FINAL PERFORMANCE REPORT

FEDERAL AID GRANT NO. F-62-R-3

DISTRIBUTION AND ECOLOGY OF ALLIGATOR GAR IN OKALAHOMA

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

JULY 1, 2005 through JUNE 30, 2008

FINAL PERFORMANCE REPORT

STATE: Oklahoma **GRANT NUMBER:** F-62-R-3

GRANT PROGRAM: Sport Fish Restoration

GRANT TITLE: Distribution and Ecology of Alligator Gar in Oklahoma

GRANT PERIOD: July 1, 2005 – June 30, 2008

ABSTRACT:

Alligator gar is a fishery resource of growing importance in the southeastern United States and Mexico. Declining populations in portions of the species' range have caused many state and federal agencies to actively manage populations. In an effort to better understand the population dynamics of alligator gar in Oklahoma, populations were sampled in the Red River and Arkansas River drainages from 2006-2008. Seventy-three alligator gar were collected from the Red River drainage; none were collected from the Arkansas River System. A mail survey was distributed to 80 Oklahoma alligator gar fishermen, and 28 surveys were returned. Bowfishing was the primary method for catching gar and most fishing occurred in the Red River system. Movements and home-range of twenty individuals were examined using ultrasonic telemetry. Home ranges of six individuals ranged from 4.93 to17.13 km^2 during a nine month period. We examined the ages of 64 alligator gar from the Red River. Ages ranged 0-26 years (mean = 8.4 years) at date of capture. Age data indicated that spawning occurred in 2006 and 2007. Because of small sample sizes, data on diet, fecundity, and survival and mortality were insufficient to reliably describe these population attributes. Future management should focus on obtaining better estimates of angler exploitation and population size and structure.

OBJECTIVE:

Determine the distribution, abundance, movements, habitats and population characteristics of the alligator gar in the Red and Arkansas River drainages in Oklahoma.

PROCEDURES

Angler Survey

We administered a mail survey during the first project year to anglers who fish for alligator gar in the Red and Arkansas rivers. Survey participants were identified by their membership in fishing clubs or through personal communications. The survey was designed to provide information about habitat selection, specific collection locations, fishing pressure, and angler demographics. Habitat and collection location information was used to identify potential sampling locations within these river systems. Information about fishing effort was used to estimate annual exploitation rates for alligator gar populations in Oklahoma.

Sampling Design

We used an adaptive stratified random sampling design (Thompson 1991) to collect alligator gar in the Arkansas and Red River systems for population abundance assessments. Sampling was conducted from April 2006 to April 2007 and from October 2007 to April 2008 in the Red River system and from October 2007 to March 2008 in the Arkansas River system. Reservoirs were divided into 1.6 kilometer shoreline sections based on pool elevations of 2003 aerial photos. Only near-shore habitats were sampled based on observations of telemetry tracked alligator gar. River sample sites were also 1.6 km sections. We only sampled deep water habitats in these, based on limitations of sampling gear and visual observations of schooling gar. Red River samples were limited to the area between the river's confluence with Lake Texoma and Frog Bottom (near Sivells Bend), approximately 16.5 river kilometers west of the Interstate 35 Bridges. Arkansas River samples were limited to the area between Robert S. Kerr Lock & Dam and the Tulsa-Wagoner County line on the Arkansas River as well as the first dam on each tributary river. Prior to sampling we digitized sample sites from aerial photos using ArcGIS 9.1. Sample sites were randomly selected prior to sampling. When one or more alligator gar were collected from a sample site, we continued sampling in the area on subsequent days until the end of the sampling session or when no alligator gar were collected or sighted in the area. We used this method to increase the likelihood of recapturing tagged fish for mark-recapture abundance estimates.

Non-wadeable strata, those deeper than 1.1 meters, were sampled with a series of one to three multi-filament trammel nets (64 mm inner, bar mesh, 270 mm wall, bar mesh) measuring 61.3 m by 3.6 m each (W.G. Layher, Layher BioLogics RTEC, Inc., personal communication). In the third project year, we fished two medium (0.9 m x 3.7 m x 50.8 mm mesh) hoop nets in association with each trammel net. Trammel nets were checked periodically to minimize escape and mortality. Hoop nets were checked at the end of each sample session. We used long handled dip nets (A. A. Echelle, Oklahoma State University, personal communication), light traps, minnow traps (K. Graves, USFWS Tishomingo NFH, personal communication) and mini-fyke nets to sample young-of-year in identified spawning areas and at other wadeable, vegetated sites in Lake Texoma.

Fish Collections

All collected fish were identified to species and measured to the nearest millimeter, total length, weighed to the nearest 0.05 kilogram, and returned to the water. We measured anterior vent scale length and width (A.M. Ferrara, Nichols State University, personal communication), head width, girth, snout length and width, and anal, caudal, and dorsal fin lengths (Johnson and Noltie 1997; Love 2001; G.R. Wilde and K.L. Pope, Texas Tech University, and A.M. Ferrara, Nicholls State University, unpublished data) of all alligator gar to evaluate sexual dimorphism within the species. Large alligator gar were tagged with two individually numbered jaw tags, and small alligator gar were tagged with two individually numbered T-bar (Floy) tags for mark-recapture population estimates. Any alligator gar killed during collections were retained for age, diet, and fecundity analyses. We also sacrificed additional fish to increase sample size and minimize any bias associated with the selection of incidental mortalities. Retained specimens were euthanized by rapidly decreasing body temperature in a bath of ice water to induce shock.

Telemetry

Alligator gar collected between December 2005 and January 2007 in the Red River system were fitted with external ultrasonic telemetry transmitters (Model CHP-87-L, Sonotronics, Inc.) (Sakaris et al. 2003). Each transmitter emits a unique aural ping that is used to distinguish individual fish. We used an ultrasonic receiver (Model USR-96, Sonotronics, Inc.) equipped with a directional hydrophone (Model DH-4, Sonotronics, Inc.) to search for each tagged fish monthly, circumstances permitting. Once detected, we determined the location of individual fish by triangulation of transmitter pings. The precise location of each fish was recorded with a GPS receiver. We also deployed submersible receivers (Model SUR-1-M-D, Sonotronics, Inc.) at strategic points in the lake (Figure 1, Table 1) to document fish passage and help focus searches.

