American alligator *(Alligator mississippiensis)* population surveys and nest counts in the Big Thicket National Preserve, Texas.

By
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A Report to
the Thicket of Diversity, Big Thicket Association
and
Big Thicket National Preserve

Introduction

The American alligator (*Alligator mississippiensis*) is the largest reptile in North America (Newsom et al. 1987) and can be found in rivers, swamps, bayous, marshes and other bodies of water along the Southeastern United States (Eversole et al. 2013). Alligator population data is often used to assess the integrity of ecosystems because of their significant influence as top predators and ecosystem engineers (Eversole et al. 2015). They alter their habitat by digging dens and building nest mounds (Beard 1938; Craighead 1968; Kushlan 1972; Joanen and McNease 1989). Dens are used by other aquatic organisms as refuges, especially during times of drought (Kushlan 1972). Nest mounds, along with a den sites typically dug nearby, require uprooting several square meters of vegetation, altering the habitat considerably (Joanen 1969). Dens and nests help maintain richness in diversity in wetlands (Kushlan 1972).

The American alligator nearly became extinct in the mid-1900s due to the negative effects of industry, agriculture, and over-hunting (Lutterschmidt and Wasko 2006). They were placed on the endangered species list in 1969 but were removed from the list in 1987 due to successful management practices (Lutterschmidt and Wasko 2006). Most alligator research has occurred in Florida and Louisiana due to intense management and restoration programs there (Dunham, Dinkelacker, and Miller 2014). In Texas, coastal surveys in 1998 estimated 283,263 alligators living in Jefferson, Chambers, and Orange counties (TPWD 1998). The Texas Division of Parks and Wildlife has continued to survey alligator populations in state owned parks and wildlife refuges but does not conduct surveys on federal lands. The Big Thicket National Preserve (BTNP) has never conducted an alligator population survey since the founding of the

preserve in 1974 (Ken Hyde, Chief of Resource Management of BTNP in 2016, personal communication).

Most alligator surveys and research has focused on coastal populations, but coastal populations represent only a portion of the species' entire distribution range. Habitat choice varies among alligator populations; coastal alligators prefer open areas with less vegetation, such as shallow, brackish marshes, while inland alligators vary in habitat preference (Webb et al. 2006; Eversole et al. 2015). Habitat selection of inland alligators can be separated by age groups, with adults occupying deeper, open water habitats away from vegetation while subadults preferring shallower, heavily vegetated areas (Webb et al. 2006).

Most alligator surveys have focused on habitats in coastal wetlands, inland lakes, and well vegetated bayous, but surveys of river systems are lacking (Lutterschmidt et. al. 2006). The major waterbodies within BTNP (Lower Neches River, Village Creek, and Pine Island Bayou) consist of low-gradient, often shallow rivers and streams with short sections of deep, fast following water. The river bottoms consist of mostly sandy or fine sediments with abundant organic debris. The main river channels are surrounded by bottomland hardwood forest, backwater swamps, marshlands, and forested oxbow lakes with little herbaceous vegetation (Saalfeld et al. 2008). Determining the number of alligators within the preserve provides a baseline for future alligator research within the preserve. Alligator population data will also influence the development of policies to protect both alligators and park visitors, such as developing restricted areas for nesting female alligators to protect the nests and hatchlings (Ken Hyde, Chief of Resource Management of BTNP in 2016, personal communication). Our

objective of this study is to conduct a first-ever alligator population survey within the preserve and assess habitat preferences for alligators within the BTNP.

Methodology

Alligator populations were assessed at night, using spot-light surveys. The surveys were conducted along approximately 96 miles of the Lower Neches River from the base of Town Bluff Dam to the southern park boundary just north of the I-10 bridge. Surveys also included smaller backwater areas and tributary creeks of the Neches River that could be accessed by a boat and were within BTNP. We followed the alligator survey protocols used by Texas Parks and Wildlife: (1) surveys begin 1 hour after sunset, (2) surveys occur within a 20-day period around the new moon, and (3) the boat speed must remain between 4-7 mph. Following the state's protocols can allow us to compare our results to the results of state surveys in nearby refuges and state parks. We used spotlights to scan near the river banks for an alligator's distinct red eye-shine. When an eye-shine was observed, the boat approached the animal and paused long enough for us to estimate the size and record the alligator's location. The size classes were separated into hatchlings (< 30.5 cm or 1 foot), sub-adults (30.6-182.9 cm or 1-6 feet), and adults (>183cm or 6 ft). We sized the individuals by visually estimating the distance from snout to eyes in inches which correlates with the total length of an alligator in feet (Lutterschmidt et. al. 2006). If an alligator was spotted but submerged before a length could be determined, length was marked as unknown.

Surveys were conducted in a 16-foot, motorized, aluminum boat. To safely complete each night survey, a minimum of three people were needed: a driver and two people using

spotlights to scan for eye-shines. Typically, we had between 4-5 people each night which made surveys more efficient. The type of habitat used by each sighted alligator was categorized into one of five types: open water, emergent vegetation, floating vegetation, mud, and dry ground. Shoreline slope was also estimated as shallow (<15°), moderate (15-30°), and steep (>30°). At five-mile intervals, water parameters were logged utilizing the multiparameter meter (Hanna HI9829), which recorded temperature, conductivity, salinity, total dissolved solids, and ph. Atmospheric climate data for each survey night was retrieved from an online database (weather.org). Three surveys were completed: a fall (October 2017), spring (May 2018) and summer (August 2018) survey.

Day surveys of potential den sites, slide outs, and nesting sites were conducted in January 2018 and again in September 2018 (locations described in tables 8 & 9). The day surveys were conducted at backwaters, oxbow lakes and bayous within the preserve that were potential areas of alligator activity. Most of these locations were disconnected from the Neches River and could not be surveyed at night safely. Sites were hiked into and surveys were completed before sunset to avoid hazards. The January nest surveys were conducted six months after the substantial flooding of the river caused by Hurricane Harvey, which likely destroyed evidence of nesting or den sites from the previous summer.

Results

During our fall survey in October 2017, we recorded 65 alligator sightings with sizes varying between 2 and 8 feet in length (Figure 1). Out of the 65, we were able to determine the length of 38 individuals (Table 1). Sandy banks were the most common habitat with 39

alligators, followed by fallen vegetation (23 alligators), and a steep bank was the most common shoreline slope with 38 of the 65 being found near steep shorelines (Table 1). Water temperatures were between 19.46 °C and 27.47 °C with an average of 23.99 °C, pH had an average of 7.12 and varied between 7.95 and 6.79, total dissolved solids (TDS) fluctuated between 34ppm and 600ppm with an average of 102ppm, salinity ranged between 0.59 psu and 0.04 psu with a 0.10 psu average, and conductivity readings varied between 74 µs/cm and 1187µs/cm and averaged around 202.81µs/cm (Table 2). The high values for TDS, salinity and conductivity were outliers that were found in the two bayous below the Salt Water Barrier near the city of Beaumont and along Pine Island Bayou (Table 2). Dissolved oxygen readings for the fall survey are only available for 3 nights due to a mechanical error; of the 10 readings obtained, they varied between 45.5% and 91.2% with an average of 72.8% (Table 2).

The spring surveys were conducted in May 2018 and 63 alligators were observed, ranging in size between 1 and 5 feet along with 36 individuals of unknown length (Figure 2). During the surveys, 24 were observed among fallen vegetation, however, the favored slope type was more evenly distributed among shallow, moderate and steep slope with 22 each for shallow and steep and the remaining 16 found along moderately sloped shorelines (Table 3). Water temperatures were between 25.5 °C and 28.55 °C with an average of 27.17 °C, conductivity readings varied between 79 µs/cm and 222 µs/cm and averaged around 138.09 µs/cm (Table 4). Dissolved oxygen, pH, TDS and salinity readings for the spring survey are only available for certain nights due to a mechanical error; of the readings obtained, the dissolved oxygen varied between 71.5% and 99.4% with an average of 86.71%, the TDS fluctuated between 52 ppm and 71 ppm with an average of 64.52 ppm, pH had an average of 7.39 and

varied between 7.9 and 7.14 and salinity ranged between 0.01 psu and 0.07 psu with a 0.06 psu average (Table 4).

The summer survey was conducted in August 2018 and recorded 110 individuals (Figure 3). Recorded lengths were between 1 and 7 feet with 42 unknown lengths (Table 5). Side channels with moderate to abundant riparian vegetation contained 45 of the 110 individuals with fallen vegetation having the second most at 34 individuals (Table 5). Shallow banks accounted for 45 individuals with moderate and steep banks each comprising of 32 individuals (Table 5). Water temperatures were between 27.16 °C and 32.37 °C with an average of 30.60 °C, TDS readings fluctuated between 29 ppm and 1290 ppm with an average of 142.92 ppm, salinity ranged between 1.33 psu and 0.03 psu with a 0.14 psu average, and conductivity readings varied between 2811µs/cm and 85µs/cm and averaged 320.96µs/cm (Table 6). Dissolved oxygen and pH readings for the summer survey were obtained for all but one night; the dissolved oxygen varied between 9.4% and 93.2% with an average of 63.23% and the pH had an average of 6.24 and varied between 3.44 and 7.42 (Table 6). The lowest pH reading (3.44) was recorded near road construction on the highway 96 bridge over Pine Island Bayou (table 6). Other outliers in the TDS, pH, salinity, dissolved oxygen and conductivity readings were in the Neches River near Beaumont, 10 Mile Bayou, and Long Lake Bayou (Table 6).

