average Daily Distance (m)	Habitat preference - Percent of time			
						Aquatic Vegetation	Open Water	Cypress Trees	Willow and Buttonwillow
2B	46	*	Spring	65	154.08	59.5%	13.5%	0%	27.0%
			Summer	18	8.47	66.7%	0%	0%	33.3%
7B	28	*	Spring	18	303.79	100.0%	0%	0%	0%
			Summer	84	149.87	100.0%	0%	0%	0%
3B	36	12.14	Summer	76	68.98	6.5%	0%	0%	93.5%
			Fall	18	6.77	20.0%	0%	0%	80.0%
10B-3	24	0.81	Summer	24	68.52	100.0%	0%	0%	0%
			Fall	73	5.06	100.0%	0%	0%	0%
11B-2	27	14.57	Summer	24	78.18	100.0%	0%	0%	0%
			Fall	73	41.88	94.7%	0%	5.3%	0%
2B-3	4	*	Summer	10	405.08	100.0%	0%	0%	0%
			Fall						
Avg.	27.5	9.19	Spring		186.54				
			Summer		95.22 =				
			Fall		43.68				

*Insufficient Data

Minimum home range is given in hectares.

Table 4. Minimum home range sizes, average daily distance traveled and habitat preference by season, Black Bayou Lake marsh alligators.

Alligator No.	No. Locations	Minimum Home Range	Season	Radio Days	Average Daily Distance (m)	Habitat preference-Percent of time			
						Aquatic Vegetation	Open Water	Cypress Trees	Willow and Buttonwillow
8B	66	85.50	Spring	71	70.96	28.9%	0%	0%	68.9%
			Summer	56	128.66	28.6%	4.8%	4.8%	61.9%
9B	27	140.84	Spring	51	100.22	96.3%	0%	0%	3.7%
10B	35	169.97	Spring	70	185.01	54.3%	2.9%	17.1%	11.4%
11B	57	100.37	Spring	71	145.88	57.1%	0%	0%	42.2%
			Summer	26	54.50	100.0%	0%	0%	0%
12B	62	226.63	Spring	71	143.96	53.0%	4.4%	4.4%	37.7%
			Summer	56	81.66	41.2%	0%	0%	58.8%
10B-2	23	*	Summer	38	146.15	12.3%	6.3%	81.3%	0%
			Fall	16	269.44	85.7%	0%	0%	14.3%
9B-2	15	2.43	Summer	44	38.16	40.0%	0%	0%	60.0%
Avg.	40.7	121.01	Spring		130.76				
			Summer		92.84 =		120.03		
			Fall		269.47				

* Insufficient Data

Minimum home range is given in hectares.

Table 5. Minimum home range sizes, average daily distance traveled and habitat preference by season, Wham Brake Reservoir local alligators.

Alligator No.	No. Locations	Minimum Home Range	Season	Radio Days	Average Daily Distance (m)	Habitat preference-Percent of time			
						Open Water	Logs with Duckweed	Floating Vegetation	Cattails
3W	32	159.45	Spring	25	226.65	33.3%	58.3%	8.3%	0%
			Summer	61	101.04	0%	80.0%	20.0%	0%
1W	34	321.33	Spring	12	633.98	0%	42.9%	57.1%	0%
			Summer	84	281.00	0%	88.9%	11.1%	0%
5W	48	78.51	Spring	06	216.41	0%	50.0%	0%	50.0%
			Summer	93	29.90	3.0%	39.4%	0%	57.6%
Avg.		186.45	Fall	43	32.03	0%	7.7%	0%	92.3%
			Spring		338.91				
			Summer		136.76 =		109.24		
			Fall		32.03				

Minimum home range is given in hectares.

Table 6. Minimum home range sizes, average daily distance traveled and habitat preference by season, Wham Brake Reservoir marsh alligators.