We evaluated home range of alligator gar using minimum convex polygon methods. These methods require a minimum of three detection points to estimate a fish's home range. Intuitively, precision of estimates increases with the addition of detection points. Murphy and Willis (1996) defined home range as the area over which an animal travels in its normal activities, exclusive of migrations. Using this definition, we excluded points that appeared to be associated with migration attempts. We estimated home range of tagged alligator gar using the Animal Movement Extension (Hooge & Eichenlaub 2000) for ArcView 3.2. We clipped the polygons created by this program to the boundaries of Lake Texoma (Figure 2).

Habitat variables were measured at alligator gar detection sites. We measured temperature, specific conductance, dissolved oxygen, and pH with a multi-parameter meter (Models 556 MPS and 650MDS, Yellow Springs Instruments, Inc.). Current velocity was measured, when detectable, with a flow meter (Flow Mate Model 2000, Marsh-Mc Birney, Inc.). We determined depth and substrate with a side imaging depth finder (Model 987c SI, Humminbird) or by direct measurement. We estimated percent coverage of submergent and emergent macrophytes and noted prominent species in a 10 meter by 10 meter quadrant centered over fish locations. Physicochemical variables were measured near the surface and bottom of the water column or maximum length of the probe cable (3.93 m).

Fecundity

We estimated fecundity and calculate a gonadosomatic index (GSI) of euthanized and incidentally killed alligator gar.

Diet

Diets of alligator gar were determined from sacrificed and donated individuals.

Age and Growth

We used scale sections and otoliths to age collected and donated alligator gar. A thin, transverse slice was cut through the scale origin for examination (J. Boxrucker, Oklahoma Department of

Wildlife Conservation, personal communication). Any alligator gar incidentally killed or euthanized were also aged using whole otoliths for comparative analyses.

We cleaned, processed, and examined structures using structure appropriate procedures (Secor et al. 1992; DeVries and Frie 1996, J. Boxrucker ODWC, personal communication). Two to four readers with varying experience examined all scale sections independently and without knowledge of fish length, age, sex, or weight (DeVries and Frie 1996). A concert read was scheduled to resolve any discrepancies among readers. Precision of age determinations was evaluated based on the sampling standard error among readers (Sharp and Bernard 1988). Accuracy of scale section ages was assessed in comparison with otolith ages as determined by an experienced gar otolith reader.

Survival and Mortality

We estimated survival (S) and total mortality (Z) rates based on weighted catch curve regressions for alligator gar populations in the Red River. Mortality was determined from the slope of the regression of the natural log of number captured at age versus age (Van Den Avyle and Hayward 1999). Survival was calculated as $S = e^{-Z}$.

RESULTS

Angler Survey

We distributed surveys to 80 anglers in January 2006. Twenty-eight surveys were returned resulting in a 35% return rate. Two participants indicated that they had never fished for alligator gar, and a third had never fished for them in the state of Oklahoma. Ninety-six percent (N = 23) of those who fish for alligator gar in Oklahoma identified recreation as one of their purposes. Nine (38%) of these individuals also indicated that consumption was part of their purpose. Three survey participants (13%) were also involved in some form of alligator gar research. One of these identified research as their only purpose for pursuing the species and was omitted from exploitation estimates.

Not surprisingly, bow fishing was the primary method identified for catching alligator gar in Oklahoma (88%, N = 22). Most of the surveys we distributed were sent to members of two bow fishing groups. Fifty-six percent (N = 14) of surveyed anglers use this gear type exclusively. Thirty-three percent (N = 8) also spent part of their time snagging. Thirteen percent (N = 3) used baited hook and line, and 4% (N = 1) used jug lines at least part of the time.

Survey participants indicated that they made an average of 4.6 (0- 25) alligator gar fishing trips in 2005, fishing with 1-10 other anglers (mean = 2.76). Length of fishing trips ranged 3-48 hours (mean = 13.09). Surveyed anglers collected an average of 7.2 (0-60) alligator gar in 2005. Ten (42%) participants indicated that they did not catch any during this time period, while two participants indicated that they caught more than 50 fish. We were unsure of some angler's ability to identify the species consistently and suspect that some reported alligator gar are in fact longnose gar. The two largest alligator gar that anglers reported catching in Oklahoma were 7 ft. 4 in., 189 lbs (223.5 cm, 85.73 kg) and 7 ft. 9 in., 180 lbs (236.2 cm, 81.65 kg).

Surveyed anglers primarily fished the Red River drainage. Waters fished included the Red River (67%, N = 16), Lake Texoma (58%, N = 14), Kiamichi River (17%, N =4), and Muddy Boggy River (4%, N = 1). Four anglers (17%) fished a portion of the year in the Arkansas River drainage.

Using the mean hours fished, mean trips per year, and mean alligator gar caught, it took anglers 8.3 hours to catch one alligator gar. We made two assumptions in calculating an exploitation rate. First, we assumed that all bow fishermen harvested their fish and all hook-and-line anglers released their fish. Second, we assumed that effort and number caught was evenly split between bow fishing and hook-and-line fishing for those who indicated that they used both methods. Under these assumptions, 135.5 alligator gar were harvested by 21 bow fishermen in 857 hours of effort. This resulted in an exploitation rate of 0.16 fish per angler hour.

Fish Collections

Forty-three alligator gar were collected from the Red River System during 535 trammel/gill-net hours (Tables 2 & 3). None were collected during 78 trammel-net hours in the Arkansas River System. No tagged alligator gar were recaptured. Catch rates were highest using mini-fyke nets to collect young juveniles (CPUE = 0.55 gar/trap-night, Table 4). Twenty-three juvenile alligator gar were collected in 42 trap nights. Trammel nets were slightly more effective than the gill nets for collecting alligator gar (CPUE = 0.09 and 0.07, respectively). Hoop nets were ineffective in both the Arkansas and Red river systems. Dip nets, minnow traps, and light traps were also ineffective, but these methods may still be useful for collecting young-of-year the first two to four weeks following a spawn at shallow vegetated sites.