During all three surveys, alligators were concentrated at the northern and southern ends of the Neches River within BTNP, leaving only a small number of sighted individuals between Spurger, TX, and north of the Salt Water Barrier (Figures 1-3). No alligators were sighted within Village Creek during the surveys and Pine Island Bayou had only a few sightings

during the spring and summer sessions (Figures 1-3). The LVNA canal only had one sighting of an alligator during the summer survey (Figure 3).

During the January nest surveys, several slides, prints and a single den site were found in backwaters and oxbow lakes near the Neches River (Figure 4 &8; Table 8). During the September nest surveys, we did not find prints or slides because of the overgrowth of herbaceous vegetation at the water's edge. We did find a nest located at the same pond where the den site was discovered in January (Figure 5 & 9; Table 9). During the August nighttime surveys, 14 hatchlings (< 1 foot in length) were discovered in Long Lake Bayou (Figure 10; Table 5). After encountering the young we returned to the location during daytime in September to locate the nest but were unsuccessful; we did find the young again in the same location.

Discussion

Alligator surveys provide valuable population and ecosystem data, which is key for ecological management and monitoring (Subalusky et al. 2009). This survey was able to establish the alligator abundance and distribution within BTNP waterways along with nesting and den locations. Currently, BTNP has no management practices for alligators. The Lower Neches River is a frequently used for recreational fishing, swimming, paddling, and other outdoor activities. (Subalusky et al. 2009).

The August 2018 survey had the highest number of alligators with 110, almost double the numbers from the October 2017 and May 2018 surveys of 65 and 63 individuals sighted, respectively (Tables 1, 3 & 5). The increased number of alligators in August 2018 may be due to

the warmer water temperatures (Tables 2, 4, & 6), which may induce increased reptile activity and mobility (Eversole et al. 2015). The addition of sited hatchlings in August also increased the survey numbers for that season. Other possible explanations for increased numbers during the summer may be due to subadults being forced out of more favorable habitats after the mating season or population stabilization after the severe flooding brought on by Hurricane Harvey (Bugbee 2018).

All three survey sessions had similar distributions, with most of the alligators congregated near Dam B Wildlife Management Area at Steinhagen Lake, north of the preserve, and below the Salt Water Barrier near the brackish marshlands of the Lower Neches Wildlife Management Area, south of the preserve (Figure 1-3). This suggests that the areas north and south of the survey may area have more favorable habitats. The lack of herbaceous vegetation and relatively small size classes of alligators found in the Neches River may indicate that that the individuals in the river are transitory. The largest alligator recorded during the surveys was 8 feet in length while the average size was approximately 3-4 feet in length (such as the alligator in Figure 11). Since most of the alligators were subadults, it is possible they are spill-over individuals that were driven out of better-suited habitat by larger adults. Larger alligators display a high site-fidelity to their home ranges (Fujisaki 2016). Subadults were likely driven out for adult home ranges with the threat of being cannibalized by the larger adults (Bugbee 2008). Alligators in the Neches River near Steinhagen Lake and the brackish marshlands of the Lower Neches Wildlife Management Area could be utilizing the River within the preserve until they reach adulthood and can defend a territory within a better-suited habitat.

Few alligators were observed towards the middle of the survey area (Figures 1-3) and perhaps are lasting residents within BTNP. Signs of alligator activity in the oxbow lakes surrounding the Neches River, including some den sites and a single nest site, indicate that those lakes are being used by alligators and at least one female has been reproducing within the northern portions of BTNP (Figure 5). The presence of hatchlings in Long Lake Bayou indicate successful reproduction in the preserve below the Salt Water barrier. Since alligator territory sizes vary according to resource availability and larger expanses of marshland habitat is found in the preserve below the Salt Water Barrier, this would suggest that the Lower Neches River within the BTNP has the capability of supporting a small, permanent population of alligators.

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Table 1. Alligator location, length, and habitat from the October 2017 survey

#	length (ft)	Location		Habitat				Shore line slope			River Section	Date
		Latitude	Longitude	open water	side swamp	fallen vegetation	sandy shoreline	shallow	moderate	steep		
1	UK > 7	30.7948	-94.1780				1			1	Neches River	10/9/2017
2	4	30.7939	-94.1734				1			1	Neches River	10/9/2017
3	8	30.7944	-94.1705				1			1	Neches River	10/9/2017
4	UK > 7	30.7949	-94.1713				1			1	Neches River	10/9/2017
5	UK > 7	30.7952	-94.1719				1			1	Neches River	10/9/2017
6	UK	30.7960	-94.1730				1			1	Neches River	10/9/2017
7	6	30.7970	-94.1747				1			1	Neches River	10/9/2017
8	UK	30.7956	-94.1718				1			1	Neches River	10/9/2017
9	UK	30.7951	-94.1712				1			1	Neches River	10/9/2017
10	2	30.7938	-94.1685				1			1	Neches River	10/9/2017
11	1	30.7925	-94.1663			1				1	Neches River	10/9/2017
12	2	30.7905	-94.1632			1				1	Neches River	10/9/2017
13	UK <5	30.7904	-94.1612			1				1	Neches River	10/9/2017
14	UK	30.7902	-94.1597			1				1	Neches River	10/9/2017
15	UK	30.7896	-94.1595		1					1	Neches River	10/9/2017
16	2	30.7908	-94.1539				1			1	Neches River	10/9/2017
17	UK	30.7903	-94.1544			1				1	Neches River	10/9/2017
18	UK	30.7904	-94.1528				1			1	Neches River	10/9/2017
19	UK <5	30.7880	-94.1472			1				1	Neches River	10/9/2017
20	4	30.7737	-94.1419			1				1	Neches River	10/9/2017
21	3	30.7706	-94.1393			1				1	Neches River	10/9/2017
22	2	30.7698	-94.1367				1	1			Neches River	10/9/2017
23	3	30.7686	-94.1353				1			1	Neches River	10/9/2017
24	UK	30.7668	-94.1340				1		1		Neches River	10/9/2017
25	3	30.7618	-94.1345				1		1		Neches River	10/9/2017

#	length (ft)	Location		Habitat				Shore line slope			River Section	Date
		Latitude	Longitude	open water	side swamp	fallen vegetation	sandy shoreline	shallow	moderate	steep		
26	UK <5	30.7512	-94.1358				1			1	Neches River	10/9/2017
27	2	30.7517	-94.1310				1			1	Neches River	10/9/2017
28	UK	30.7517	-94.1306				1			1	Neches River	10/9/2017
29	UK<5	30.7415	-94.1319				1			1	Neches River	10/9/2017
30	UK	30.7318	-94.1376			1			1		Neches River	10/9/2017
31	UK	30.7321	-94.1374			1			1		Neches River	10/9/2017
32	UK	30.7299	-94.1367				1	1			Neches River	10/9/2017
33	2	30.7277	-94.1349			1			1		Neches River	10/9/2017
34	3	30.7263	-94.1320		1		1	1			Neches River	10/9/2017
35	UK	30.7195	-94.1292				1	1			Neches River	10/9/2017
36	UK	30.4164	-94.1351			1	1		1		Neches River	10/9/2017
37	UK	30.7118	-94.1340			1	1		1		Neches River	10/9/2017
38	UK	30.6872	-94.1258		1		1		1		Neches River	10/9/2017
39	5	30.6837	-94.1213		1		1	1			Neches River	10/9/2017
40	UK	30.6845	-94.1212				1	1			Neches River	10/9/2017
41	5	30.6854	-94.0888			1				1	Neches River	10/9/2017
42	2	30.6016	-94.0785				1	1			Neches River	10/11/2017
43	5	30.6035	-94.0782				1			1	Neches River	10/11/2017
44	UK	30.6291	-94.0531				1		1		Neches River	10/11/2017
45	UK	30.6421	-94.0514				1			1	Neches River	10/11/2017
46	UK <5	30.6601	-94.0634			1	1			1	Neches River	10/11/2017
47	4	30.6601	-94.0634			1	1			1	Neches River	10/11/2017
48	UK	30.6601	-94.0634				1	1			Neches River	10/11/2017
49	UK	30.5678	-94.0885			1	1			1	Neches River	10/12/2017
50	2	30.5337	-94.0681			1				1	Neches River	10/12/2017
51	4	30.5115	-94.0825		1			1			Neches River	10/12/2017
52	3	30.5115	-94.0825				1	1			Neches River	10/12/2017

#	length (ft)	Location		Habitat				Shore line slope			River Section	Date
		Latitude	Longitude	open water	side swamp	fallen vegetation	sandy shoreline	shallow	moderate	steep		
53	4	30.4790	-94.0919			1			1		Neches River	10/12/2017
54	UK	30.4790	-94.0919				1		1		Neches River	10/12/2017
55	4	30.1139	-94.0729			1			1		Neches River	10/18/2017
56	UK	30.1209	-94.0782		1			1			Neches River	10/18/2017
57	5	30.1250	-94.0788		1				1		Neches River	10/18/2017
58	UK	30.1250	-94.0788				1		1		Neches River	10/18/2017
59	3	30.1309	-94.0864		1					1	Neches River	10/18/2017
60	3	30.1331	-94.0960			1				1	Neches River	10/18/2017
61	4	30.1389	-94.1069	1	1			1	1		Neches River	10/18/2017
62	5	30.1426	-94.0789		1			1			Lake Bayou	10/21/2017
63	UK	30.2521	-94.1086			1				1	Neches River	10/24/2017
64	4	30.3346	-94.0958			1				1	Neches River	10/24/2017
65	UK	30.1793	-94.1121		1					1	Neches River	10/24/2017

