

**Alligator Gar (*Atractosteus spatula*) Life History and Habitat Use in the Cache, Mississippi, and White Rivers, Arkansas.**

Ultrasonic and radio transmitters will be attached to hatchery-reared and wild-caught alligator gar. The tagged fish will be released into areas of known occurrences. The known occurrence areas will be identified from historical data of the Cache, Mississippi, and White Rivers and through targeted species sampling. Tagged fish will be monitored on a weekly basis with the use of stationary and mobile receivers. Monitoring tagged fish will permit biologists to collect and evaluate life history data of the alligator gar.

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State Wildlife Grant Request: \$39,800

Matching Funds and In-Kind Services: \$56,336

## **Alligator Gar (*Atractosteus spatula*) Life History and Habitat Use in the Cache, Mississippi, and White Rivers, Arkansas.**

**Funding and Conservation Priorities:** The proposed study will address alligator gar and respective life history data gaps as identified under the 2007 Wildlife Action Plan and as implemented by the Taxa Association Teams/Habitat Teams and Steering Committee. The alligator gar is listed under the *Umbrella Project* for Arkansas Rivers and Streams with the *Strategy* to conduct a life history study based on the *Category* of data gap.

The alligator gar has a calculated priority score of 33, with respective G (worldwide) and S (Arkansas) rankings of G3G4 - Vulnerable (uncertain rank) and S2? - Imperiled in Arkansas (inexact numeric rank). Thus, research identifying habitat use areas of adult and juvenile alligator gar is warranted. With a joint collaboration between the Arkansas Game and Fish Commission and the United States Fish and Wildlife Service, progress can be made to identify critical habitat areas preferred by the alligator gar. In so doing, attempts to preserve alligator gar habitat can be initiated.

**Study Sites:** Historically, in Arkansas, the alligator gar has been found in the Arkansas Valley, Mississippi Alluvial Plain, and South Central Plains. For this study, the Mississippi Alluvial Plain will be the focal ecoregion. Within the Mississippi Alluvial Plain, the water bodies, or ecobasins, in which the study will be conducted are the Cache, Mississippi, and White Rivers. Depending upon fish movement and abundance, additional water bodies may be considered or preliminary rivers may be omitted.

**Study Goal:** The proposed study will help identify movement patterns and habitat preferences of adult (sexually mature) and juvenile (sexually immature) alligator gar (*Atractosteus spatula*). Historical data indicates that alligator gar were once common in most of the larger river systems of Arkansas. While alligator gar once thrived throughout Arkansas' rivers, population trends now show a decline in the species. Population declines have been attributed to commercial by-catch mortality, sport harvest, and habitat loss.

While regulatory measures can be taken to reduce commercial by-catch mortality and sport harvest, measures to limit habitat loss require extensive organization, planning, and deliberation. Furthermore, with the authorization of navigation projects on many of our river systems, the potential for existing habitats to become imperiled has greatly increased. However, before any measures can be taken to prevent further habitat loss, preferred habitat areas must be identified. Information regarding preferred habitat, more specifically, spawning and nursery habitats, is limited.

The overall goals and objectives of this study are 1) to locate and capture adult alligator gar from known occurrence areas, 2) acquire and release hatchery-reared juvenile alligator gar, 3) monitor movements of adult and juvenile alligator gar, and 4) identify spawning and nursery habitats of alligator gar. During 2007, we plan to collect 10 adult and 5 juvenile alligator gar. From 2007 to 2009, we will use telemetry equipment (radio and ultrasonic) to tag, track, and monitor adult and juvenile alligator gar. Thus, preferred nursery and spawning habitats will be identified. Once preferred habitat areas are identified, measures can be taken to help preserve and restore remaining habitats of the alligator gar.

**Materials and Methods:** Arkansas Game and Fish Commission (AGFC) and United States Fish and Wildlife Service (USFWS) personnel will capture 10 adult alligator gar from the wild. In addition, 5 hatchery-reared juvenile alligator gar will be obtained from the Private John Allen National Fish Hatchery, in Tupelo, Mississippi.

Adult and juvenile alligator gar will be fitted (tagged) with Vemco® model ultrasonic coded transmitters (V16-T) and Advanced Telemetry Systems (ATS) F2000 Series radio transmitters. Transmitters will be surgically implanted into the abdominal cavity or mounted externally near the dorsal fin on each fish. Each ultrasonic tag will be identified by a unique code sequence and will also record water temperature. Once tagged, all fish will be released into the Cache, Mississippi, and White Rivers at

pre-determined sites. Wild-caught fish will be released in the vicinity of initial capture. Release sites will be documented and habitat features recorded.

To monitor fish movement and identify habitat use, ten submersible stationary receivers (VR2) will be placed at strategic locations. The locations will be areas of transition and/or at river confluences. The stationary receivers will allow for continuous monitoring of the ultrasonic tags. Additionally, field personnel will manually track fish by boat using a mobile receiver (VR100) and directional hydrophone (VH110) to relocate ultrasonic tags. Attempts to relocate fish by radio tags will be done using a scanning receiver (ATS R410) and a 3-element Yagi antenna. Radio tracking will be done in conjunction with the ultrasonic tracking. Fish will be manually tracked on a weekly or bi-weekly basis.



Transmitter insertion into the abdominal cavity of an alligator gar by USFWS personnel.

**Study Results and Benefits:** With the use of telemetry equipment, biologists will be able to identify movement patterns along with temperature and seasonal preferences of alligator gar. As fish are located in the field, all immediate habitat features will be measured. Habitat descriptors along with movement and temperature data will enable us to determine preferred habitats and seasonal use areas of adult and juvenile alligator gar. Once habitat use areas are documented, conservation of the alligator gar in Arkansas can begin.

