

TITLE: Life history research on the special concern
Southern Hickorynut, *Obovaria jacksoniana* (Frierson, 1912) in the White River Drainage.

DESCRIPTION: By July of 2015, we propose to document the reproductive life history of *Obovaria jacksoniana* in the White River drainage and compare it to previous studies conducted in the Ouachita River drainages.. The proposed objective of this study is to conduct a life history study of *O. jacksoniana* in the White River drainages, specifically the Red River Drainage, to include: a) identification of reproductive events, b) estimate fecundity, c) estimate infestation success, and d) identify suitable host fish.

PROJECT LEADER:

Alan D. Christian, Associate Professor
University of Massachusetts Boston
Department of Biological Sciences
100 Morrissey Boulevard
Boston, MA 02125
E-mail: alan.christian@umb.edu
617-287-6639
617-287-6650 FAX

PROJECT PARTNERS:

John L. Harris, Adjunct Professor
Arkansas State University
Department of Biological Sciences
P.O. Box 599
State University, AR 72467
E-mail: omibob@aol.com
501-569-2285
870-972-2638 FAX

William R. Posey, Malacologist, Commercial Fisheries Biologist
Arkansas Game and Fish Commission, P.O. Box 6740
Perrytown, AR 71801
(877) 777-5580

TOTAL AMOUNT REQUESTED: \$8,418.00

AMOUNT AND SOURCE OF MATCHING FUNDS:

Total Direct Cost: \$7,653.00
Total Indirect Cost: \$765.00
Total Funding Requested: \$8418.00
Indirect Cost Recovery (UMass 52.5% - 10% = 42.5%): \$4018 - \$750 = \$3268
Total Labor Match by John L. Harris \$5,000.00
Total Project Cost: \$16,686.00

1. WHICH OF THE FUNDING PRIORITIES DOES OUR PREPROPOSAL ADDRESS?

The global conservation ranking for *O. jacksoniana* is G1G2, critically imperiled, and the Arkansas state ranking is S2, imperiled. As part of the conservation planning process, the Arkansas Game and Fish Commission identified three data gaps / research needs for *O. jacksoniana*: 1) to conduct an additional population survey of other tributaries of the Red River Drainage, and 2) conduct host fish suitability trials on Red River Drainage fish.

2. IN WHAT ECOREGION, ECOBASIN, TERRESTRIAL HABITAT OR AREA WILL OUR PROJECT BE CONDUCTED?

Obovaria jacksoniana, the Southern Hickorynut, North American distribution is from Alabama west to eastern Texas and north to the Mississippi embayment of southeastern Missouri (Parmalee and Bogan 1998). In Arkansas, *O. jacksoniana* is distributed in the Ozark Highlands, Arkansas Valley, and South Central Plains ecoregions. The majority of occurrence in the Ouachita River drainage, but also are distributed in the Red River, Arkansas River and White River drainages (Harris et al 2010).

3. WHAT IS THE GOAL(S) OF OUR PROJECT AND WHAT MAJOR OBJECTIVES OR TASKS WILL WE UNDERTAKE TO ACHIEVE THAT GOAL?

By July of 2015, we propose to document the reproductive life history of *Obovaria jacksoniana* in the White River drainage and compare it to previous studies conducted in the Ouachitta River drainages.. The proposed objective of this study is to conduct a life history study of *O. jacksoniana* in the White River drainages, specifically the Red River Drainage, to include: a) identification of reproductive events, b) estimate fecundity, c) estimate infestation success, and d) identify suitable host fish.

4. WHAT ARE THE METHODS (BRIEFLY) BY WHICH WE PROPOSE TO CARRY OUT OUR WORK?

Life History: To determine reproductive timing, individual *O. jacksoniana* will be observed on a monthly basis for 2 years for each of the 3 target drainage basins. Gravid *O. jacksoniana* will be identified for taxonomic identification and tagged with an enumerated plastic id tag that will be glued to the left valve. Each female will be carefully inspected for mature and viable glochidia. Adult females with viable glochidia will be collected for transport to the U.S. Fish and Wildlife Service National Fish Hatchery in Mammoth Spring, AR. Glochidia from each females will be removed with a non-invasive technique where a 5- mL syringe (20-gauge needle) filled with synthetic water (hardness = 100 mg/L) will be carefully placed into the marsupial pouch and injected with water to tease the glochidia from the marsupium into a sterilized petri dish. Collected glochidia will be pooled and equal volume subsamples will be made. Two subsamples will be used to estimated fecundity while the remaining subsamples will be infested on various fish species to qualify suitable fish hosts.