Oklahoma Department of Wildlife Conservation personnel documented an alligator gar spawn on film in Lake Texoma, 11 March 2007. We spent 42 trap nights (Table 3) at the documented site and other potential spawning sites. Twenty-three alligator gar, ages 0-2 years old (Table 3), were collected in October 2007 and April 2008, indicating successful spawns in 2006 and 2007.

We were not able to verify the sex of a sufficient sample to effectively evaluate sexual dimorphism of alligator gar (Tables 2 & 4).

Telemetry

We attached ultrasonic telemetry tags to ten alligator gar in the first project year. In September 2007 we tagged five hatchery brood-stock scheduled to be repatriated into the Red River System from Tishomingo National Fish Hatchery in Reagan, Oklahoma. Five wild alligator gar were tagged between November 2006 and January 2007 (Table 5).

A total of seven fish either died or expelled their transmitters shortly after release. Three additional fish were never redetected after release. Manual search sessions resulted in 44 locations of the remaining 10 alligator gar (Table 5). Six fish were detected more than the minimum detections (3) required for estimating home range (Range 5-9). No alligator gar were detected after the record flooding of July 2007. Home-ranges for the nine-month detection

period ranged 4.93-17.13 km^2 (Table 5). The submersible receivers logged 120 detections of 9 alligator gar in Lake Texoma (Table 1).

Fecundity

We examined nine euthanized alligator gar collected 15 December 2006 - 07 March 2008 and 2 juveniles donated from Lake Texoma bow fishing tournaments, 21 April 2007 and 17 May 2008. Eight fish were males and three were females (Table 4). The ovary of a female collected on 15 December 2006 did not have any developing eggs and had a GSI of 0.0040 at death. A female collected 24 February 2007 was filled with an estimated 655,677 developing eggs and had a GSI of 0.2580. The third female was a young juvenile. Male GSIs ranged 0.0004-0.0448 (Table 4).

Diet

The stomachs of nine out of eleven dissected alligator gar were devoid of food contents and contained various parasitic worms (Table 4). One fish's stomach was completely empty, (contained no parasitic worms) and the other contained 2 inland silversides. The one fish with food contents was collected in a mini-fyke net and likely consumed these fish inside the net. It is has been observed that gar tend to regurgitate when stressed, which may be the source of the empty stomachs. The lack of food could also suggest that alligator gar feeding is reduced during the cool water periods in which most of the fish were collected (>12 °C, approximately December to April) (Table 4).

Age and Growth

We obtained scales from 64 alligator gar and sagittal otoliths and scales from 15 fish between 15 December 2006 and 30 April 2008. Otoliths and/or scales from 14 of these fish were obtained from Oklahoma fishermen. Ages ranged 0-26 years at date of collection.

Otolith ages were highly correlated with scale ages ($R^2 = 0.94$) for the 15 alligator gar we were able to obtain both structures (Figure 4). Ages determinations for these fish ranged 0-25 years. However, scale ages were not very accurate or precise. Ideally we would see a 1:1 ratio of age determinations between structures originating from the same individual. Scale ages were typically higher than otolith ages (Figure 4). Standard error among scale readers ranged 0-16.1 years, indicating that age determinations varied significantly among readers. With further research, scales may yet prove to be a viable, non-lethal method for evaluating age structure of alligator gar populations. Future research will need to verify that presumed annuli are in fact annual marks.

Survival and Mortality

Based on weighted catch curve regressions (Figure 3) estimated instantaneous total mortality for the Red River alligator gar population was 0.0409. Using this mortality rate we calculated probability of annual survival to be 1.04. Obviously, our estimates are flawed. One likely source of error is that our age sample does not accurately represent the population. Twenty-one alligator gar were not aged for this analysis due to collection of inadequate structures early in the

project. Additionally, several age classes were absent from our sample, and others were represented by a single individual (Table 2). Typically, survival and mortality estimates are derived from much larger data sets. Our estimates are also based on scale ages which have not been verified for accuracy.

RECOMMENDATIONS:

1. Resurvey alligator gar anglers in Oklahoma to evaluate exploitation rates. The survey should include a larger sample and an incentive to increase survey return rate. The survey also should include diagrams illustrating the key characteristics of alligator gar that distinguish alligator gar them from other gar to improve reporting accuracy.

2. Establish annual alligator gar population monitoring. The monitoring protocol should include sampling deep pool habitats in the Red River systems with floating, heavy twine, multi-filament trammel or gill nets, on the coldest days between December-March to evaluate trends in adult and large juvenile cohorts. Shallow vegetated sites in Lake Texoma and along tributaries of the Red River should be sampled with trap nets June-September to evaluate annual spawning success. Deep pools (> 30 ft.) of tributary streams to the Arkansas and Canadian rivers should be intensively sampled during winter months to evaluate the status of alligator gar populations in this system.

3. Collaborate with Texas Parks and Wildlife Department to establish lake-wide management of the alligator gar population in the Red River system. Large areas of potential spawning habitat lie on the Texas side of the reservoir; therefore, management efforts need to be coordinated between Oklahoma and Texas.

SIGNIFICANT DEVIATIONS:

None.

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Tabel 1. Submersible ultrasonic receiver deployment periods and detections of alligator gar in the Red River System, OK-TX, 2006-2008.

Location ID	Date Deployed	Date Retrieved	Latitude	Longitude	Fish Detections
SUR1	13-Jun-2006	29-Apr-2007	33.95565	-96.92780	0
SUR2	25-Jul-2006	4-Nov-2006	33.89550	-96.98358	0
SUR3	16-May-2006	26-May-2008	33.88072	-96.88455	101
SUR4	23-Sep-2006	29-Oct-2006	33.99565	-96.61840	7
SUR5	18-Nov-2006	4-Jan-2007	33.96465	-96.58199	11
SUR6	14-Aug-2007	20-Apr-2008	33.95250	-96.58765	0
SUR7	15-Aug-2007	19-Mar-2008	33.82364	-96.80541	1
SUR8	15-Oct-2007	20-Apr-2008	33.91049	-96.65442	0

Table 2. Vital statistics of alligator gar collected from the Red River System, OK-TX, 2006-2008. (Y = Yes, N = No, UD = Undetermined, M = Male, F = Female, * = Tishomingo National Fish Hatchery brood stock). Fish with alpha-numeric IDs were donated by anglers.

