

REVIEW PROTOCOL
INDIANA UNIVERSITY OF PENNSYLVANIA
Institutional Animal Care and Use Committee (IACUC)

- All information must be typed. Handwritten proposals are not accepted.
- Submit one hard copy with original signatures to: Institutional Animal Care and Use Committee, Office of the Dean, College of Natural Sciences and Mathematics, 305 Weyandt Hall

Please click in the shaded fields to complete form

1. Principal Investigator:

Name Adam Smith
 Email address styz@iup.edu
 Campus address 2485 South Church St, Indiana, PA 15701
 Department/Division Biology
 Status: _____ Faculty
 _____ Staff
 _____ Doctoral candidate
 Grad student
 _____ Undergrad
 _____ Other

2. Students please provide the name of faculty supervising your project:

Faculty Advisor Dr. John Jones
 Department Biology
 Position/Rank Associate Professor
 Email address jjones@iup.edu
 Daytime Phone 7-2059
 Campus address 503 Weyandt Hall

3. Project Title

Understanding factors that influence the distribution of the endemic shorthead garter snake in northwestern Pennsylvania

Date of submission 20 Apr 2010

Dates during which project will be conducted – From 4/2010 To 10/2010

4. Project Funding Source (check as many as apply)

_____ Extramural Grant – Agency name _____

IUP Grant

_____ Non-funded faculty or student research

_____ Other

5. Purpose (check one) _____ Teaching (Course _____) Research

6. Species shorthead garter snake

Number of subjects ca. 30 Source of Animals wild populations

7. Please discuss the following information as it relates to your use of animals for research or teaching. Information should be discussed at a level suitable for a layperson but without omission of relevant information. Responses to the following questions should be typed and submitted with the previous cover page.

A. Purpose of the Study – State concisely what the study is intended to accomplish.

The primary objective of this study is to identify and quantify specific habitat requirements of the shorthead garter snake. The identified habitat variables and presence absence data gathered during repeated surveys will be used to develop a model that predicts shorthead garter snake occupancy throughout northwestern Pennsylvania.

B. Background – Briefly state the background and rationale for your study, including some relevant references. Identify the main questions the proposed research is designed to address.

The shorthead garter snake (*Thamnophis brachystoma*) is considered a species of conservation concern in Pennsylvania and presently has a state ranking of S3 (vulnerable). It is endemic to northwestern Pennsylvania and adjacent southwestern New York, occurring primarily on the Allegheny High Plateau (Price 1978). The shorthead garter snake has one of the most restricted ranges of any snake species in the United States, with approximately 90% lying within 14 counties in Pennsylvania. Although recent surveys indicate that the shorthead garter snake is currently relatively abundant in certain locations of northwestern Pennsylvania (Maret 2008, unpublished data), there is at least some evidence of population decline, apparently due to habitat loss and habitat changes due to succession (Bothner 1986). Because the majority of the species range is in Pennsylvania, it is the Commonwealth's responsibility to conserve the shorthead garter snake.

The shorthead garter snake is almost always found in close proximity to water, and deep woodlands appear to be avoided (Ernst and Ernst 2003). A broad description of habitat for the shorthead garter snake includes open areas with low vegetation (e.g. old fields, marsh edges, roadside banks) that provide cover such as rocks, logs or human litter (e.g. corrugated tin, plywood, tarps). A more detailed understanding of shorthead garter snake habitat requirements and areas of occupancy is a necessary first step toward the development of an appropriate species-specific conservation strategy. Once habitat requirements of the shorthead garter snake are determined, those characteristics can be used in correlation with data from multiple field surveys to identify environments most likely to be occupied by this species, and an occupancy model can be developed. Future field surveys can test the accuracy of the model, and those areas occupied by shorthead garter snakes can be monitored to detect any changes in order to maintain or modify conservation efforts.

Proposed Research Objectives

The shorthead garter snake is listed as a species of High Level Concern in Pennsylvania's Wildlife Action Plan (WAP). The following is a description of the objectives concerning species of High Level Concern, taken directly from the Pennsylvania Wildlife Action Plan:

Goals in managing these species are: 1) to gather adequate information to make a status determination and 2) to ensure the continued viability of populations and protect key habitats to the point that vulnerable populations are secure and risks are minimized to the extent feasible. Many of these species will require direct and focused habitat management and protection in order for their populations to be stabilized. Responsibility species that fall within the High Level Concern category represent high-priority targets for the WAP (http://fishandboat.com/promo/grants/swg/nongame_plan/pa_wap_sections/10priority_species.pdf).

As described below, my study will gather information that will contribute to the determination of the status of the shorthead garter snake, and will also identify the key habitats that should be protected / restored.