Potential fish hosts will be collected from the Ouachita River, Red River, and Arkansas River system and transferred to Mammoth Spring National Fish Hatchery. Distribution of fishes listed in Robison and Buchanan (1988) and cited in the Arkansas Fish Database (Robison 2000) will be used to select fish for transfer to the Mammoth Spring National Fish Hatchery.

Fish will be infested with glochidia using the bucket method. One to six individuals, depending on individual size, of conspecific fish will be placed in 20L plastic containers with approximately 15 cm of water. Viable glochidia will be added to the container and the water will be vigorously aerated to keep the glochidia suspended. Aeration will continue for at least 45 minutes to assure encystment onto gills/fins of exposed fish. To estimate the number of glochidia that actually infested the fish(es) per bucket, we will also count the number of glochia remaining in each bucket after the encystment period.

Parasitized fish will be isolated in 2 to 5-L flow-through monitoring tanks and siphoned twice weekly after the first 5 days of encystment. Thereafter, tanks will be siphoned for juvenile transformation until inspected fish are no longer parasitized. Siphonate collected from each isolation tank will be filtered through a 300 µm Nitex[®] mesh to remove larger sized organic fractions followed by 105 µm Nitex[®] mesh to retain juveniles for inspection. The contents of the siphon will be inspected with a dissecting

microscope fitted with a polarizing lens for efficient identification of both excysted and transformed juveniles, and both excysted and transformed juveniles will be enumerated.

From the host suitability trails, fecundity, number of glochidia encysted, number of glochidia excysted, and number of glochidia transformed to juveniles can be enumerated. Thus a model can be developed to estimate the relative reproductive success each female has on each species of fish.

5. WHAT MEASURABLE PRODUCTS OR OUTCOMES WILL RESULT FROM OUR PROJECT?

1. Reproductive events, e.g. period of gravidity and length of gravidity, for *O. jacksoniana*
2. Fecundity of *O. jacksoniana*
3. Reproductive success of *O. jacksoniana*
4. Basin specific lists of suitable and non suitable host fish for *O. jacksoniana*.

Interim reports will be delivered on, December 15, 2013, 15 June 2014, December 15 2014 and 15 June 2015. These reports will provide a summary of work accomplished, a discussion of difficulties, and a study plan outlining all work that remains to be completed. A final report will be prepared and submitted by 15 December 2015 and will include a detailed description of methods and results. The discussion of results will include an analysis and host suitability and comparison with previous studies.

6. TO WHAT EXTENT WILL YOUR PROPOSED PROJECT BE ABLE TO TAKE ADVANTAGE OF EXISTING RESOURCES (E.G., FUNDING, TEAMS, CONSERVATION AREAS, PARTNERSHIPS)?

1. We will be able to match difference in indirect cost and WRP III field assistance to reach the 50% matching requirement.
2. We are working as a team with UMass Boston, ASU and AGFC researchers
3. We will be able to use the U.S. Mammoth Spring National Fish Hatchery facilities and personnel for conducting the host suitability trails.

7. BUDGET JUSTIFICATION:

We are requesting a Total Funded Budget of \$8418.00 in which Total Direct cost are \$7653.00 and Total Indirect Cost are \$765.00. The Total Project Cost is \$16,836 which the Total Funded Budget of \$8418.00, plus the UMass Boston Indirect Cost Recover amount of \$3704, and John L. Harris labor match of \$5,000. This provides a 50% match and if we only need a 35% match, we can reduce the labor match for John L. Harris..

