Project Title: Is the Fourche la Fave River Important Habitat for Alligator Gar?

Project Summary:

Alligator gar is a species of conservation concern, and the need for basic life history information is an implementation priority of the State Wildlife Action Plan Steering Committee. I am requesting support for an ongoing, pilot investigation of alligator gar reportedly using the Fourche la Fave River. This research could lead to a better understanding of the resource requirements of the species, particularly those related to reproduction.

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Conway, Arkansas 72035
Telephone: 501-450-5933
Fax: 501-450-5914
Project Partners: None

Total Amount Requested: $5,500
Matching Funds: $6,500 UCA Cash Match
A. Which of the funding priorities does your preproposal address? I am proposing an implementation grant to monitor and provide critical life history information on a species of conservation need, alligator gar *Atractosteus spatula*.

B. In what ecoregion, ecobasin, terrestrial habitat or area, will your project be conducted? This research will be conducted in the Arkansas Valley ecoregion of Arkansas, more specifically, the Fourche la Fave River.

C. What is the conservation priority that your project will address? Alligator gar were considered by Warren et al. (2000) to be "vulnerable - a species or subspecies that may become endangered or threatened by relatively minor disturbances to its habitat or that deserves careful monitoring of its distribution and abundance in continental waters of the United States to determine its status." Indeed, the species is endangered or extinct in numerous states within the Mississippi River basin and Atlantic Gulf Coast drainages and has experienced dramatic declines elsewhere. Alligator gar has declined precipitously in Arkansas and considered a species of "Special Concern" by the Arkansas Game and Fish Commission. The alligator gar is listed as an implementation priority by the 2007 State Wildlife Action Plan Steering Committee due to lack of basic life history data.

D. What is the goal(s) of your project and what major objectives or tasks will you undertake to achieve that goal? Basic life history and resource requirements of many large-river fishes are poorly known, and the alligator gar is no exception. Scant information exists on diet, size, longevity, age at first reproduction, and general habitat (e.g., Robison and Buchanan 1988; Layher and Phillips 2000; Ferrara 2001). However, other than a general idea of a spring/early summer spawning period associated with rising water levels and the occasional collection of a larval individual, we know little about the reproductive life history and requirements of alligator gar. Reproduction has never been observed *in situ*; therefore, we can only speculate when, where, and how they spawn in river ecosystems.

Exploitation and widespread habitat change in rivers are implicated in the decline of alligator gar. In Arkansas, large adults continue to be reported in many rivers (e.g., White, Ouachita, and Arkansas rivers), but no conclusive evidence of recruitment has been found (Layher and Phillips 2000). Little or no recruitment is alarming and could be due to a combination of low adult density and lack of suitable spawning and/or rearing habitat. Knowledge of the current status of existing populations/aggregations and information on spawning and rearing requirements is critical to the designing and implementation of effective conservation and management measures for the alligator gar.

*Project Goal*-- The goal of this project is to confirm the existence of a population of alligator gar in the lower reaches of the Fourche la Fave River and to collect initial abundance and life history data. By June 2008, I will have a preliminary indication of the importance of the Fourche to alligator gar and if a larger, more extensive project (e.g., telemetry) is feasible and warranted on this natural population. Knowledge of the continued existence of alligator gar in the Fourche came to my attention when a bowfisher brought me a very large individual collected from that location during August 2005. The fisher indicated to me that he has observed alligator gar in the Fourche during late summer for multiple years, often "several" in one outing. On a trip guided by the bowfisher, myself and a student observed a large alligator gar breach the water's surface during August 2006. Currently, I have a graduate student conducting a comparative study of the reproductive life history of all four gar species occurring in the Fourche la Fave River; field sampling begins in February 2007. An unconfirmed, working hypothesis is that smaller, mainstem tributaries (e.g., Fourche la Fave River) of large rivers are important spawning and rearing habitat for alligator gar.

The potential existence of a population of alligator gar in or seasonally using the Fourche, a tributary of the Arkansas River, to meet some aspect of its life history requirements presents exciting research and conservation opportunities. First, easier logistics, higher sampling efficiency, and better ratio of information learned per unit of effort favors studying fish in one, smaller river system, such as the Fourche, relative to conducting research in multiple larger rivers. For example, Layher and Phillips
(2000) expended considerable effort in the Arkansas, Red, Ouachita, and White rivers to collect four alligator gar. If the alligator gar is relatively abundant in the Fourche, we can potentially fill in many data gaps for this species. Secondly, understanding how and why alligator gar use the Fourche la Fave River has management and conservation implications for the many smaller tributaries of the Arkansas River and other large rivers.