Table 2. Water chemistry taken during the October 2017 survey

Oct-17

Hydrological parameters									
Date	**River Section**	**Latitude**	**Longitude**	**TDS ppm**	**pH**	**Temperature °C**	**Salinity psu**	**DO %**	**Conductivity µs/cm**
10/9/2017	Neches River	30.79475	-94.17802	34	6.86	26.88	0.05	62.5	120
10/9/2017	Neches River	30.6799	-94.09116	35.8	7.05	27.47	0.05	74.9	124
10/11/2017	Neches River	30.65471	-94.05586	42	7.25	26.37	0.04	86.6	93
10/11/2017	Neches River	30.5756	-94.09164	70	7.28	26.95	0.06	45.5	145
10/11/2017	Neches River	30.67732	-94.09044	71	7.25	26.24	0.07	50.2	145
10/11/2017	Neches River	30.60745	-94.07222	71	7.3	26.69	0.07	91.2	146
10/12/2017	Neches River	30.53379	-94.07114	71	7.22	26.58	0.07	80.5	146
10/12/2017	Neches River	30.57556	-94.09101	71	7.33	26.61	0.07	83.6	146
10/12/2017	Neches River	30.4478	-94.10722	71	7.27	26.6	0.07	75.5	147
10/12/2017	Neches River	30.49064	-94.08079	71	7.27	26.65	0.07	77.5	147
10/13/2017	Neches River	30.41263	-94.11777	71	7.35	27.06	0.07	N/A	147
10/13/2017	Neches River	30.3596	-94.09595	71	7.39	27	0.07	N/A	148
10/13/2017	Neches River	30.44587	-94.10792	71	6.93	27	0.07	N/A	150
10/18/2017	Neches River	30.16024	-94.11496	72	N/A	21.45	0.07	N/A	142
10/18/2017	Neches River	30.21653	-94.11279	72	7.18	24.19	0.07	N/A	142
10/18/2017	Neches River	30.18836	-94.11072	72	N/A	24.22	0.07	N/A	143
10/19/2017	Neches River	30.14988	-94.11372	72	7.14	23.92	0.07	N/A	142
10/19/2017	Neches River	30.13578	-94.10297	73	7.95	24.23	0.07	N/A	143
10/19/2017	Neches River	30.104115	-94.081401	450	7.14	24.88	0.43	N/A	885
10/21/2017	Lake Bayou	30.15154	-94.09962	128	6.84	24.72	0.12	N/A	250
10/21/2017	10 Mile Bayou	30.13133	-94.05617	258	6.79	24.7	0.25	N/A	515
10/21/2017	Lake Bayou	30.13274	-94.08053	600	7.19	24.55	0.59	N/A	1187
10/23/2017	Pine Island Bayou	30.16253	-94.11601	71	N/A	22.7	0.07	N/A	136
10/23/2017	Cooks Lake	30.17198	-94.12592	71	N/A	22.59	0.07	N/A	140

Date	River Section	Latitude	Longitude	TDS ppm	pH	Temperature °C	Salinity psu	DO %	Conductivity µs/cm
10/23/2017	Pine Island Bayou	30.17903	-94.18705	123	N/A	24.3	0.12	N/A	246
10/23/2017	Pine Island Bayou	30.1785	-94.21851	225	N/A	21.3	0.22	N/A	419
10/24/2017	Neches River	30.35618	-94.09338	61	N/A	21.5	0.06	N/A	114
10/24/2017	Neches River	30.21662	-94.11308	63	N/A	22.08	0.06	N/A	118
10/24/2017	Neches River	30.28006	-94.11749	64	N/A	21.21	0.06	N/A	119
10/24/2017	Neches River	30.31569	-94.10128	63	N/A	21.62	0.06	N/A	119
10/24/2017	Neches River	30.25188	-94.10831	65	N/A	21.63	0.06	N/A	121
10/25/2017	Village Creek	30.27084	-94.18264	42	N/A	19.59	0.04	N/A	74
10/25/2017	Village Creek	30.28556	-94.19155	44	N/A	19.46	0.04	N/A	78
10/26/2017	Village Creek	30.24123	-94.12035	44	6.96	20.43	0.04	N/A	81
10/26/2017	LNVA Canal	30.21757	-94.12012	61	7.09	20.14	0.06	N/A	113
10/26/2017	LNVA Canal	30.172	-94.15443	62	7.06	20.74	0.06	N/A	115

Table 3. Alligator location, length, and habitat from the May 2018 survey

		Location		Habitat				Shore line slope				
#	**length (ft)**	**Latitude**	**Longitude**	**open water**	**side swamp**	**fallen vegetation**	**sandy shoreline**	**shallow**	**moderate**	**steep**	**River Section**	**Date**
1	2	30.1118	-94.0732			1				1	Neches River	5/10/2018
2	2	30.1132	-94.0712		1				1		10 Mile Bayou	5/10/2018
3	4	30.1187	-94.0658		1			1			10 Mile Bayou	5/10/2018
4	4	30.1137	-94.0636		1			1			10 Mile Bayou	5/10/2018
5	3	30.1159	-94.0639		1			1			10 Mile Bayou	5/10/2018
6	UK	30.1235	-94.0635		1			1			10 Mile Bayou	5/10/2018
7	2	30.1247	-94.0627		1			1			10 Mile Bayou	5/10/2018
8	UK	30.1299	-94.0573		1				1		10 Mile Bayou	5/10/2018
9	UK	30.1185	-94.0749		1			1			Neches River	5/10/2018
10	UK	30.1308	-94.0768		1			1			Lake Bayou	5/10/2018
11	UK	30.1315	-94.0771		1			1			Lake Bayou	5/10/2018
12	2	30.1308	-94.0784		1			1			Lake Bayou	5/10/2018
13	3	30.1395	-94.0798		1			1			Lake Bayou	5/10/2018
14	UK	30.1420	-94.0651		1				1		Lake Bayou	5/10/2018
15	4	30.1438	-94.0900		1				1		Lake Bayou	5/10/2018
16	UK	30.1345	-94.1064	1				1			Neches River	5/10/2018
17	1	30.1844	-94.1775			1				1	Pine Island Bayou	5/11/2018
18	3	30.1702	-94.1471	1						1	Pine Island Bayou	5/11/2018
19	4	30.1660	-94.1230	1					1		Pine Island Bayou	5/11/2018
20	5	30.4025	-94.1150				1	1			Neches River	5/16/2018
21	UK	30.5616	-94.0892		1			N/A			Neches River	5/17/2018
22	UK	30.5536	-94.0862		1				1		Neches River	5/17/2018
23	UK	30.5319	-94.0664		1				1		Neches River	5/17/2018
24	UK	30.5039	-94.0807			1		1			Neches River	5/17/2018
25	UK	30.4884	-94.0836			1				1	Neches River	5/17/2018

		Location		Habitat				Shore line slope				
#	length (ft)	Latitude	Longitude	open water	side swamp	fallen vegetation	sandy shoreline	shallow	moderate	steep	River Section	Date
26	UK	30.7966	-94.1733				1		1		Neches River	5/18/2018
27	3	30.7947	-94.1710				1			1	Neches River	5/18/2018
28	UK	30.79438898	-94.16986699				1		1		Neches River	5/18/2018
29	UK	30.7949	-94.1708				1		1		Neches River	5/18/2018
30	2	30.7943	-94.1695				1			1	Neches River	5/18/2018
31	3	30.7947	-94.1706	1							Neches River	5/18/2018
32	UK	30.7928	-94.1665			1				1	Neches River	5/18/2018
33	3	30.7923	-94.1660			1				1	Neches River	5/18/2018
34	2	30.7913	-94.1658			1		1			Neches River	5/18/2018
35	UK	30.7904	-94.1644			1			1		Neches River	5/18/2018
36	UK	30.7903	-94.1620	1				1			Neches River	5/18/2018
37	UK <5	30.7899	-94.1617			1				1	Neches River	5/18/2018
38	UK <5	30.7898	-94.1615			1				1	Neches River	5/18/2018
39	UK	30.7906	-94.1511	1				N/A			Neches River	5/18/2018
40	UK <5	30.7904	-94.1512			1				1	Neches River	5/18/2018
41	UK <5	30.7899	-94.1499				1		1		Neches River	5/18/2018
42	UK	30.7830	-94.1412			1				1	Neches River	5/18/2018
43	UK <5	30.7776	-94.1398				1			1	Neches River	5/18/2018
44	UK	30.7669	-94.1343			1	1	1			Neches River	5/18/2018
45	UK <5	30.7585	-94.1373			1				1	Neches River	5/18/2018
46	5	30.7184	-94.1294				1		1		Neches River	5/18/2018
47	UK <5	30.7048	-94.1281			1				1	Neches River	5/18/2018
48	UK <5	30.6922	-94.1245			1				1	Neches River	5/18/2018
49	UK	30.6840	-94.1259			1				1	Neches River	5/18/2018
50	2	30.6849	-94.1139			1				1	Neches River	5/18/2018
51	UK	30.5762	-94.0960			1	1		1		Neches River	5/19/2018
52	UK	30.6084	-94.0795			1				1	Neches River	5/19/2018