For the Total Funded budget of \$8418.00 in which Total Direct cost are \$7653.00 and Total Indirect Cost are \$765.00. We are requesting summer salary for Dr. Christian at \$4,119 for field, lab, and report writing activities representing 15% of Dr, Christian summer efforts. We are requesting \$66 in fringe benefits for Dr. Christian's 15% summer effort. We are requesting \$1500 in national travel for field collections and laboratory infestations for Drs. Christian and Harris and for B. Posey. We are requesting \$968 in field and laboratory supplies that include supplies for collecting and preserving mussels, glochidia, and transformed juveniles and for collecting and preserving host fish. We are requesting \$1000 for a consulting that will monitor the host-suitability trials after infestation and will collect sloughed glochidia and transformed juveniles and document these occurrences in a spread sheet so that Drs. Christian and Harris can write the report.

8. BUDGET

Attachment A: Budget Worksheet (Year-1)

The University of Massachusetts Boston
Office of Research and Sponsored Programs

Proposal Information

Project Grant #		Period Start	08/01/13
Proposal ID #		Period End	07/31/14
PI Name	Alan Christian		
Sponsor	Arkansas Game and Fish Commission		
Title	Life History Research on the Special Concern Southern Hickorynut		

PeopleSoft Descriptor	Sponsor	Cost Share	Total
6REGSALARY (Salaries-Benefited)	\$0	\$0	\$0
Summer Additional Compensation	\$4,119	\$0	\$4,119
6SPECLSALARY (Non-Benefited Employees)	\$0	\$0	\$0
Graduate Students	\$0	\$0	\$0
Undergraduate Students	\$0	\$0	\$0
6FRINGE BENEFIT	\$66	\$0	\$66
6TRAVELNAT (Travel)	\$1,500	\$0	\$1,500
6TRAVELFGN --Foreign Travel	\$0	\$0	\$0
6OPERATIONAL (Operational Client Exp)	\$0	\$0	\$0
6SUPPLIES (Supplies and Materials)	\$968	\$0	\$968
6CONSULTANT (Consultant/Contract for Service, i.e., Procurement)	\$1,000	\$0	\$1,000
6SUBCONTRACT<=25 (Subrecipients: Sum of first \$25,000/contract)	\$0	\$0	\$0
6SUBCONTRACT>25 (Subrecipients: Sum of excess above \$25,000/contract)	\$0	\$0	\$0
6HUMANSUBJECTS Human Subjects	\$0	\$0	\$0
6INFRASTRUCTURE Infrastructure & Construction	\$0	\$0	\$0
6EQUIPMENT	\$0	\$0	\$0
6EQUIPLEASE Equipment Lease Rent	\$0	\$0	\$0
6OTHERNONPER Tuition/Fees, Fellowships	\$0	\$0	\$0
6OTHERNONPER NOFNA Participant Cost	\$0	\$0	\$0
6OTHEXPENSE Other (Included in BASE)	\$0	\$0	\$0
6OTHEXPENSE NOFNA Other (Excluded from BASE)	\$0	\$0	\$0
TOTAL DIRECT COST	\$7,653	\$0	\$7,653
TDC	\$7,653	\$0	\$7,653
Enter Facilities and Administrative Rate ==>	10.00%	0.00%	\$0
6FACADM Indirect Cost	\$765	\$0	\$765
TOTAL COST OF PROJECT	\$8,418	\$0	\$8,418

Sept 12, 2012

QUALIFICATIONS OF THE INDIVIDUALS AND ORGANIZATION INVOLVED

1. Alan D. Christian, have conducted surveys, life history, growth, and ecological research on freshwater mussels in Arkansas since 1992 and received Ph. D in Zoology from Miami University in 2002 with dissertation emphasizing the ecology of freshwater mussels. His research lab at Arkansas State University graduated 7 graduate students (MS and PhD) that conducted freshwater mussel research, including 3 that did life history/ host suitability research for their thesis
2. John L. Harris: Received Ph.D. in Zoology from University of Tennessee in 1986 with emphasis in taxonomy and systematics of aquatic fauna concentrating on fish and mussels. Have 30 years experience in performing mussel surveys and impact analyses resulting in numerous peer-reviewed publications and/or agency reports. Have co-directed or been a committee member for seven graduate students researching distribution and/or life history aspects of freshwater mussels in Arkansas
3. William R. Posey. Conducted graduate research on freshwater mussels and is the State Malacologist and Fisheries Biologist.