ID	Transmitter Attached	Collection Date	Sex	Total Length (mm)	Weight (kg)	Girth (mm)	Age			
							Scale	SE	L Otolith	R Otolith
201	N	16-Dec-05	UD	1025	5.5	373	—	—	—	—
212	N	16-Dec-05	UD	1980	47.5	806	—	—	—	—
295	Y	24-Mar-06	UD	1080	6	390	—	—	—	—
298	Y	24-Mar-06	UD	1184	9.1	467	—	—	—	—
350	Y	24-Mar-06	UD	1362	16.9	583	—	—	—	—
391	Y	24-Mar-06	UD	1426	16.2	558	—	—	—	—
204	Y	25-Mar-06	UD	1175	10	459	—	—	—	—
284	Y	25-Mar-06	UD	1074	7.5	418	—	—	—	—
306	Y	25-Mar-06	UD	1444	16.7	527	—	—	—	—
395	Y	25-Mar-06	UD	1362	13.7	519	—	—	—	—
233	Y	8-Apr-06	UD	1348	14.6	521	—	—	—	—
337	Y	8-Apr-06	UD	1495	16.9	550	—	—	—	—
223*	Y	20-Sep-06	M?	1154	8.35	405	—	—	—	—
265*	Y	20-Sep-06	M?	1249	9.75	456	—	—	—	—
363*	Y	20-Sep-06	M?	1302	12.1	467	—	—	—	—
382*	Y	20-Sep-06	M?	1312	13.5	493	—	—	—	—
397*	Y	20-Sep-06	M?	1595	23.8	586	—	—	—	—
254	Y	11-Nov-06	UD	1083	7.0	406	—	—	—	—
101	N	15-Dec-06	UD	1052	8.55	410	6.9	2.8	—	—
198	N	15-Dec-06	UD	996	6.35	382	8.1	1.7	—	—
300	N	15-Dec-06	F	1155	8.55	423	7.6	1.8	6	6
301	N	15-Dec-06	M	1486	21.75	583	8.0	2.2	7	7
302	N	15-Dec-06	UD	1577	25.7	635	9.1	2.8	—	—
304	N	15-Dec-06	UD	1262	25.35	629	10.4	5.8	—	—
308	N	15-Dec-06	UD	1497	20.5	594	8.5	4.8	—	—
312	N	15-Dec-06	M	1564	25.85	645	8.4	3.6	6	10
314	N	15-Dec-06	UD	1915	47.9	804	14.3	7.0	—	—
317	N	15-Dec-06	M	1460	20.15	614	8.4	4.8	8	8
318	N	15-Dec-06	M	1227	11.85	484	6.1	5.3	5	5
320	N	15-Dec-06	UD	2036	52.9	845	12.5	4.8	—	—

Table 2. Continued.

ID	Transmitter Attached	Collection Date	Sex	Total Length (mm)	Weight (kg)	Girth (mm)	Age			
							Scale	SE	L Otolith	R Otolith
321	N	15-Dec-06	M	1591	27.35	667	8.6	3.1	8	9
343	N	15-Dec-06	UD	1397	16.8	554	—	—	—	—
351	Y	15-Dec-06	UD	1970	46.05	806	—	—	—	—
—	Y	15-Dec-06	UD	2201	72.2	934	—	—	—	—
348	Y	6-Jan-07	UD	1469	9.05	579	7.3	4.4	—	—
354	N	6-Jan-07	UD	1564	10.65	637	11.1	4.8	—	—
356	Y	6-Jan-07	UD	1876	21.36	794	17.6	7.6	—	—
388	N	6-Jan-07	UD	1588	11.35	642	12.8	7.0	—	—
386	N	3-Feb-07	UD	1402	8.1	565	6.0	3.9	—	—
137	N	24-Feb-07	M	1428	9.4	521	7.4	2.9	6	6
185	N	24-Feb-07	UD	1158	4.15	425	5.8	3.7	—	—
325	N	24-Feb-07	UD	1881	23.55	775	19.0	10.2	—	—
328	N	24-Feb-07	F	2215	35.6	834	17.6	8.0	18	18
1325	N	17-Oct-07	UD	587	—	201	1.0	1.4	—	—
1327	N	17-Oct-07	UD	607	—	202	0.5	0.7	—	—
1329	N	17-Oct-07	UD	441	—	169	0.0	0.0	—	—
1331	N	17-Oct-07	UD	680	—	243	1.0	0.0	—	—
1333	N	17-Oct-07	UD	453	—	144	0.5	0.7	—	—
1335	N	17-Oct-07	UD	459	—	159	0.5	0.7	—	—
1338	N	17-Oct-07	UD	384	—	128	0.0	0.0	—	—
1321	N	18-Oct-07	UD	361	0.2	126	0.5	0.7	—	—
1342	N	18-Oct-07	UD	515	0.75	200	0.0	0.0	—	—
1345	N	18-Oct-07	UD	444	0.4	155	0.5	0.7	—	—
1347	N	18-Oct-07	UD	655	1.65	247	1.0	0.0	—	—
1320	N	19-Oct-07	M	378	0.2	118	0.0	0.0	0	0
310	N	2-Dec-07	UD	1756	34.2	709	18.5	0.7	—	—
316	N	4-Mar-08	UD	1819	40.95	764	20.0	8.5	—	—
323	N	4-Mar-08	UD	1473	20.6	588	11.0	4.2	—	—
329	N	5-Mar-08	UD	1757	32.15	684	13.0	1.4	—	—
360	N	6-Mar-08	UD	1786	40.15	755	15.5	3.5	—	—
384	N	6-Mar-08	UD	1997	47.65	804	26.5	3.5	—	—
288	N	7-Mar-08	M	1929	45.45	784	19.0	2.8	16	17
2125	N	27-May-08	UD	479	0.45	154	0.0	0.0	—	—
2127	N	27-May-08	UD	410	0.17	123	0.5	0.7	—	—
2129	N	27-May-08	UD	451	0.23	149	0.5	0.7	—	—
2131	N	27-May-08	UD	531	0.6	156	1.0	0.0	—	—
2133	N	27-May-08	UD	668	1.19	208	1.0	0.0	—	—
2135	N	27-May-08	UD	524	0.6	151	1.0	0.0	—	—
2137	N	27-May-08	UD	358	—	93	0.5	0.7	—	—
2139	N	28-May-08	UD	382	0.2	109	0.0	0.0	—	—
2144	N	28-May-08	UD	412	0.2	118	1.0	1.4	—	—
2146	N	28-May-08	UD	481	0.35	134	0.0	0.0	—	—
2148	N	28-May-08	UD	677	1.25	216	0.5	0.7	—	—