Alligator No.	No. Locations	Minimum Home Range	Season	Radio Days	Average Daily Distance (m)	Habitat preference — Percent of time			
						Open Water	Logs with Duckweed	Floating Vegetation	Cattails
4W	7	103.60	Summer	57	127.04	85.7%	14.3%	0%	0%
6W	27	8.09	Summer	72	49.77	40.7%	59.3%	0%	0%
7W	14	2.83	Summer	66	95.83	92.9%	7.1%	0%	0%
8W	30	24.28	Summer	53	206.20	11.1%	88.9%	0%	0%
			Fall	40	332.23	0%	100.0%	0%	0%
10W	26	151.76	Summer	53	100.09	41.2%	58.8%	0%	0%
			Fall	36	5.19	0%	100.0%	0%	0%
Avg.		58.11	Summer		112.65				
			Fall		177.67 = 125.76				

Minimum home range is given in hectares.

alligators of both origins in Wham Brake Reservoir ranged from 2.8 to 321.3 hectares and averaged 106.2 hectares.

Minimum home range sizes for six local alligators in both lakes combined ranged from 0.8 to 321.3 hectares and averaged 97.8 hectares.

Minimum home range sizes for 11 introduced alligators in both lakes combined ranged from 2.4 to 226.6 hectares and averaged 92.4 hectares.

Local alligators in Black Bayou Lake occupied a much smaller home range than did the immature alligators introduced into that lake. Conversely, local alligators in Wham Brake Reservoir occupied a much larger home range than the introduced animals. However, when combined into two groups, an analysis of variance showed no significant differences in the minimum home range sizes of local alligators and those introduced from marsh habitat.

Daily Activity

Although the daily movements of local alligators under surveillance were greater than movements of those introduced into Wham Brake Reservoir, the average daily movements of introduced alligators were slightly greater in Black Bayou Lake than local alligator movements. The movements of introduced alligator in both lakes combined, averaged slightly greater than those of local alligators in both lakes combined (Table 7). These movements were not significantly greater ($P > 0.05$, $F = 0.0005$, d.f. 1, 18).

Table 7. Average distance traveled for immature alligators, 1975.

Source	Lake	Minimum (m)	Maximum (m)	Average (m)	Source Average (m)
Local	Black Bayou	20.75	405.08	92.50	115.64
	Wham Brake	38.42	325.12	150.14	
Marsh	Black Bayou	38.17	185.01	114.38	118.90
	Wham Brake	49.76	260.41	125.77	

Daily movement data, averaged by season, are presented in Figure 1. Both local and introduced alligators showed the same trend in daily movement patterns in spring and summer but varied significantly in fall. Local alligator movements decreased from spring to summer then increased significantly during fall. Wide variation in daily movements were observed for both groups during each season.

No transmitters were active during winter months.

Habitat Preference

The most important aspect of this study involved habitat preferences exhibited by the study animals.

Figures 2-5 describe mean habitat preferences according to origin and season. Tables 3, 4, 5, and 6 describe individual alligator habitat preference by season of the year.

In Black Bayou Lake there were no significant differences in habitat preferences by season for local and introduced immature alligators (Figures 4 and 5). In Wham Brake