Objectives—The specific objectives are:
1) to determine the relative abundance and size distribution of alligator gar in the Fourche la Fave River during late summer/fall through late winter/spring,
2) to visually search the river for alligator gar spawning aggregations during and following high discharge events in spring, and
3) to sample late larval/early juvenile gar during spring through early summer.

E. What are the methods (briefly) by which you propose to carry out your work? Abundance and size distribution of alligator gar will be accomplished by deploying multiple gears (e.g., trammel nets, gill nets, and jug lines) during sampling trips to the Fourche la Fave River beginning in late summer 2007 and ending spring 2008. Sampling effort will be concentrated, but not limited to, the reach of river from Perryville, AR downstream to the confluence with the Arkansas River. Length and weight will be measured on all individuals captured, and then they will be released. Other gar species, including alligator gar, reportedly spawn in aggregations during spring in association with rising water levels. From March through May 2008, we will visually search and monitor areas on the river identified as potential gar spawning habitat during spring 2007. Gar larvae and early juveniles have a tendency to lie near the water's surface and are vulnerable to capture with dipnets and seines. Alligator gar larvae are easily distinguished from other gar species by the presence of a dorsal, white-colored wedge/stripe. Gar larvae will be sampled with dipnets and seines from April through May 2008. Searches for spawning aggregations and larvae will help determine if alligator gar are spawning in the Fourche la Fave River.

F. What measurable products or outcomes will result from your project? To conserve alligator gar, we must understand the reason(s) for lack of recruitment. Addressing this issue begins with knowledge of the reproductive ecology of alligator gar. Smaller tributaries of large rivers are important spawning and rearing habitat for many riverine fishes, and they are increasingly important as "linear floodplains" in modified river ecosystems lacking extensive floodplain habitat. Alligator gar might be similar to longnose gar Lepisosteus osseus and spawn in or near flowing waters of the Fourche. Conversely, alligator gar, similar to spotted gar Lepisosteus oculatus, could utilize floodplain areas or the non-flowing channel of the Fourche during flooding along the Arkansas River. Reports of alligator gar in the Fourche la Fave River is enticing and could represent an opportunity to gain insight into the reproductive habits and requirements of the species.

A direct outcome of this project will be verification that alligator gar are utilizing the Fourche la Fave River. This initial sampling will allow us to refine techniques for sampling, handling, and monitoring all life stages of gar. Assuming numbers are high enough, the next step would be to conduct a telemetry study of adults to locate spawning areas. The proposed project is exploratory yet necessary given the lack of basic information about this species. An indirect outcome could be a breakthrough in knowledge of spawning and rearing requirements of a species in need of conservation throughout its range.

G. To what extent will your proposed project be able to take advantage of existing resources (e.g., funding, teams, conservation areas, partnerships)? I have a graduate student already conducting gar research on the Fourche la Fave River. This research is being conducted with resources (e.g., nets and boat/motor) already acquired. The current proposal will contribute to ongoing research and will benefit from knowledge gained from sampling during spring 2007. I am aware of a potential alligator gar telemetry study of stocked individuals by the Arkansas Game and Fish Commission; a recent conversation with the principal investigator of this proposed study suggests the potential for future collaboration if a natural population is identified on the Fourche la Fave River.
H. Budget:

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Total Project Budget: $12,000
Name: Reid Adams
Date Hired: August 2003

Education:

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Selected Publications:


Grant Support (Selected)

- U.S. Army Corps of Engineers; 2006-2009; $95,911
- Arkansas Game and Fish Commission; 2006-2007; $52,000
- Missouri Department of Conservation; 2004-2006; $8,000
- Missouri Department of Conservation; 2006; $3,000
- U.S. Army Corps of Engineers; 2005; $13,000
- UCA University Research Council, Summer stipend $2,600

Courses Taught (within past 2 years):

General Ecology, Vertebrate Zoology, Bio II, Biometry, Aquatic Ecology