		Location		Habitat				Shore line slope				
#	**length (ft)**	**Latitude**	**Longitude**	**open water**	**side swamp**	**fallen vegetation**	**sandy shoreline**	**shallow**	**moderate**	**steep**	**River Section**	**Date**
53	2	30.6184	-94.0760				1		1		Neches River	5/19/2018
54	UK	30.6213	-94.0644		1			1			Neches River	5/19/2018
55	3	30.6212	-94.0644			1				1	Neches River	5/19/2018
56	3	30.6238	-94.0630				1	1			Neches River	5/19/2018
57	2	30.6247	-94.0592				1	1			Neches River	5/19/2018
58	2	30.6429	-94.0521				1	1			Neches River	5/19/2018
59	3	30.6492	-94.0535			1				1	Neches River	5/19/2018
60	UK	30.6613	-94.0640			1		1			Neches River	5/19/2018
61	3	30.6630	-94.0652				1	1			Neches River	5/19/2018
62	UK	30.6660	-94.0727			1				1	Neches River	5/19/2018
63	UK	30.6612	-94.0777				1		1		Neches River	5/19/2018

Table 4. Water chemistry taken during the May 2018 survey

May-18

Hydrological parameters									
Date	**River Section**	**Latitude**	**Longitude**	**TDS ppm**	**pH**	**Temperature °C**	**Salinity psu**	**DO %**	**Conductivity µs/cm**
5/10/2018	Neches River	30.10915	-94.07726	N/A	7.73	27.8	N/A	N/A	151
5/10/2018	10 Mile Bayou	30.1247	-94.0621	N/A	7.28	26.2	N/A	N/A	161
5/10/2018	Long Lake Bayou	30.14181	-94.07996	N/A	7.16	25.58	N/A	N/A	222
5/11/2018	Pine Island Bayou	30.18006	-94.18541	52	7.35	27.15	N/A	N/A	110
5/11/2018	Pine Island Bayou	30.16716	-94.14811	54	7.4	27.59	N/A	N/A	115
5/11/2018	Pine Island Bayou	30.16209	-94.11578	59	7.19	25.94	N/A	N/A	123
5/12/2018	Neches River	30.17189	-94.11433	N/A	7.83	27.86	N/A	99	127
5/12/2018	LNVA Canal	30.18089	-94.14846	N/A	7.48	27.65	N/A	85.08	129
5/12/2018	Neches River	30.21091	-94.10316	N/A	7.9	27.9	N/A	97.28	129
5/13/2018	Village Creek	30.26111	-94.16828	N/A	7.65	27.77	N/A	94.65	79
5/15/2018	Neches River	30.3543	-94.09018	61	N/A	28.03	0.05	85.4	128
5/15/2018	Neches River	30.21739	-94.11752	61	N/A	27.92	0.06	79.1	131
5/15/2018	Neches River	30.26313	-94.1068	64	N/A	28.18	0.06	87.6	135
5/15/2018	Neches River	30.25365	-94.1071	64	N/A	28.1	0.05	88.6	135
5/15/2018	Neches River	30.32472	-94.09944	65	N/A	28.38	0.06	83.8	136
5/15/2018	Neches River	30.29975	-94.11824	64	N/A	28.18	0.06	87.6	136
5/16/2018	Neches River	30.39774	-94.11641	65	N/A	28.38	0.03	95.7	133
5/16/2018	Neches River	30.35921	-94.0949	64	N/A	28.22	0.01	98.4	135
5/16/2018	Neches River	30.42764	-94.11797	65	N/A	28.55	0.06	99.4	138
5/17/2018	Johns Lake	30.44685	-94.11092	67	7.14	25.5	0.06	80.4	141
5/17/2018	Neches River	30.57524	-94.09203	67	7.18	25.9	0.06	79.6	142
5/17/2018	Neches River	30.53397	-94.0724	69	7.23	26	0.06	87.9	145
5/17/2018	Neches River	30.45792	-94.0995	69	7.39	27.3	0.06	97.1	146
5/17/2018	Neches River	30.49322	-94.08051	71	7.16	25.5	0.07	97.3	149

Date	River Section	Latitude	Longitude	TDS ppm	pH	Temperature °C	Salinity psu	DO %	Conductivity µs/cm
5/18/2018	Neches River	30.7941	-94.17797	67	7.77	27.8	0.06	73.9	137
5/18/2018	Neches River	30.76506	-94.13315	68	7.32	26.57	0.06	71.5	139
5/18/2018	Neches River	30.71614	-94.13586	68	7.16	25.5	0.06	83.9	143
5/18/2018	Neches River	30.68921	-94.09423	55	7.15	25.5	0.05	90	145
5/19/2018	Neches River	30.67534	-94.08968	68	7.39	27.22	0.06	80	141
5/19/2018	Neches River	30.64957	-94.05361	69	7.24	26.11	0.05	76.2	144
5/19/2018	Neches River	30.61148	-94.06918	69	7.39	27.44	0.06	79	146
5/19/2018	Neches River	30.57483	-94.08838	68	7.56	27.73	0.06	76.2	148

Table 5. Alligator location, length, and habitat from the August 2018 survey

		Location		Habitat				Shore line slope				
#	**length (ft)**	**Latitude**	**Longitude**	**open water**	**side swamp**	**fallen vegetation**	**sandy shoreline**	**shallow**	**moderate**	**steep**	**River Section**	**Date**
1	UK	30.1729	-94.1673		1				1		Pine Island Bayou	8/6/2018
2	4	30.1682	-94.1393		1				1		Pine Island Bayou	8/6/2018
3	4	30.1084	-94.0778	1				1			Neches River	8/7/2018
4	3	30.1084	-94.0768		1			1			Neches River	8/7/2018
5	1	30.1140	-94.0729		1			1			Neches River	8/7/2018
6	4	30.1135	-94.0716		1			1			10 Mile Bayou	8/7/2018
7	2	30.1128	-94.0713		1			1			10 Mile Bayou	8/7/2018
8	3	30.1111	-94.0716		1			1			10 Mile Bayou	8/7/2018
9	5	30.1137	-94.0662		1			1			10 Mile Bayou	8/7/2018
10	5	30.1187	-94.0659		1			1			10 Mile Bayou	8/7/2018
11	UK	30.1210	-94.0643		1			1			10 Mile Bayou	8/7/2018
12	7	30.1233	-94.0638	1				1			10 Mile Bayou	8/7/2018
13	7	30.1249	-94.0617		1			1			10 Mile Bayou	8/7/2018
14	4	30.1154	-94.0733		1			1			Neches River	8/7/2018
15	UK	30.1174	-94.0742		1			1			Neches River	8/7/2018
16	2	30.1174	-94.0742		1			1			Neches River	8/7/2018
17	5	30.1208	-94.0775	1				1			Neches River	8/7/2018
18	UK	30.1227	-94.0778		1			1			Neches River	8/7/2018
19	UK	30.1295	-94.0774		1			1			Lake Bayou	8/7/2018
20	4	30.1302	-94.0781		1				1		Lake Bayou	8/7/2018
21	2	30.1335	-94.0820		1				1		Lake Bayou	8/7/2018
22	UK	30.1353	-94.0840		1				1		Lake Bayou	8/7/2018
23	UK	30.1354	-94.0841		1			1			Lake Bayou	8/7/2018
24	4	30.1336	-94.0807		1				1		Lake Bayou	8/7/2018
25	UK	30.1354	-94.0841		1			1			Lake Bayou	8/7/2018

		Location		Habitat				Shore line slope				
#	length (ft)	Latitude	Longitude	open water	side swamp	fallen vegetation	sandy shoreline	shallow	moderate	steep	River Section	Date
26	3	30.1395	-94.0798		1			1			Lake Bayou	8/7/2018
27	UK	30.1447	-94.0921		1				1		Lake Bayou	8/7/2018
28	4	30.1460	-94.0929		1			1			Lake Bayou	8/7/2018
29	3	30.1437	-94.0854		1				1		Lake Bayou	8/7/2018
30	1	30.1419	-94.0721		1			1			Lake Bayou	8/7/2018
31	1	30.1419	-94.0708		1			1			Lake Bayou	8/7/2018
32	1	30.1419	-94.0696		1			1			Lake Bayou	8/7/2018
33	1	30.1420	-94.0688		1				1		Lake Bayou	8/7/2018
34	1	30.1420	-94.0683		1				1		Lake Bayou	8/7/2018
35	1	30.1420	-94.0679		1				1		Lake Bayou	8/7/2018
36	1	30.1420	-94.0677		1				1		Lake Bayou	8/7/2018
37	1	30.1420	-94.0674		1				1		Lake Bayou	8/7/2018
38	1	30.1419	-94.0665		1				1		Lake Bayou	8/7/2018
39	1	30.1420	-94.0665		1				1		Lake Bayou	8/7/2018
40	1	30.1420	-94.0665		1				1		Lake Bayou	8/7/2018
41	1	30.1420	-94.0699		1			1			Lake Bayou	8/7/2018
42	1	30.1420	-94.0699		1			1			Lake Bayou	8/7/2018
43	1	30.1355	-94.1084		1			1			Neches River	8/7/2018
44	3	30.1368	-94.1083		1			1			Neches River	8/7/2018
45	6	30.1420	-94.1001		1				1		Neches River	8/7/2018
46	UK	30.1438	-94.1011	1				1			Neches River	8/7/2018
47	UK	30.1440	-94.1018	1				1			Neches River	8/7/2018
48	UK	30.1453	-94.1037		1			1			Neches River	8/7/2018
49	3	30.1460	-94.1115		1				1		Neches River	8/7/2018
50	6	30.2024	-94.0944			1				1	Neches River	8/11/2018
51	4	30.1671	-94.1093		1			1			Neches River	8/11/2018
52	3	30.1830	-94.1470			1				1	LNVA Canal	8/13/2018