Table 2. Concluded.

ID	Transmitter Attached	Collection Date	Sex	Total Length (mm)	Weight (kg)	Girth (mm)	Age			
							Scale	SE	L Otolith	R Otolith
'07 OFS 1	N	21-Apr-07	M	577	0.77	186	—	—	0	0
'07 OFS 2	N	21-Apr-07	UD	—	—	—	15.0	2.2	—	—
'07 OFS 3	N	21-Apr-07	UD	—	65.32	—	18.3	4.9	—	—
'08 OFS 1	N	17-May-08	F	527	0.59	126	1.0	0.0	0	0
Chatham	N	19-Feb-06	F	2235	83.46	—	25.0	16.1	18	—
Lebanon	N	24-Mar-06	UD	—	—	—	—	—	—	5
Starry 1	N	—	F	643	—	240	3.5	1.5	—	1
Starry 2	N	—	M	780	—	211	4.4	0.9	3	3
Starry 3	N	19-May-06	M	2057	41.73	—	14.8	5.1	—	—
Starry 4	N	19-May-06	M	2032	39.92	—	21.9	9.0	—	—
Turney	N	17-Feb-07	F	2210	74.84	—	21.9	11.1	17	15
Keeton 1	N	18-Jun-07	UD	—	—	—	20.3	6.6	—	—
Keeton 2	N	18-Jun-07	UD	—	—	—	17.6	5.0	—	—
Keeton 3	N	18-Jun-07	UD	—	—	—	16.6	5.1	—	—

Table 3. Alligator gar catch rates in Oklahoma water bodies by sampling method, 2006-2008.

Project year	Method	Trap Nights	Effort (hh:mm)	Water Body	Number of Fish Collected	CPUE
			Red River System			
PY1	Snagging		67:27	River	2	0.03
PY1	Gill Net		7:53	Lake Texoma	0	0.00
PY1	Gill Net		143:21	River	10	0.07
PY2	Trammel Net		115:16	Lake Texoma	20	0.17
PY3	Trammel Net		41:50	Lake Texoma	1	0.02
PY2	Trammel Net		168:00	River	6	0.04
PY3	Trammel Net		58:51	River	6	0.10
PY3	Hoop Net		45:14	Lake Texoma	0	0.00
PY3	Hoop Net		164:10	River	0	0.00
PY2	Dip Net		6:00	Lake Texoma	0	0.00
PY2	Minnow Traps	12		Lake Texoma	0	0.00
PY2	Light Traps	15		Lake Texoma	0	0.00
PY3	Mini-Fyke Nets	42		Lake Texoma	23	0.55
			Arkansas River System			
PY3	Trammel Nets		44:40	River	0	0.00
PY3	Trammel Nets		18:15	Webber's Falls	0	0.00
PY3	Trammel Nets		15:04	Kerr Reservoir	0	0.00
PY3	Hoop Nets		147:05	River	0	0.00
PY3	Hoop Nets		50:12	Webber's Falls	0	0.00
PY3	Hoop Nets		140:44	Kerr Reservoir	0	0.00

Table 4. Vital statistics of dissected alligator gar collected from the Red River System, OK-TX, 2006-2008.

ID	Collection Date	Dissection Date	Sex	Total Length (mm)	Girth (mm)	Live Weight (g)	Gonad Weight (g)	GSI	Stomach Contents
300	15-Dec-06	21-Dec-06	Female	1155	423	8550	34.62	0.0040	Parasitic Worms
321	15-Dec-06	05-Feb-07	Male	1591	667	27350	418.86	0.0153	Parasitic Worms
318	15-Dec-06	05-Feb-07	Male	1227	484	11850	4.99	0.0004	Parasitic Worms
317	15-Dec-06	05-Feb-07	Male	1460	614	20150	373.34	0.0185	Parasitic Worms
301	15-Dec-06	15-Feb-07	Male	1486	583	21750	387.93	0.0178	Parasitic Worms
328	24-Feb-07	24-Feb-07	Female	2215	834	35600	4928.54	0.2580	Parasitic Worms
137	24-Feb-07	24-Feb-07	Male	1428	521	9400	197.82	0.0448	Parasitic Worms
07-OFS	21-Apr-07	12-Jul-07	Male	577	186	766	0.41	0.0005	Parasitic Worms
1320	19-Oct-08	15-Feb-08	Male	378	118	200	0.00	0.0000	2 Inland Silversides
288	07-Mar-08	07-Mar-08	Male	1929	784	3920	165.00	0.0421	Parasitic Worms
08-OFS	17-May-08	17-May-08	Female	527	165	589	0.00	0.0000	Empty

Table 5. Telemetry statistics of 20 alligator gar tagged in the Red River System, OK-TX, 2006-2008.