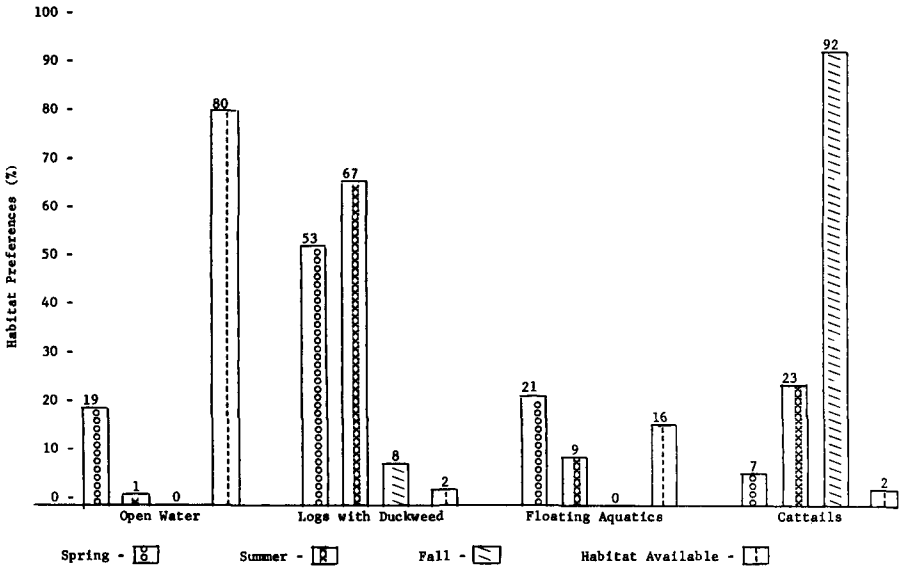


Figure 2. Habitat preferences of local immature alligators by season, Wham Brake Reservoir, 1975.

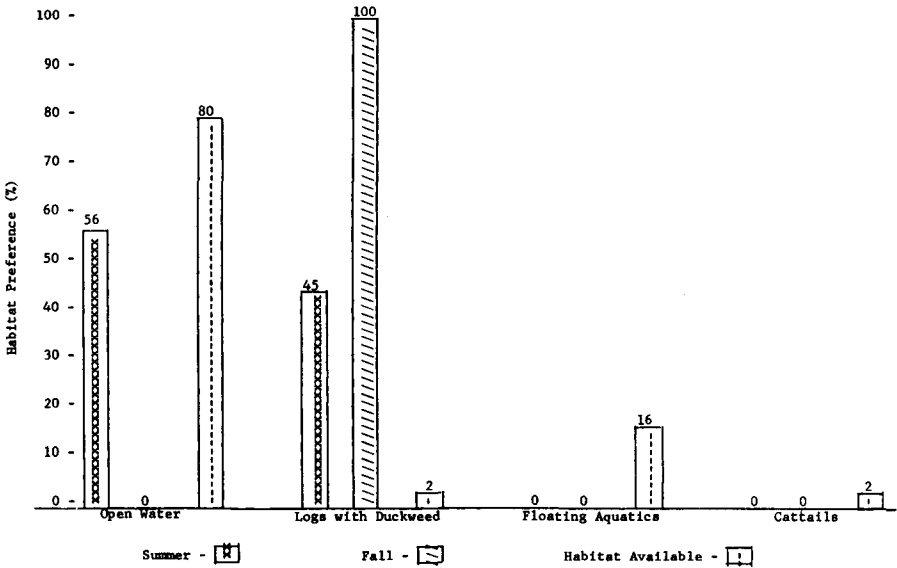


Figure 3. Habitat preferences of immature marsh alligators by season, Wham Brake Reservoir, 1975.