		Location		Habitat				Shore line slope				
#	length (ft)	Latitude	Longitude	open water	side swamp	fallen vegetation	sandy shoreline	shallow	moderate	steep	River Section	Date
53	UK	30.3190	-94.0992			1				1	Neches River	8/14/2018
54	2	30.7941	-94.1768	1				1			Neches River	8/17/2018
55	4	30.7942	-94.1783	1				1			Neches River	8/17/2018
56	3	30.7943	-94.1699				1		1		Neches River	8/17/2018
57	UK	30.7938	-94.1700			1			1		Neches River	8/17/2018
58	UK	30.7933	-94.1686	1							Neches River	8/17/2018
59	UK	30.7930	-94.1679	1							Neches River	8/17/2018
60	UK	30.7929	-94.1676	1							Neches River	8/17/2018
61	2	30.7926	-94.1672				1	1			Neches River	8/17/2018
62	UK	30.7925	-94.1663			1				1	Neches River	8/17/2018
63	UK	30.7901	-94.1639			1				1	Neches River	8/17/2018
64	2	30.7902	-94.1623	1							Neches River	8/17/2018
65	4	30.7896	-94.1589	1					1		Neches River	8/17/2018
66	2	30.7895	-94.1559			1				1	Neches River	8/17/2018
67	2	30.7897	-94.1497				1		1		Neches River	8/17/2018
68	4	30.7886	-94.1481	1						1	Neches River	8/17/2018
69	UK	30.7877	-94.1470			1			1		Neches River	8/17/2018
70	UK	30.7862	-94.1449				1		1		Neches River	8/17/2018
71	UK	30.7820	-94.1409	1						1	Neches River	8/17/2018
72	3	30.7812	-94.1409				1	1			Neches River	8/17/2018
73	UK	30.7810	-94.1405				1		1		Neches River	8/17/2018
74	UK	30.7745	-94.1410			1				1	Neches River	8/17/2018
75	UK	30.7719	-94.1427			1				1	Neches River	8/17/2018
76	2	30.7652	-94.1328				1	1			Neches River	8/17/2018
77	UK	30.7652	-94.1327	1				1			Neches River	8/17/2018
78	UK	30.7615	-94.1341			1				1	Neches River	8/17/2018
79	1	30.7546	-94.1396			1				1	Neches River	8/17/2018

		Location		Habitat				Shore line slope				
#	length (ft)	Latitude	Longitude	open water	side swamp	fallen vegetation	sandy shoreline	shallow	moderate	steep	River Section	Date
80	UK	30.7480	-94.1287			1				1	Neches River	8/17/2018
81	UK	30.7472	-94.1285				1			1	Neches River	8/17/2018
82	4	30.7412	-94.1324			1			1		Neches River	8/17/2018
83	2	30.7369	-94.1353			1			1		Neches River	8/17/2018
84	2	30.7297	-94.1369			1				1	Neches River	8/17/2018
85	3	30.7203	-94.1303			1				1	Neches River	8/17/2018
86	UK	30.7170	-94.1349			1				1	Neches River	8/17/2018
87	UK	30.7143	-94.1371	1						1	Neches River	8/17/2018
88	UK	30.7037	-94.1265			1				1	Neches River	8/17/2018
89	UK	30.6936	-94.1245			1			1		Neches River	8/17/2018
90	2	30.6875	-94.1247			1				1	Neches River	8/17/2018
91	UK	30.6852	-94.1194				1			1	Neches River	8/17/2018
92	UK	30.6881	-94.1087			1				1	Neches River	8/17/2018
93	2	30.6888	-94.0925			1				1	Neches River	8/17/2018
94	3	30.6882	-94.0906			1				1	Neches River	8/17/2018
95	UK	30.6877	-94.0907			1				1	Neches River	8/17/2018
96	3	30.6142	-94.0719				1	1			Neches River	8/18/2018
97	2	30.6185	-94.0748				1	1			Neches River	8/18/2018
98	2	30.6217	-94.0641				1	1			Neches River	8/18/2018
99	3	30.6351	-94.0523			1				1	Neches River	8/18/2018
100	UK	30.6362	-94.0512			1				1	Neches River	8/18/2018
101	UK	30.6375	-94.0507			1				1	Neches River	8/18/2018
102	UK	30.6452	-94.0538				1		1		Neches River	8/18/2018
103	2	30.6550	-94.0557			1				1	Neches River	8/18/2018
104	5	30.6681	-94.0745			1				1	Neches River	8/18/2018
105	4	30.6681	-94.0745			1				1	Neches River	8/18/2018
106	UK	30.6643	-94.0835				1		1		Neches River	8/18/2018

		Location		Habitat				Shore line slope				
#	**length (ft)**	**Latitude**	**Longitude**	**open water**	**side swamp**	**fallen vegetation**	**sandy shoreline**	**shallow**	**moderate**	**steep**	**River Section**	**Date**
107	3	30.5611	-94.0882			1				1	Neches River	8/20/2018
108	4	30.5366	-94.0734			1			1		Neches River	8/20/2018
109	UK	30.4944	-94.0799			1			1		Neches River	8/20/2018
110	UK	30.4601	-94.0977	1				1			Neches River	8/20/2018

Table 6. Water chemistry taken during the August 2018 survey

Date	River Section	Latitude	Longitude	TDS ppm	pH	Temperature °C	Salinity psu	DO %	Conductivity µs/cm
8/6/2018	Pine Island Bayou	30.17971	-94.18554	74	3.44	30.23	0.07	N/A	163
8/6/2018	Pine Island Bayou	30.16731	-94.14587	76	7.03	30.23	0.07	N/A	166
8/6/2018	Pine Island Bayou	30.16152	-94.11568	67	6.51	30.57	0.06	N/A	149
8/7/2018	Neches River	30.11003	-94.07727	349	4.85	30.38	0.36	34	756
8/7/2018	10 Mile Bayou	30.1259	-94.06087	167	5.5	27.16	0.16	9.4	342
8/7/2018	Long Lake Bayou	30.14212	-94.08007	1290	5.82	28.88	1.33	17.2	2811
8/7/2018	Neches River	30.13489	-94.09624	596	6.16	30.02	0.58	43.5	1533
8/11/2018	Village Creek	30.24435	-94.12137	39	6.11	29.3	0.03	84.7	85
8/11/2018	Neches River	30.19793	-94.09638	66	6.65	30.03	0.06	79	144
8/11/2018	Neches River	30.16952	-94.11211	67	6.62	29.3	0.06	88.8	146
8/13/2018	LNVA Canal	30.17229	-94.15433	66	6.37	30.72	0.06	74.4	145
8/14/2018	Neches River	30.26478	-94.10658	62	N/A	31.31	0.06	58.9	137
8/14/2018	Neches River	30.30137	-94.11604	64	N/A	31.26	0.06	77.6	143
8/14/2018	Neches River	30.33542	-94.09574	60	N/A	31.1	0.06	63.5	136
8/15/2018	Neches River	30.40458	-94.1156	57	N/A	31.37	0.05	62.3	129
8/15/2018	Neches River	30.43358	-94.11363	62	N/A	31.17	0.06	49.5	137
8/15/2018	Johns Lake	30.45009	-94.11411	52	N/A	30.6	0.05	20.5	114
8/16/2018	Neches River	30.36016	-94.09607	62	7.42	31.49	0.06	58.5	138
8/17/2018	Neches River	30.79395	-94.1767	70	6.79	32.37	0.06	85.1	160
8/17/2018	Neches River	30.76665	-94.13455	63	6.19	30.04	0.06	58.5	138
8/17/2018	Neches River	30.7168	-94.13478	62	6.33	30.84	0.05	82.7	138
8/17/2018	Neches River	30.68799	-94.09039	63	6.28	30.85	0.06	77.6	139
8/18/2018	Neches River	30.5793	-94.0938	64	6.11	31.83	0.06	64	138
8/18/2018	Neches River	30.61774	-94.07638	68	6.75	31.27	0.06	76.7	152
8/18/2018	Neches River	30.66259	-94.06832	62	6.45	30.7	0.06	73.8	135
8/20/2018	Neches River	30.52251	-94.07187	66	6.95	31.45	0.06	84.2	147
8/20/2018	Neches River	30.47667	-94.09376	65	6.77	31.68	0.06	93.2	145