The main purpose of my study is to identify the specific habitat requirements of the shorthead garter snake. Data from repeat field surveys will be used along with significant habitat variables to create an occupancy model that can be used as a tool to protect or enhance shorthead garter snake habitat. I hypothesize that there are habitat variables that discriminate between sites that are occupied and unoccupied by the shorthead garter snake. I expect that the discriminating variables may include size, type and availability of cover objects, percent canopy cover, and proximity to water. The shorthead garter snake is not found anywhere in the world outside of its relatively small range in Pennsylvania and New York and I believe that the information obtained from my study will be a valuable first step to ensure conservation of the species.

C. Characteristics of the Subject Population – Provide the following information regarding your subject population.

- a. Species shorthead garter snake (Thamnophis brachystoma)
- b. Age Range and/or weight range
All shorthead garter snakes found will be used in this project; there are no limits on age or weight
- c. Sex Both male and female shorthead garter snakes will be used in this project
- d. Why does this project require the use of animals (i.e., could results be obtained in another manner such as computer simulation)?
The specific habitat requirements of the shorthead garter snake are currently unknown; the use of this snake species to obtain this information is required
- e. Why does the project require the use of this particular species?
This project requires the use of shorthead garter snakes because the identification of the habitat requirements of this species is the purpose of the study

- f. Why does the project require this number of animals? Justify the number of animals needed for your experiments. Please provide this information in tabular form (e.g., numbers of experimental groups x sample size of each group = total number of animals requested).

In order to determine factors that influence habitat selection by shorthead garter snakes, each individual detected will be captured and processed. It is necessary to include every shorthead garter snake that is found at each site in order to collect data that will be representative of each population. During surveys conducted in 2006, 2007, and 2008, the average number of shorthead garter snakes processed by Mr. Smith was 30 per year (2006, n=24; 2007, n=44; 2008, n=23) (Smith, unpublished data). Therefore, the total number of individuals that will be handled for this project is approximately 30.

- g. Does the Biology Department/Field Station have the proper facilities to maintain the animals, meeting USDA Animal Welfare regulations as to housing, food and water?

Housing of the shorthead garter snakes will not be necessary for this project

- h. At the conclusion of this project what will be done with the animals? If they will be euthanized complete section 12.

All snakes will be released at the point of capture immediately following processing (measuring weight and length, photographing).

8. Methods and Procedures – Provide the following information regarding your methods and procedures.

- A. Describe your experimental design. (Do not address surgical procedures here. Surgical procedures are to be described in item 9). Include in your description everything that is done to the animal.

A “Consent of Risk” form has been provided by Dr. Larkin and signed by myself. I have been informed of and understand all risks associated with working in the field. My Scientific Collector’s Permit (Number 96, Type 1) has been renewed for the 2010 collection year by the Pennsylvania Fish & Boat Commission. Documentation of each has been provided with this protocol.

I will survey sites throughout northwestern Pennsylvania from late April through the end of June, and late August through early October 2010. Success at finding shorthead garter snakes is highly dependent on weather conditions (Maret 2008, unpublished data). Shorthead garter snake seasonal activity begins in Pennsylvania as early as the first week of April, but snakes are not commonly found until the end of the month (Hulse et al. 2001). Activity levels remain constant through May, reach a peak in mid-June, and significantly decline in July. Shorthead garter snake activity reaches a second peak in August, and gradually decline through September and October (Hulse et al. 2001).

Surveys will occur in the following counties: Clearfield, Forest, Warren, McKean, Erie, Venango, and Mercer. Each of these counties contains sites where shorthead garter snake presence has been confirmed (Maret 2008, unpublished data). All sites included in this study have been surveyed for shorthead garter snakes previously for a different project. The majority of sites are located on public land (roadside right-of-ways, State Game Land, State Park property, etc.), one site is on private property that is accessible with permission from the owner (Wattsburg Fen, Erie County- permission granted by Joe Weber 16705 Rte. 89 Corry, PA 16470). At each site I visit, I will search for shorthead garter snakes under all cover objects within a predetermined sampling area. I will identify, record, and photograph all snakes found during the surveys. Each site will be surveyed at least three times during the sampling period.

All methods used in this study will follow the Guidelines for Use of Live Amphibians and Reptiles in Field and Laboratory Research comprised by the Herpetological Animal Care and Use Committee (Beaupre et al. 2004).

Every shorthead garter snake that is found will be captured by hand. The shorthead garter snake is a very docile species that never attempts to bite, and very rarely thrashes its body to attempt escape (Hulse et al. 2001). Each snake will be weighed by placing it in a cloth snake bag attached to a spring scale. The snout-vent length (SVL) and total body length (ToL) of each snake will be measured by firmly holding the snake directly behind its head and at the base of the tail to gently stretch it into a linear position, ventral surface down, along a meter stick that has been placed on the ground. The body of the snake will be fully supported at all times during processing and no excessive force will be used to restrain the snake, minimizing the risk of injury (Dunham et al. 1988). Before being released at the point of capture, I will observe the overall condition of each shorthead garter snake, taking note of any unusual coloration, markings or deformities, and a reference photo will be taken. The sex of each snake will be determined by calculating the snout-vent length to tail length ratio (Hulse et al. 2001).

