American Fisheries Society Student Subsection of the Education Section



# **How To Conduct Undergraduate Research**

## Overview

Undergraduate research is, quite simply, a scientific investigation conducted by an undergraduate student. Fisheries research can take many forms. For example, an undergraduate student may assist a conservation agency in sampling sportfish in inland lakes, help a graduate student identify small-bodied native fishes from prairie streams, or design an angler survey instrument with a faculty member. Undergraduate students commonly conduct research for course credit, graduation with honors, professional experience, and/or intellectual enrichment. Research prepares undergraduate students for graduate school and future employment and is a valuable way to contribute to fisheries science early in one's career.

# Conducting undergraduate research

- 1. Brainstorm research ideas
  - a. Identify your research interest area(s).
  - b. Email and/or meet with a faculty member to discuss possible research ideas, especially those related to your interests.
  - c. Consult with graduate students who need research assistants for projects they are completing.
- 2. Develop research questions, objectives, hypotheses
  - a. Outline the question or questions that need to be answered.
  - b. Conduct a literature review exploring previous studies in areas related to your research.
  - c. Identify knowledge gaps in the literature.
  - d. Outline objectives that will fill knowledge gaps.
  - e. Predict research results based on your literature review and prior knowledge.



## 3. Make a plan

- a. Forecast logistical details of the research project (e.g., how much you will work, when you will work).
- b. Estimate required expenses.
- c. Obtain necessary supplies and personnel.
- d. Identify deliverables necessary for project completion.

## 4. Apply for funding

- a. Work with your faculty advisor to identify possible grants and funding sources.
- b. Complete and submit funding applications.
- c. \*See "How to Write Effective Scholarship Applications" document.

#### 5. Collect data

- a. Perform fieldwork, conduct laboratory experiments, and perform other tasks as required to fulfill your objectives.
- b. Arrange for research equipment and data to be safely and securely stored.

## 6. Analyze data

- a. Consult with a faculty member, graduate student, and/or statistician about appropriate statistical tests to perform.
- b. Select an appropriate statistical program (e.g., R, SAS, SPSS).
- c. Save statistical outputs.
- d. \*See "How To Analyze Your Data" document.

## 7. Organize and interpret results

- a. Identify important results.
- b. Elucidate results by conducting a literature review.

## 8. Write a manuscript or report

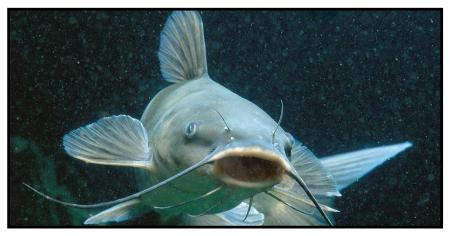
- a. Organize all background information, results, interpretations, and conclusions in the form of a scientific manuscript or report.
- b. Send drafts to advisors for review.

### 9. Revise and submit

- a. Make changes to initial drafts according to edits from advisors.
- b. Write a final copy and submit it for peer-reviewed and/or university publication.

### 10. Present and reflect

- a. If possible, communicate your results in the form of an oral or poster presentation at a scientific conference.
- b. Reflect on your research experience, highlighting personal growth, areas for improvement, and ideas for future research.



# By:

Andrew Carlson, M.S. Candidate, South Dakota State University

Tracy Wendt, M.S. Student, University of Montana

# Image credits:

AFS Education Section: http://www.fisheriessociety.org/education/River electrofishing: http://www.fisheriessociety.org/education/Channel Catfish: http://www.fisheriessociety.org/education/