Table 7. Climate and moon characteristics for each survey night

Date	Station	Air Temperature (°C)	Rainfall (in) (within past 24 hours)	Humidity (%)	Cloud Cover	Wind Velocity (mph)	Wind Direction	Moon Phase
10/9/2017	Jasper County-Bell Station, TX	84	0	81	Clear	1	S	Waning Gibbous
10/11/2017	Jasper County-Bell Station, TX	70	0	68	Clear	5	NNW	Waning Gibbous
10/12/2017	Beaumont Municipal, TX	77	0	69	Scattered Clouds	3	NNE	Waning Gibbous
10/13/2017	Beaumont Municipal, TX	80	0	75	Clear	1	E	Last Quarter
10/18/2017	Beaumont Municipal, TX	66	0	72	Clear	2	ESE	Waning Crescent
10/19/2017	Beaumont Municipal, TX	70	0	71	Clear	3	ENE	New Moon
10/21/2017	Beaumont Municipal, TX	80	0	80	Clear	6	ESE	Waxing Crescent
10/23/2017	Beaumont Municipal, TX	64	0	67	Clear	1	N	Waxing Crescent
10/24/2017	Beaumont Municipal, TX	64	0	52	Clear	1	N	Waxing Crescent
10/25/2017	Beaumont Municipal, TX	58	0	51	Clear	0	N	Waxing Crescent
10/26/2017	Beaumont Municipal, TX	66	0	63	Clear	2	SSE	Waxing Crescent
5/10/2018	Beaumont Municipal, TX	76	0.1	65	Clear	6.9	S	Waning Crescent
5/11/2018	Beaumont Municipal, TX	79	0	71	mostly clear	11.8	S	Waning Crescent
5/12/2018	Beaumont Municipal, TX	80	0	72	mostly clear	10	S	Waning Crescent
5/13/2018	Beaumont Municipal, TX	81	0	73	mostly clear	7.9	SE	Waning Crescent

Date	Station	Air Temperature (°C)	Rainfall (in) (within past 24 hours)	Humidity (%)	Cloud Cover	Wind Velocity (mph)	Wind Direction	Moon Phase
5/15/2018	Beaumont Municipal, TX	81	0.1	67	mostly clear	4.8	S	new moon
5/16/2018	Beaumont Municipal, TX	83	0	59	Clear	6.7	SW	Waxing Crescent
5/17/2018	Beaumont Municipal, TX	83	0	62	Clear	7.2	S	Waxing Crescent
5/18/2018	Jasper County-Bell Station, TX	82	0.1	75	mostly clear	8.8	S	Waxing Crescent
5/19/2018	Jasper County-Bell Station, TX	82	0.1	67	mostly clear	10.5	S	Waxing Crescent
8/6/2018	Beaumont Municipal, TX	85	Trace amount	75	mostly clear	5.8	S	Waning Crescent
8/7/2018	Beaumont Municipal, TX	82	0.06	81	mostly clear	3.8	SE	Waning Crescent
8/11/2018	Beaumont Municipal, TX	83	0.06	79	mostly clear	4.2	E	new moon
8/13/2018	Beaumont Municipal, TX	84	0	75	mostly clear	4	SW	Waxing Crescent
8/14/2016	Beaumont Municipal, TX	85	0	72	clear	4.8	SW	Waxing Crescent
8/15/2016	Beaumont Municipal, TX	86	0	73	clear	4.1	SW	Waxing Crescent
8/16/2018	Beaumont Municipal, TX	87	0	70	mostly clear	3.6	S	Waxing Crescent
8/17/2018	Jasper County-Bell Station, TX	87	0	72	mostly clear	4.6	SW	Waxing Crescent
8/18/2018	Jasper County-Bell Station, TX	88	0	74	mostly clear	6.1	S	First Quarter
8/20/2018	Beaumont Municipal, TX	85	0.12	67	mostly clear	8.4	SW	Waxing Gibbous

Table 8. Daytime nest and den survey note for January 2018

Name or type	Location	Notes	Signs of alligator	by boat	by foot
Scatterman lake/swamp	30.174272, -94.117138	Emmett Worsham, Jami Brown, and Tara Forst surveyed. The lake area had a gradual shoreline, the swamp was dominated by Cypress and Tupelo. The swamp had many channels through high, dry ground. A partially open canopy allowed for tall grasses and dumb cane patches. Three possible alligator slides were documented and one print.	3 slides, 1 print		X
Banks Bayou (within park)	30.181513, -94.110971	Emmett, Jami, and Tara surveyed the lake by boat, shallow water, no indications of alligators' present.		X	
Side-channel connected to the river	30.360563, -94.093859	Matt Pyne, Tara Forst, and Joseph Patin surveyed the outer portion of the u-shaped Bend. The bank was very steep with Upland Forest surrounding the lake and very little area for ground vegetation. We only surveyed one-third to one-half of the lake due to duck hunters being on the lake. Inner portion was surveyed by David, Jami, and Marissa Hill, the shoreline was small with a steep incline into the forest.			X
Side-channel connected to the river	30.352527, -94.084351	Matthew Pyne and Tara Forst surveyed the outer bank of the u-shaped channel. It consisted of steep banks with upland vegetation and no sign of alligators. We were only able to survey a half of the outer bank due to a long side channel that extended up past the highway. We explored the east side of the side channel, and it was a shallower bank with bald cypress dominating. No sign of alligators. Joe Patin and David Narvaiz surveyed the interior bank while Jami and Marissa surveyed a side swamp. High beaver activity area.			X
Laurel Lake, an oxbow lake	30.272468, -94.115642	Matt Pyne, Joe, and David surveyed the lake. The exterior bank of the lake consisted of steep banks with upland vegetation. The interior bank of the lake was shallower but still consisted mostly of upland vegetation with some bald cypress. No sign of alligators.			X

Name or type	Location	Notes	Signs of alligator	by boat	by foot
Unnamed pond	30.304269, -94.112322	The pond had moderate slopes on the south side while the east north and west sides had shallow slopes. The pond was surrounded by upland vegetation. No sign of alligators. There was a second pond directly to the east, but we did not notice the pond and did not investigate.			X
Big Eddy Lake	30.307793, -94.110597	Surveyed by Tara, Marissa, and Jami. Forested up to water's edge, the inner part of the lake is swamp like and very shallow.			X
Lake Travis (swimming area)	30.306260, -94.113888	Surveyed by Tara, Marisa, and Jami. Very muddy, lots of mammal and bird activity, no signs of alligator activity, half the shoreline was muddy and gradual and the other half with steep and forested.			X
Twin Lakes, a side channel the Neches River	30.339755, -94.092636	The entire group surveyed this lake via boat. The entrance to the lake had moderately had moderately sloped banks with upland vegetation leading to shallow slopes and bald cypress dominated vegetation further into the two arms of the lake. No sign of alligators, although we did not leave the boat.		X	
Lake (below Laurel Lake)	30.267023, -94.112179	Surveyed by Tara, Marisa and Jami. Very forested, very little shore line.			X
Lake (below Laurel Lake, across Neches)	30.268597, -94.110415	Surveyed by Tara, Marisa and Jami. Sandy area with a small stream out to the main river. Duck hunter activity and beaver activity. Dominated by American Sycamores			X
Oxbow lake (B shaped)	30.658363, -94.074428	Surveyed by Tara and Jami. Small, sandy shoreline and steep inclines to the forest. Lots of hurricane debris.			X
Oxbow lake, still connected by a channel to the Neches River	30.6 46072, -94.057508	The entire lake was surveyed by boat, there were no signs of alligator pull outs, nests, or holes. The outer banks of the lake had moderate slopes except in the northeast corner which consisted of shallow mudflats. The inner banks of the lake were mostly shallow mud flats. We should have walked the mudflats to see if we could find any gator footprints.		X	

Name or type	Location	Notes	Signs of alligator	by boat	by foot
Oxbow lake	30.617075, -94.068816	Matthew Pyne and Jean-Luc surveyed the lake. There was a mudflat in the northeastern portion of the outer bank. An alligator track with 12 in rear footprints was found there. Using the equation from the Wilkinson and Rice 2000 paper, we estimated the alligator length to be 11.6 ft. The remainder of the outside Bank was very steep with bald cypress right near the shore and upland vegetation on the upper portion of the bank. We did not walk the interior bank; it consisted mostly of shallow mud flats (probably should have).	1 print		X
Oxbow lake	30.592068, -94.089299	Matthew Pyne and Jean-Luc surveyed the lake. The interior bank was shallow with bald cypress trees. The outer bank consisted of moderate to steep slope with upland vegetation on the top of the bank and bald cypress right along the shore. No sign of alligators.			X
Oxbow lake (fishhook shaped)	30.628480, -94.060609	Surveyed by Tara and Jami. Mostly steep shore line with one large "beach area." Beach area had otter activity. A lot of dead trees from the hurricane. Living trees were all less than 6 inches in diameter.			X
Oxbow Lake	30.604895, -94.075677	Surveyed by Tara and Jami. Partly private. Dominant sycamore forest. Very muddy. Very little open shoreline.			X
Alligator Lake	30.285785, -94.122115	Tara, Jean-Luc and Jami surveyed lake by boat. Interior of the lake had a moderate to shallow shoreline, little to zero underbrush, and lots of leaf litter. A Large muddy bank near mouth to the river had three slides and several prints.	multiple slides, several prints	X	
Ward Lake	30.301919, -94.117066	Tara, Jean-Luc and Jami surveyed the lake by boat, not really a lake but a channel that goes into lake Travis and then back into the Neches river. Muddy, moderate shore, cypress and tupelo dominated forest and the water through the area was fast moving		X	
channel	30.2813, -94.11746	Tara, Jean-Luc, and Jami surveyed by foot, shoreline to the river was muddy and the inner section sandy with several small islands. Beaver dam present as well as otter activity.			X