- B. Does this project duplicate previous work? If so, what is the justification for duplication (e.g., teaching, verification of results, etc.)? If a literature search was performed to rule out duplication of previous work, please give the date of the search, keywords that were used to perform the search, period covered by the search, databases searched, and results of the search.

This project does not duplicate previous work. Although general habitat characteristics of the shorthead garter snake have been reported in several of the references listed below, the specific requirements that may contribute to the restricted range of the species or that could guide habitat management for the species are currently unknown. Specifically, detailed habitat variables have not been quantified and correlated with shorthead garter snake distribution and abundance. Such analyses are needed to more effectively characterize optimal habitat type.

A literature search was performed on 2 March 2010. The search words used were *Thamnophis brachystoma* and shorthead garter snake. The period covered by the search was January 1920 – March 2010. Searches performed on BioOne produced no results for either search word.

Searches performed on Biological Abstracts (EBSCOhost) produced three results for *Thamnophis brachystoma*, which addressed food, but not habitat, selection by this species.

Biological Abstracts produced no results when shorthead garter snake was used as the search word.

A search was performed on 4 March 2010, using *Thamnophis brachystoma* and shorthead garter snake as the search words. The search period covered was 1978 – present, and the database searched was Zoological Record Plus. A total of 27 references were returned by the search. Examination of the references reveal that, while the available literature address basic aspects of shorthead garter snake ecology, no detailed information on habitat selection for this species is available. As such, the research proposed herein does not duplicate prior research.

- C. State why the animal model that you selected is appropriate for your experiments.

Using the shorthead garter snake is necessary for my project, as there is no other option for gaining a better understanding of the habitat use of the species

9. Surgical Procedures

- A. Is surgery to be performed on the animal(s)? If “No” proceed to next item. If “Yes” please complete the rest of this section.

No surgery will be performed during this project

- B. Please indicate whether this is a survival surgery or a non-survival surgery. _____
- C. Please state where the surgical activity will take place (e.g., lab, room number, etc.). _____
- D. Describe the surgical procedure. _____
- E. Will anesthetic, analgesic, or tranquilizer drugs be administered? If so, by whom, when, and in what dosages? _____
- F. Describe the post-surgical or post-treatment monitoring and care procedures, including all drugs to be used, their dosages, and routes of administration. _____
- G. Will more than one survival surgery be performed on the same animal? If “Yes” please justify. _____

10. Pain

- A. Choose the description listed below which most closely describes the potential for discomfort or pain as a result of the experiment.
- This procedure should cause only minor or no pain or distress.**
 - This procedure can cause moderate pain and/or distress. However, appropriate anesthetic, analgesic, or tranquilizer drugs will be administered to eliminate or minimize pain and/or distress. Please provide a brief summary of drugs, doses, routes of administration and frequency of administration.

 - This procedure can cause moderate pain and/or distress. However, no anesthetic, analgesic, or tranquilizer drugs will be administered to minimize pain and/or discomfort. Please justify. _____
- B. Federal guidelines require documentation that you have considered alternatives to procedures that cause more than momentary or slight pain (e.g., tissue culture, computer simulation, etc.). If a literature search was performed, please give the date of the search, keywords that were used to perform the search, period covered by search, databases searched, and results of the search. _____

11. Potential Hazards

- A. Are any of the agents used in this project hazardous (Yes, No, Unknown Hazard)? If you plan to use a hazardous agent(s), list the agent(s) below in the appropriate category.

This project does not require the use of hazardous agents

If you plan to use a substance(s) that constitutes one of the above hazards or an unknown hazard, please describe procedures to minimize risks to the animals, yourself, and others. _____

12. Euthanasia

Euthanasia will not be necessary in this project

- A. Describe the method of euthanasia at the conclusion of the experiment. Please include drugs, dosages, and routes of administration, if appropriate. _____
- B. After euthanasia, please state what method will be used for disposal of the carcass. _____
- C. What is the end point at which you have determined that an animal will be euthanized for human reasons (i.e., percentage of weight loss, general appearance, etc.)? If death is chosen as an endpoint, please justify. _____

13. Experience of Investigators

- A. Describe the Principal Investigator's training and experience in relation to this project. If this project as co-investigators, list them and describe their training and experience.