ID	Tag Date	Last Detection	Manual Detections	Total Length (mm)	Weight (kg)	Max Distance B/T Detections (km)	Home Range (km^2)	Notes
74-0892	24-Mar-2006	29-Apr-2007	2	1080	6.00	—	—	Mortality/Expulsion
76-0910	24-Mar-2006	12-May-2007	1	1184	9.05	—	—	Mortality/Expulsion
78-0985	24-Mar-2006	12-May-2007	1	1362	16.90	—	—	Mortality/Expulsion
79-1011	24-Mar-2006	—	0	1426	16.15	—	—	Never Detected
76-0922	25-Mar-2006	12-May-2006	1	1175	10.00	—	—	Mortality/Expulsion
77-0963	25-Mar-2006	25-May-2006	1	1074	7.50	5.77	—	Detected Once
79-0997	25-Mar-2006	28-Oct-2006	1	1362	13.65	—	—	Mortality/Expulsion
83-0998	25-Mar-2006	—	0	1444	16.65	—	—	Never Detected
77-0937	8-Apr-2006	25-May-2006	1	1348	14.55	7.96	—	Detected Once
82-1035	8-Apr-2006	25-May-2006	1	1495	16.90	—	—	Mortality/Expulsion
69-1250	20-Sep-2006	04-Mar-2007	5	1302	12.10	11.10	9.19	TNFH Brood Stock
72-1220	20-Sep-2006	27-Apr-2007	5	1595	23.80	5.88	4.93	TNFH Brood Stock
74-1200	20-Sep-2006	27-Apr-2007	6	1312	13.50	11.48	11.17	TNFH Brood Stock
75-1190	20-Sep-2006	01-Jun-2007	8	1249	9.75	12.39	14.37	TNFH Brood Stock
76-1180	20-Sep-2006	09-May-2007	9	1154	8.35	10.09	17.13	TNFH Brood Stock
73-1210	11-Nov-2006	—	0	1083	7.00	—	—	Never Detected
70-1240	15-Dec-2006	20-Jun-2007	6	1970	46.05	49.36	13.44	Wild Fish
71-1230	15-Dec-2006	04-Jan-2007	1	2201	72.20	—	—	Mortality/Expulsion
69-0870	6-Jan-2007	17-May-2007	2	1469	9.05	46.76	—	Too few Detections
70-0860	6-Jan-2007	04-Mar-2007	1	1876	21.36	1.14	—	Detected Once

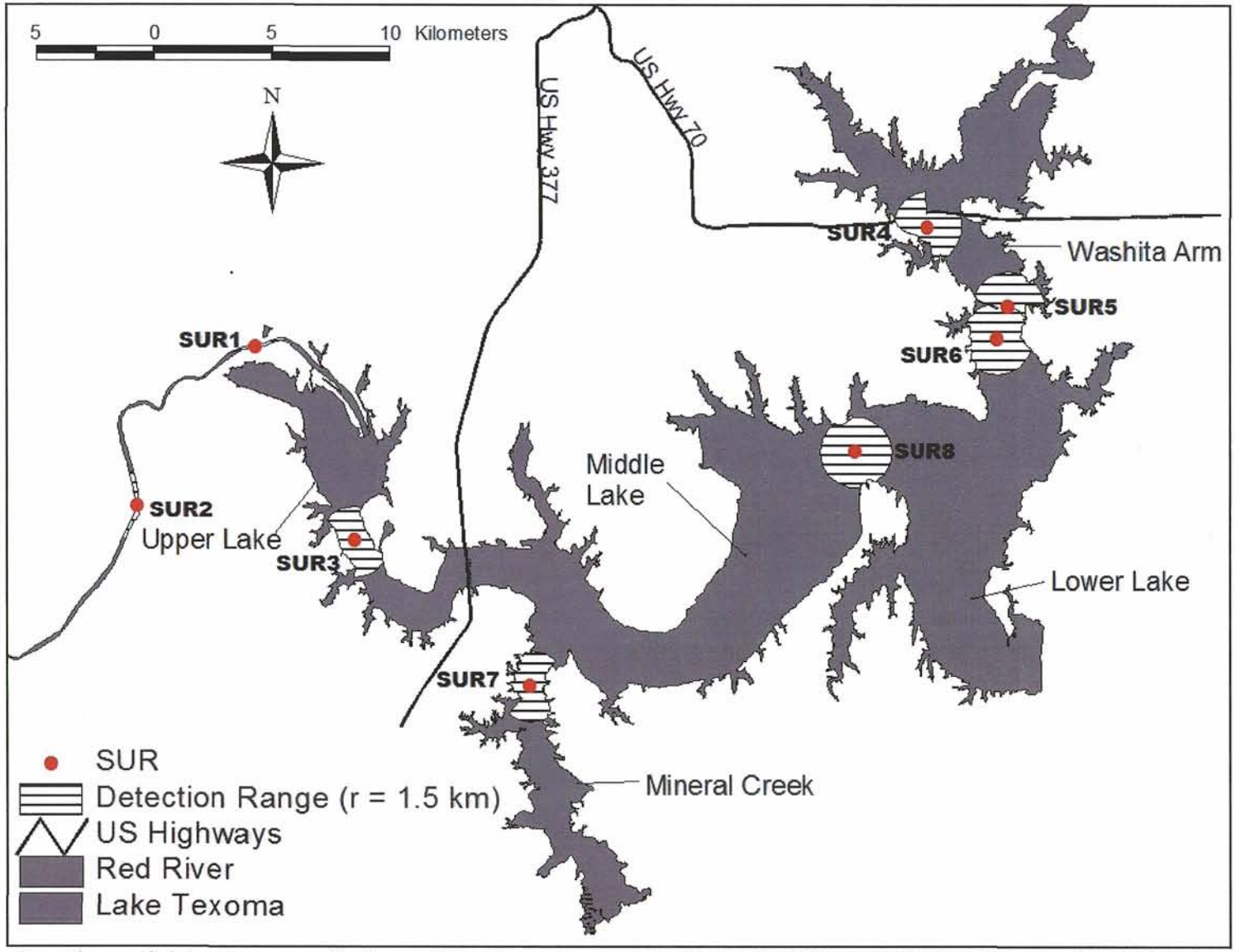

Figure 1. Location and detection area of submersible ultrasonic receivers in the Red River and Lake Texoma, OK-TX during alligator gar survey, 2006-2008.