Name or type	Location	Notes	Signs of alligator	by boat	by foot
Cockerham Lake	30.293171, -94.118092	Tara, Jean-Luc and Jami surveyed lake by boat; half of the shoreline was moderate while the other side was very steep. Dominated by cypress trees.		X	
Sandy Lake	30.179687, -94.114214	Tara, Jean-Luc and Jami surveyed by boat. Area very like Scatterman lake, swamp dominated with very little shore line and lots of small channels.		X	
Long Lake	30.209388, -94.097316	Tara, Jean-Luc and Jami surveyed. Hiked, high ground. Mixed old and new growth forest			X
Oxbow with River connected (Fishhook shaped)	30.203607, -94.091969	Tara, Jean-Luc and Jami surveyed by boat, flooded forest, moderate/steep banks, leaf litter, residential on one side.		X	
Cove on Neches	30.207942, -94.101903	High/steep banks, mixed forest, one offshoot in a cove. Lots of leaf litter.		X	
Banks Bayou-Oxbow near residential area	30.223851, -94.113768	Tara, Jean-Luc and Jami surveyed by boat. One side is residential, other is cypress/tupelo dominant. Wide channel, moderate slope into the forest.		X	
Spur off Neches	30.200031, -94.092332	High/steep banks, mixed forest.		X	
Gourd Vine Eddy	30.488248, -94.089801	Large, round lake. Gentle slope of the shoreline. Large open banks with forest all around the lake.	1 den		X
Cocklebur bend	30.463403, -94.099632	mostly dry lake bed, shallow pockets in thick forest. Water is very yellow/gold in appearance.			X
Black creek lake	30.458828, -94.105418	mostly dry lake bed, shallow pockets in thick forest. Water is very yellow/gold in appearance.			X
Almond hole	30.395003, -94.106631	small lake, human activity around most of it along with a house boat nearby. Gently sloping shoreline, heavily forested.			

Name or type	Location	Notes	Signs of alligator	by boat	by foot
John's lake	30.446278, -94.108338	Surveyed by boat, one side is residential, deep water with large cypress trees. Several boat-houses		X	
Bear Man's Lake	30.434929, -94.115819	Surveyed by boat, residential, deep water with large cypress trees.		X	
Big Sandy Lake	30.679651, -94.697716	Hiked around, major hiking trail located on one side of the pond. Thick forest around the lake, gentle slope, no sign of alligators.			X
Oxbow north of Evadale	30.386324, -94.107140	Forested, steep slopes, lots of mammal activity.			X
recently formed oxbow	30.369069, -94.098988	Steep sandy area with fallen trees, lots of beaver activity			
Lake Bayou	30.127598, -94.078409	Cypress and tall grass dominated, water very low, surveyed by boat. Mixture of gentle, moderate and steep slopes, no alligator activity sighted.		X	
10 Mile Bayou	30.113900, -94.072648	Cypress and tall grass dominated, water very low, surveyed by boat. Mixture of gentle, moderate and steep slopes, no alligator activity sighted.		X	

Table 9. Daytime nest and den survey notes for September 2018

Name or type	Location	Notes	Signs of alligator	by boat	by foot
Twin Lakes, a side channel the Neches River	30.339755, -94.092636	The entrance to the lake was moderately sloped with upland vegetation leading to shallow slopes and bald cypress dominated vegetation further into the two arms of the lake. No sign of alligators.		X	
Alligator Lake	30.285785, -94.122115	Surveyed by boat for part and walked into the interior section of the lake. Interior of lake had a moderate to shallow shoreline, moderate underbrush, and lots of leaf litter. Large muddy bank near mouth to the river with a hill leading to a large sandy bank. Alligator Lake is two small lakes connected by a small creek.		X	X
Unnamed pond (across from Travis)	30.304269, -94.112322	The pond had moderate slopes on the south side while the rest had shallow slopes. The pond was surrounded by upland vegetation. No sign of alligators found.			X
Lake Travis (swimming area)	30.306260, -94.113888	Very muddy, lots of mammal and bird activity, no signs of alligator activity, half the shoreline was muddy and gradual and the other half with steep and forested. Lots of hog activity.			X
Oxbow lake still connected by a channel to the Neches River	30.646072, -94.057508	There were no signs of alligator pull outs, nests, or holes. The outer banks of the lake had moderate slopes except in the northeast corner which consisted of shallow mudflats. The inner banks of the lake were mostly shallow mud flats. Hog activity was along the inner bank, removing any alligator slides that would have been there.		X	
Oxbow lake (fishhook shaped)	30.628480, -94.060609	Mostly steep shore line with one large "beach area". Beach area had otter activity. A lot of dead trees from hurricane. Overgrown during September surveys. Moderate slopes along pond, could not detect slides due to plant matter.			X
Sandy Lake	30.179687, -94.114214	Area very similar to Scatterman lake, swamp dominated with very little shore line and lots of small channels.		X	
Scatterman lake/swamp	30.174272, -94.117138	Gradual shoreline, the swamp was dominated by cypress and tupelo.		X	

Name or type	Location	Notes	Signs of alligator	by boat	by foot
Lake Bayou	30.127598, -94.078409	Cypress and tall grass dominated. Mixture of gentle, moderate and steep slopes. Young ~1 foot in length found towards the end of a logging trail. Water in the area appeared tannin stained but very clear.		X	
10-mile Bayou	30.113900, -94.072648	Cypress and tall grass dominated, water very low, mixture of gentle, moderate and steep slopes. Several under 5 feet alligators spotted.		X	
Oxbow lake	30.617075, -94.068816	Could not access the inner section. Surveyed the outer section via an ATV trail until we reached private property. Returned to the boat. The area was a mix of new and old growth upland vegetation. Lots a litter was present confirming the frequency of human activity. No signs of an alligator.			X
Gourd Vine Eddy	30.488248, -94.089801	large, round lake. Gentle slope of shoreline. Large open banks with forest all around lake. Found nest on the far side of the pond. Pictures in separate sheet.	Nest found		X

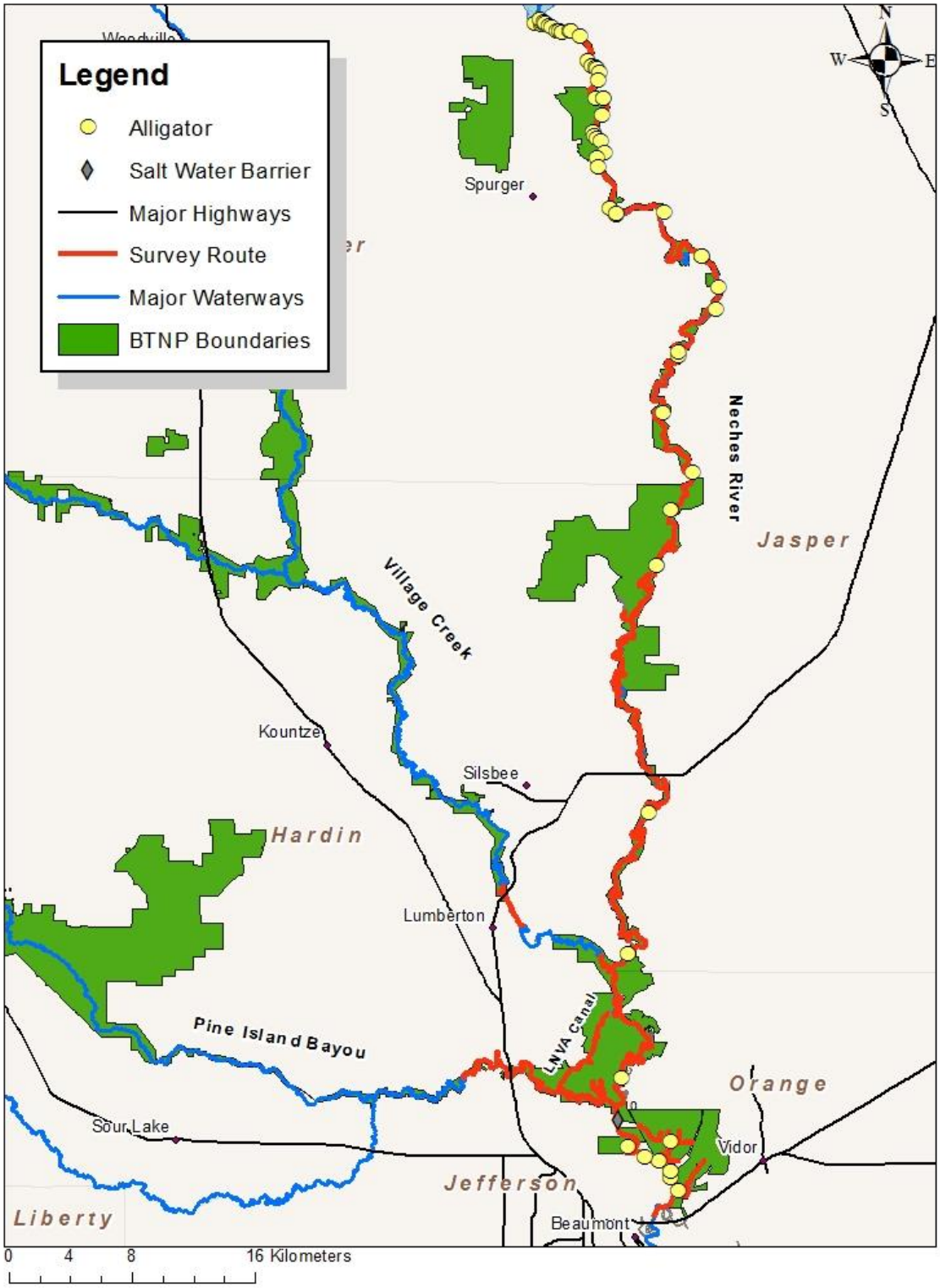

Figure 1. Distribution map of alligators in October 2017.