Dr. Jones has been involved with wildlife research since 1993. Since that time he has been actively involved in several wildlife research projects that involved the capture and handling of various wildlife species. Wildlife species that Dr. Jones has captured and monitored range from black bear and elk to bats, neotropical songbirds, small mammals, and force dwelling salamanders. He has an excellent working relation with several state and federal agencies and NGOs. He is a Certified Wildlife Biologist under the auspicious of The Wildlife Society. Since his arrival at IUP in 2005, he has been the graduate thesis advisor for 13 students and 2 undergraduate honors students.

Mr. Smith, a current graduate student and advisee of Dr. Jones, will be conducting the field work for this project. From late March to early September of 2008-2008, Mr. Smith was contracted by Shippensburg University on a State Wildlife Grant to locate and document shorthead garter snakes (*Thamnophis brachystoma*) and mountain earth snakes (*Virginia valeriae pulchra*) throughout their ranges in Pennsylvania. After Mr. Smith captured an individual of the target species, he weighed and measured the snake, observed its overall health condition, photographed, and then released it. Each target individual's data, general habitat characteristics and geographic coordinates were recorded for each site visited. Mr. Smith also recorded all other animal species captured, viewed or heard at each site. At the end of each year, he submitted all data and photographs as well as a written summary for the season's findings to the biology department at Shippensburg University. This experience, as well as his educational background, has provided the opportunity for Mr. Smith to develop the skill set necessary to successfully complete this proposed research project.

14. Permits

- A. Are any state, federal, or other permits required for the proposed research?

Yes No

- a. Describe the permits that are required and identify the agencies with authority to provide such permits. This project requires research permits from the U.S. Fish & Wildlife Service as well as the Pennsylvania Game Commission for the capture and handling of this threatened, non-game species.
- b. Attach copies of approved permits. Copies of permits are attached.

15. Sponsor Statement for Student Sponsored Research – For experiments being conducted by an undergraduate or graduate student, please have your advisor for this project address the following issue:

- A. Please describe the degree of supervision and training that you will provide for students working on this experiment.

Mr. Smith has more than enough experience with shorthead garter snakes to conduct the field work for this study without my supervision. He has been in contact with the Pennsylvania Fish & Boat Commission, and will continue this correspondence in order to collect data that will be most valuable to gaining knowledge that is necessary for conservation of the species. The extent of my supervision and training will include direction on data collection and analysis.

16. Signature of Principal Investigator

By signing below you are agreeing to the following statements. I agree to provide whatever supervision is necessary to ensure the welfare of the animal subjects being used. I understand that I cannot use animal subjects until I have received approval from the Institutional Animal Care and Use Committee (IACUC). I understand that as the principal investigator I am ultimately responsible for the welfare and protection of animal subjects and will conduct this project as approved. Any additions to or changes in procedures as well as any problems associated with the use of animal subjects must be reported to the IACUC.

Signature of Principal Investigator

Date

17. Signature of Faculty Sponsor (if applicable)

I affirm the accuracy of this application and accept responsibility for the conduct of this research and supervision of animal use.

Signature of Faculty Sponsor

Date

References

- Beaupre, S. J., Jacobson, H. B., Lillywhite, H. B. & Zamudio, K. 2004. Guidelines for use of live amphibians and reptiles in field and laboratory research. Second edition, revised by the Herpetological Animal Care and Use Committee (HACC) of the American Society of Ichthyologists and Herpetologists.
- Bothner, R. C. 1986. A survey of New York populations of the short-headed garter snake, *Thamnophis brachystoma* (Cope) (Reptilia: Colubridae). Unpublished report for NYSDEC Endangered Species Unit.
- Dunham, A. E., P. J. Morin and H. M. Wilbur. 1988. Methods for the study of reptile populations. Pp. 330-386. *In: Biology of the Reptilia*, Vol 16, C. Gans and R. B. Huey (eds). Alan R. Liss, New York, NY.
- Ernst, C. H. and R. W. Barbour. 1989. Snakes of Eastern North America. George Mason University Press, Fairfax, Virginia.
- Ernst, C. H. and E. M. Ernst. 2003. Snakes of the United States and Canada. Smithsonian Books, Washington, D.C.
- Hulse, C. A., C. J. McCoy and E. J. Censky. 2001. Amphibians and reptiles of Pennsylvania and the northeast. Comstock, Ithaca, NY.
- Maret, T. 2008. Shorthead Garter Snake, *Thamnophis brachystoma*. Unpublished report for PFBC.
- Pennsylvania Game Commission and Pennsylvania Fish & Boat Commission. 2008. Pennsylvania's Wildlife Action Plan [Internet]. [cited 4 March 2010]. Available from: <http://fishandboat.com/promo/grants/swg/00swg.htm>
- Price, A. H. 1978. New locality records and range extensions for *Thamnophis brachystoma* (Reptilia: Serpentes) in Pennsylvania. Bull. Maryland Herpetol. Soc. 14: 260-263.