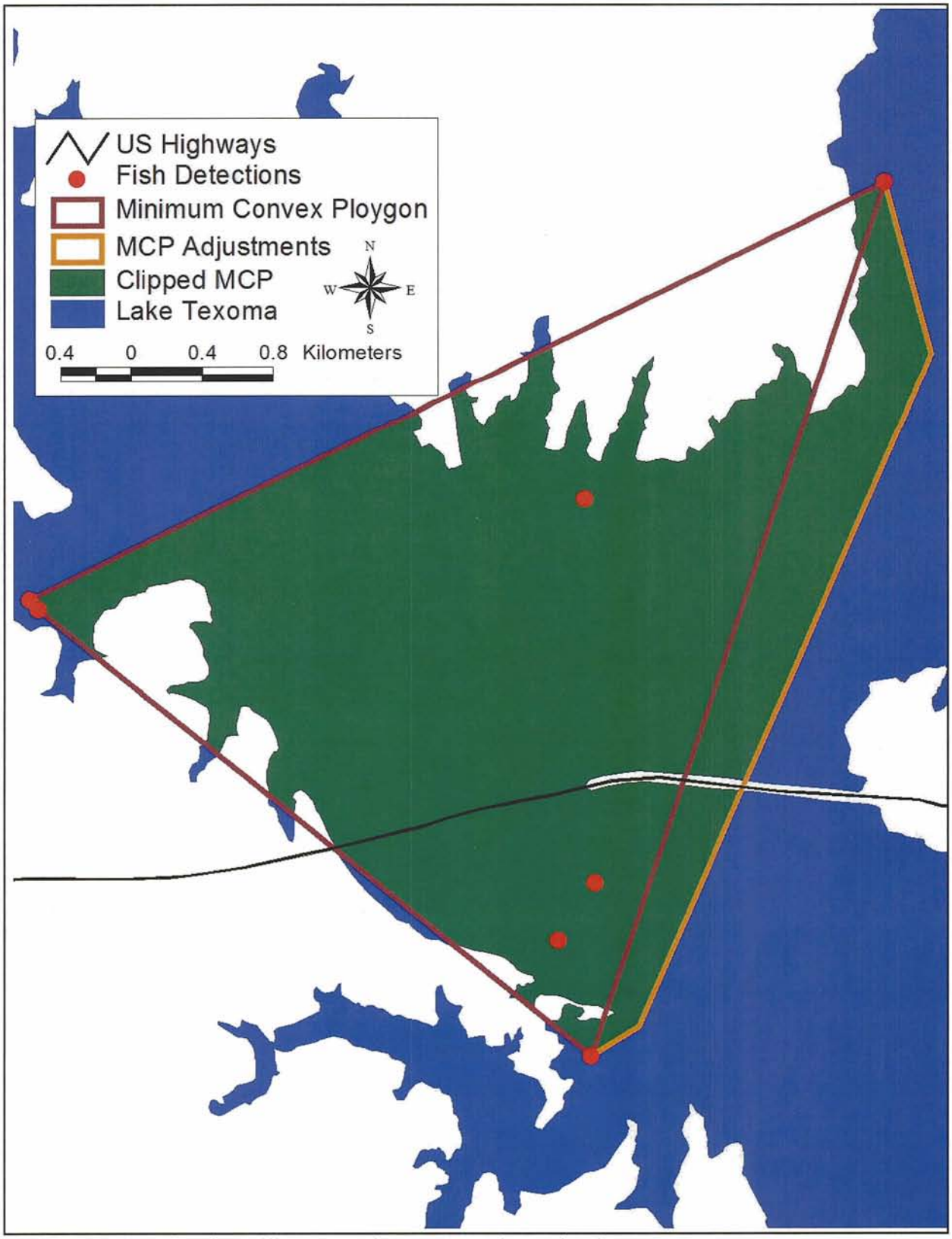

Figure 2. Example of an alligator gar home range determination.