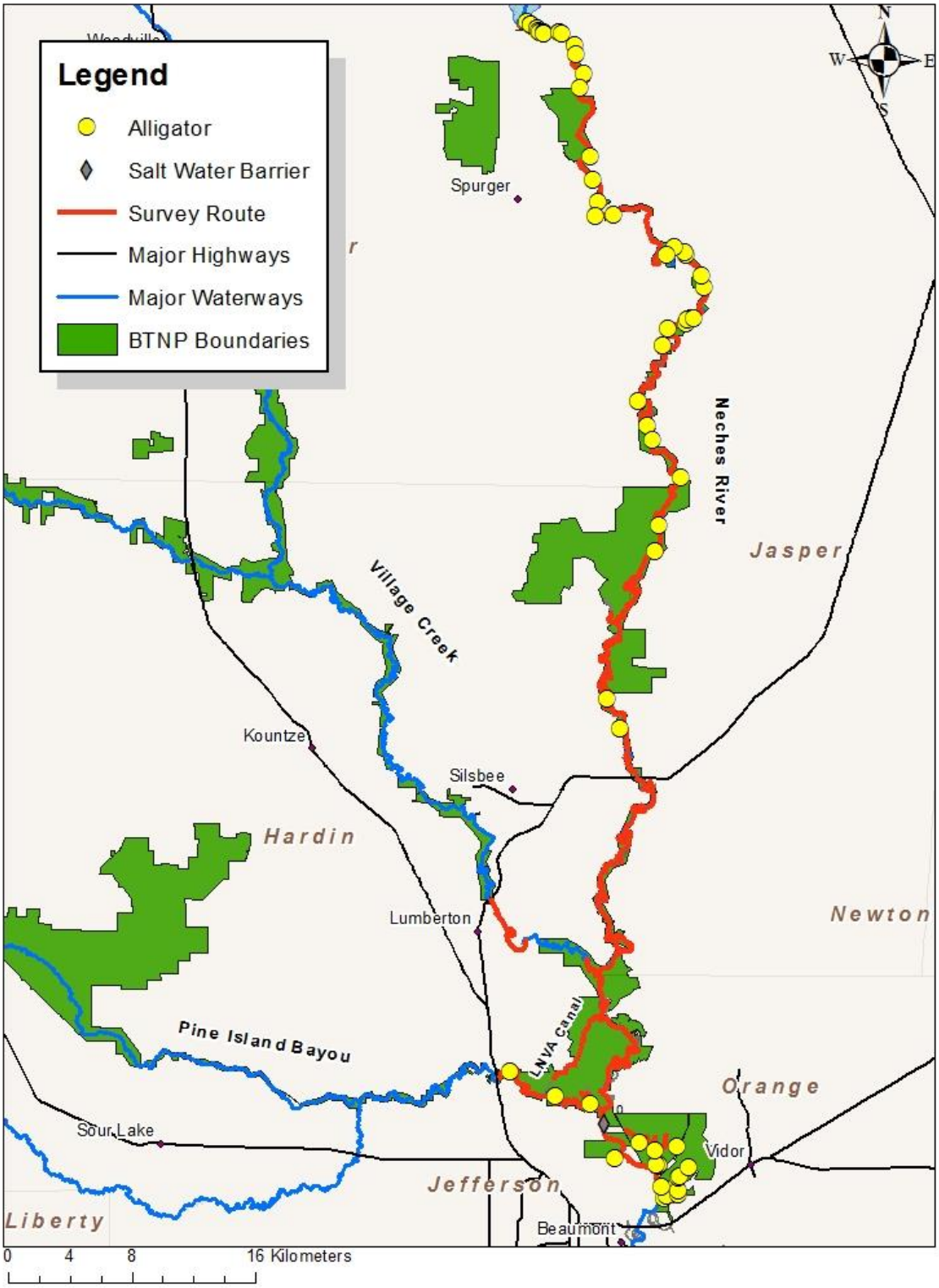

Figure 2.Distribution map of alligators in May 2018.

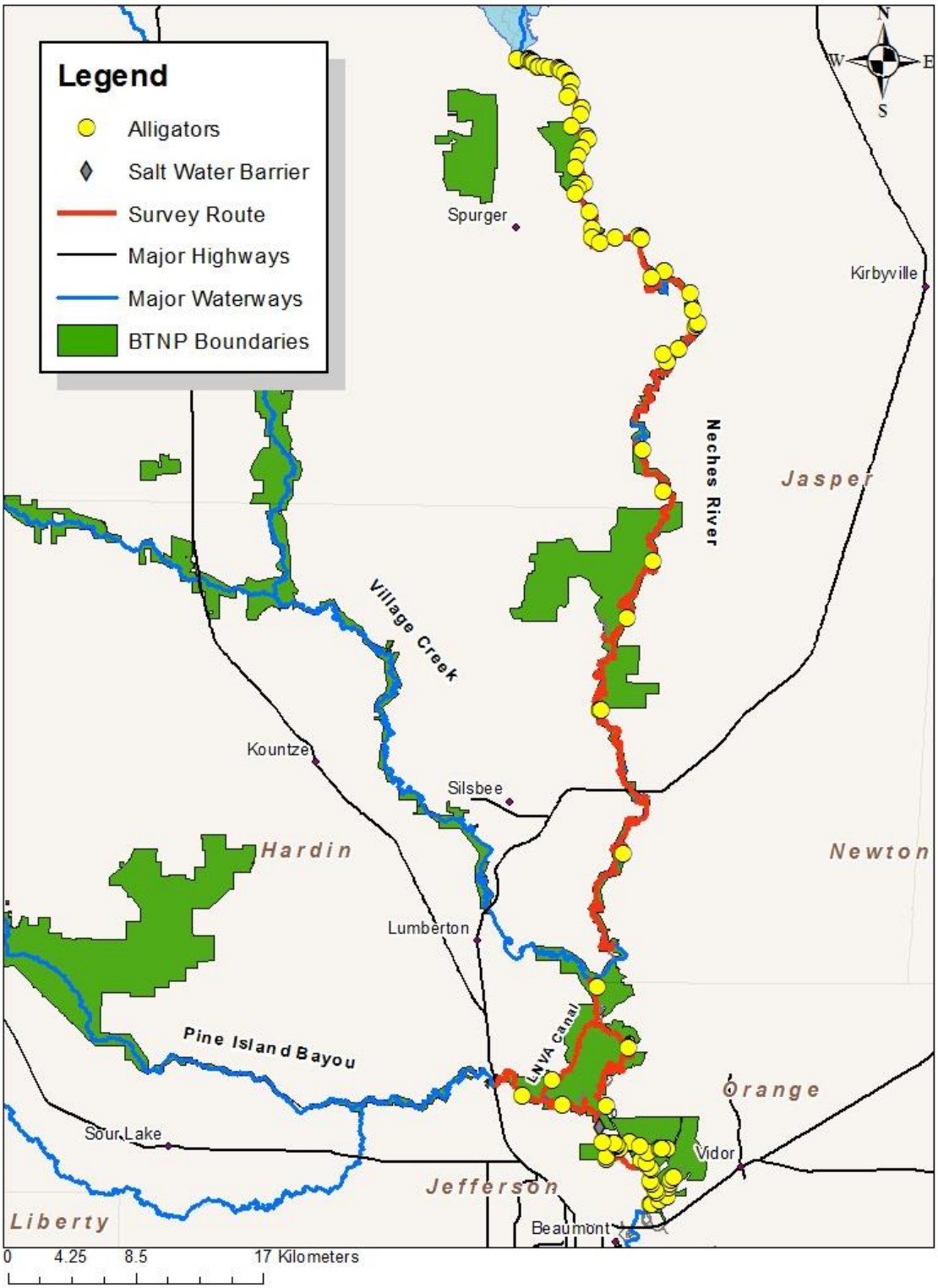

Figure 3.Distribution map of alligators in August 2018.

Figure 4. Examples of prints, slides and dens found in the January 2018 daytime surveys.

Figure 5.An alligator nest, above, and hatchling, below, found during the September 2018 day surveys

Figure 6. Slide found at Scatterman Lake in January 2018.

Figure 7. Print found at Scatterman Lake in January 2018.

Figure 8. Den site found at Gourd Vine Eddy in January 2018.

Figure 9. Nest site found at Gourd Vine Eddy in September 2018.

Figure 10. Hatchling found at Long Lake Bayou in August 2018

Figure 11. Subadult alligator swimming in the Neches River in May 2018