Additionally, the pallid sturgeon (*Scaphirhynchus albus*), which is a federally listed endangered species and has a priority score of 80, will potentially benefit from this study. With the use of similar telemetry equipment (Vemco© brand tags and receivers utilizing the frequency of 69 kHz), previously tagged pallid sturgeon can also be monitored with the new receivers. Likewise, tagged alligator gar can be monitored with existing receivers being used for pallid sturgeon telemetry projects on the Mississippi River. Thus, providing additional resources and research capabilities for monitoring alligator gar and pallid sturgeon.

## Budget and Expenditures

Source Item	Study Years		Grant
	2007-2008	2008-2009	
<b>Salary Expenses:</b>			
Two AGFC biologists @ \$18/manhour for 1000 hours/year	\$18,000	\$18,000	\$0
Two hatchery truck drivers @ \$10/hr for 10 hours/each	200	0	0
<b>Operating Expenses:</b>			
Two hatchery trucks (1000 miles @ \$0.42/mile)	420	0	0
Two filled liquid oxygen bottles (@ \$85 refill)	170	0	0
AGFC vehicle (5200 miles @ \$0.42/mile)	2,148	2,148	0
AGFC boat gas	1,000	1,000	0
<b>Capital Expenses:</b>			
<i>Tagging Equipment:</i>			
Vemco V16T Transmitters (15 @ \$400/each)	0	0	6,000
Vemco VR2 Receivers (10 @ \$1200/each)	0	0	12,000
Vemco VR100 Receiver	0	0	5,400
Vemco VH110 Directional Hydrophone	0	0	1,200
Vemco Interface Kit	0	0	200
ATS F2000 Series Transmitters (15 @ \$250/each)	0	0	3,750
ATS R410 Scanning Receiver	0	0	800
ATS 3 Element Yagi Antenna	0	0	200
<i>Sampling Equipment:</i>			
Monofilament nets and supplies	3,000	0	0
22' aluminum boat	4,500	0	4,500
Boat trailer	750	0	750
115 hp boat motor	5,000	0	5,000
<b>Project Totals</b>	<b>\$35,188</b>	<b>\$21,148</b>	<b>\$39,800</b>

Total Project Cost	\$96,136
Matching Funds and In-Kind Services	\$56,336
State Wildlife Grant Request	\$39,800

## **Qualifications of Individuals and Organizations Involved**

### **Organizations:**

Arkansas Game and Fish Commission – The Arkansas Game and Fish Commission’s mission is to wisely manage all the fish and wildlife resources of Arkansas while providing maximum enjoyment for the people.

United States Fish and Wildlife Service - The U.S. Fish and Wildlife Service's mission is working with others, to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

### **Research Personnel:**

Lee Holt – Fisheries Management Biologist

2.5 years as a fisheries management biologist

0.5 years as a hatchery technician

2.5 years as a fisheries graduate student

2 years working in various fields relating to fisheries and wildlife

4 years as an undergraduate majoring in wildlife and fisheries science

Member of the American Fisheries Society

Member of the Arkansas Chapter of the American Fisheries Society

Ricky Campbell – Hatchery Manager, Pvt. John Allen National Fish Hatchery

6 years as a hatchery manager

5 years as an assistant hatchery manager

6 years as a fisheries biological science technician

5 years as a fisheries animal caretaker

Served as a research cooperater on numerous research projects

Assisted in restoration and recovery efforts with various fish species (with completed and on-going projects)

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### **Appendix: Addressing Requests as Outlined in Notification Letter**

#### *1) Monitoring Methodology*

As stated in the proposal, the monitoring of alligator gar will be conducted by two different methods. The first method will involve the use of stationary receivers (VR2). The receivers will be placed at designated locations and will detect the presence of a tagged fish as it swims near the receiver location. Periodically (on a monthly basis), data will be uploaded from the receiver and transferred to an alligator gar database. Uploads will assist with the other monitoring method, manual tracking.

Manual tracking will be conducted on a weekly to bi-weekly basis. The tracking will involve the use of mobile receivers (VR100 and ATS R410), directional hydrophone (VH110), and a 3-element Yagi antenna. Biologists will navigate study areas while listening for signals emitted from each tag type. Once a tagged fish is located, area habitat variables will be described and recorded (water depth, vegetation, dissolved oxygen, etc.).

All information will be compiled into an alligator gar database. The database information will be entered in the Natural Resources Monitoring Partnership upon completion of the project.

#### *2) Updating the Comprehensive Wildlife Conservation Strategy*

An update of findings will be conducted at the conclusion of the project at the AGFC office in Little Rock.

#### *3) Updating the Scientific Community*

A report and summary will be completed at the conclusion of the project. A projection date for all completed research and analyses is Fall 2009.

#### *4) Making a Public Connection*

All relative information will be made available to the public. Information will be available in a medium of choice by AGFC personnel.

### 5) *Deliverables Calendar*

***Spring 2007*** – Contact researchers and corroborate information.

***Summer 2007*** - Identify alligator gar sampling areas and potential sites for stationary receiver placement.

***Fall 2007*** – Capture and tag alligator gar and place stationary receivers. Acquire and tag hatchery reared alligator gar.

***Fall 2007 to Spring 2009*** – Manually track alligator gar and collect information from stationary receivers.

***Spring 2009*** – Analyze movement and habitat data.

***Summer 2009*** – Finalize all data and prepare a report.

***Fall 2009*** – Project complete.

### 6) *Budget*

See previous budget expenditures.