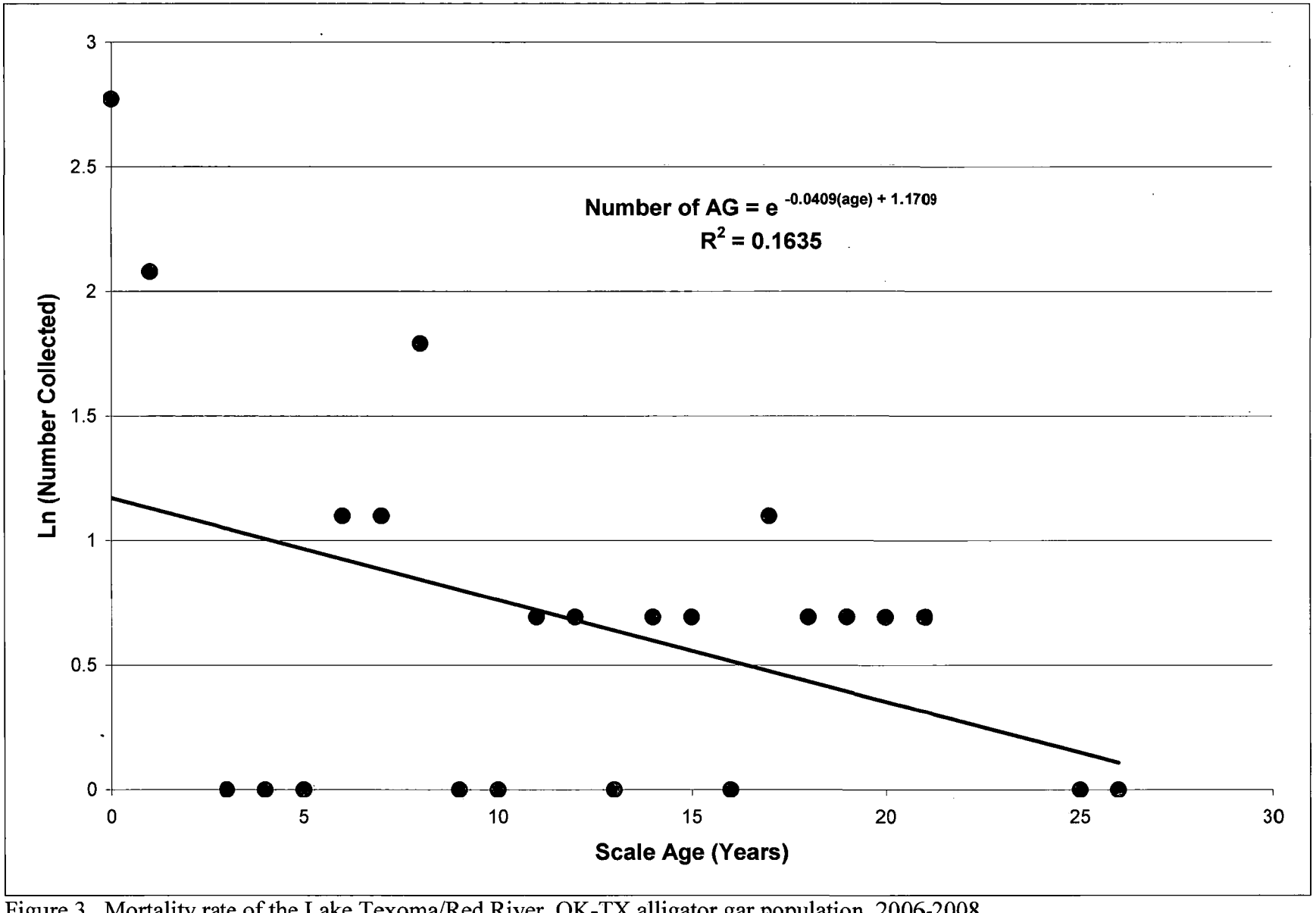

Figure 3. Mortality rate of the Lake Texoma/Red River, OK-TX alligator gar population, 2006-2008.

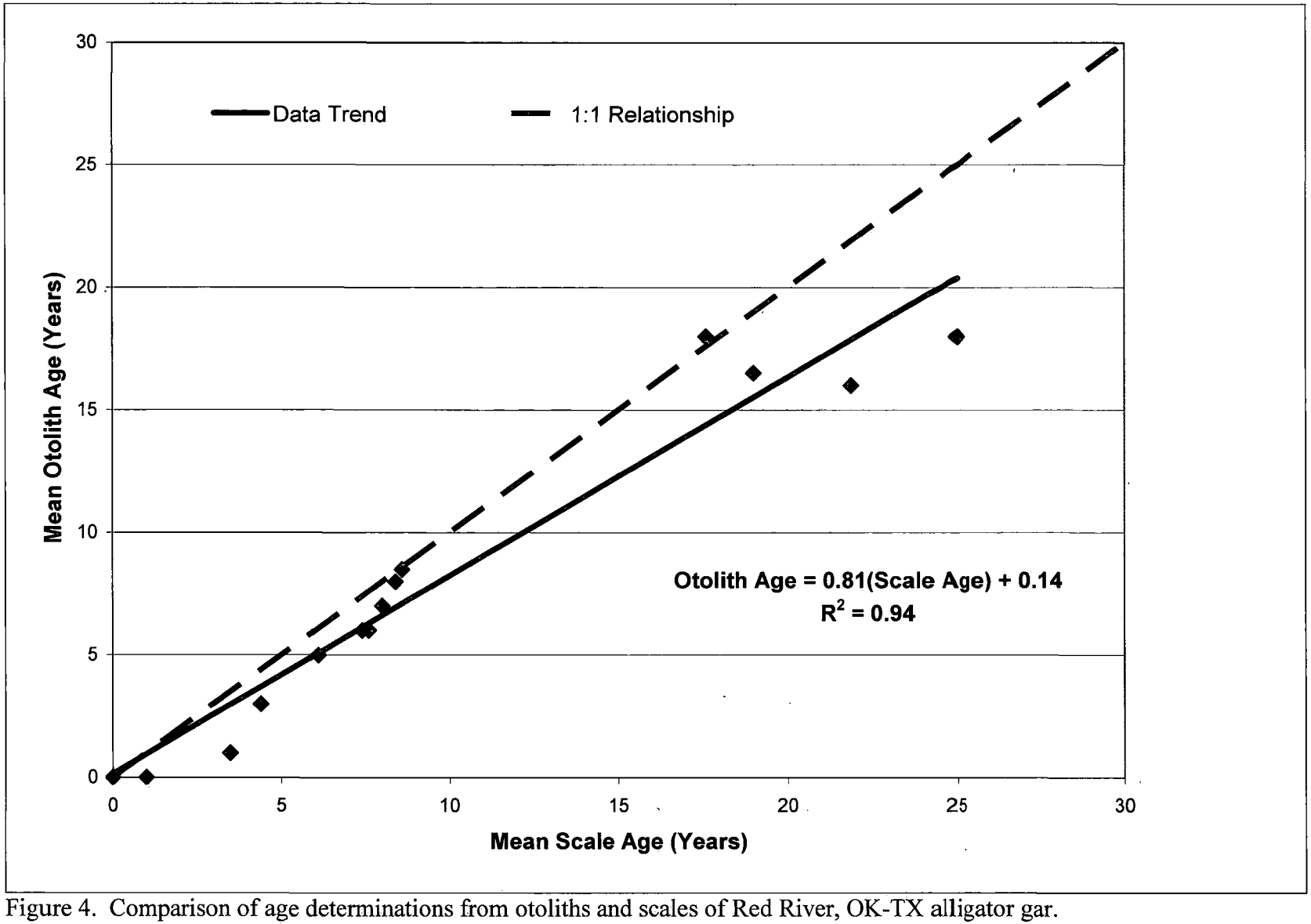

Figure 4. Comparison of age determinations from otoliths and scales of Red River, OK-TX alligator gar.