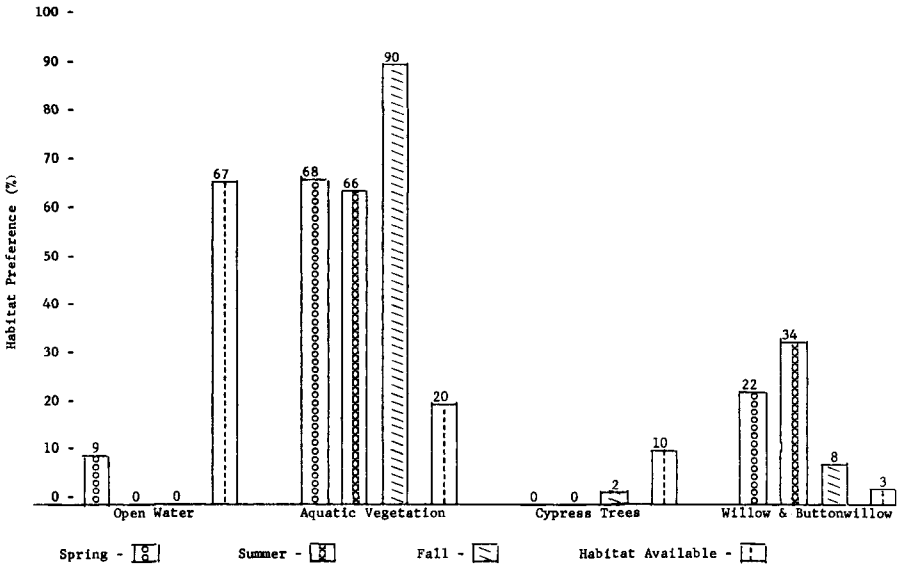


Figure 4. Habitat preferences of local immature alligators by season, Black Bayou Lake, 1975.

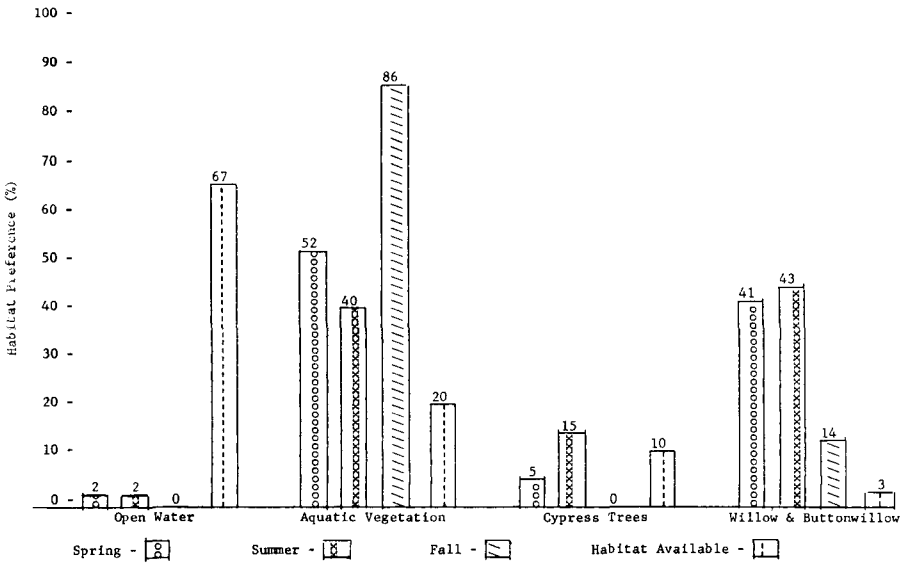


Figure 5. Habitat preference of immature marsh alligators by season, Black Bayou Lake, 1975.

Reservoir, local alligators exhibited preferences different from those of introduced alligators in both summer and fall (Figures 2 and 3).

Grouped by lake, all alligators occupied similar habitat types most of the time. When habitat preferences were compared to habitat availability, marked preferences were demonstrated for specific environmental niches which made up a relatively small amount of the overall habitat available. Alligators in Black Bayou Lake preferred areas characterized by shallow water with cover of water hyacinths, alligator weed or buttonwillow (23% of area) or a combination of these during most of the year. Areas of floating logs with duckweed (2% of area) were primarily used by alligators in Wham Brake Reservoir.

SUMMARY

A telemetric study was conducted on Black Bayou Lake and Wham Brake Reservoir in northeastern Louisiana from 10 April, 1975, through 4 December, 1975, to gather information on the daily movements, minimum home range sizes and habitat preferences of immature alligators, both local and introduced. Eleven local and 12 introduced from marsh habitat were monitored during this period and were located 668 times.

Minimum home range sizes varied from 0.8 to 321 hectares for all animals under study with no significant difference being found between range sizes of local alligators and introduced animals.

Average daily distance traveled was similar for both groups but two introduced alligators were very active during fall when water temperatures became cool.

Habitat preferences were essentially identical by both groups although sometimes individuals occupied habitats different from that used by the majority of the two groups.

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