DETAILS OF PROPOSAL

<u>Goals and Objectives:</u> Explain clearly the nature of the project and what you intend to learn from it.

This independent study is designed to prepare me for a state government career in fisheries science by providing a foundation of the scientific, mathematical and, to a lesser extent, sociopolitical tools available in managing freshwater aquatic resources. It is meant to be comparable/equivalent to upper-level undergraduate courses in ichthyology, fisheries science, and wildlife management offered at other institutions (e.g., Univ. Minnesota, St. Cloud State Univ., U. Wisconsin at Stevens Point).

<u>Feasibility:</u> Discuss the feasibility of this project, i.e. can this be completed with the resources available and in the stated time frame of the term?

Dr. Carlin has multiple textbooks available in fisheries science, both theory and practical techniques. I will also use the fish and invertebrate collections present in the Gustavus Biology Department collections. Offcampus visits will include a trip to the U. Minnesota Natural History Museum's ichthyology collection and (possibly) to the state Dept. of Natural Resource offices in New Ulm and Waterville, MN.

<u>Basic Background:</u> List any courses you have taken which relate to this study and indicate the grade you received in each.

Dept & Crse No.	Course Title	Grade
BIO 131	Minnesota Aquatic Stewardship	A
BIO 202	Evolution, Ecology and Behavior	C
BIO 245	Conservation Biology	B+
GEG 243	Water Resources Management	A-

List any experiences, readings, or research you have already done which would support this study:

I completed a 2012 summer internship with the Minnesota Dept. of Natural Resources Fisheries Division which gave me practical experience with electrofishing, water chemistry sampling, and organismal sampling towards calculation of Indices of Biotic Intergrity.

Explain how these courses and experiences provide the foundation for your study.

I have extensive background in the foundations of ecology and geography involved in fisheries science. However, my internship supervisors have suggested that I obtain formal fisheries training that would allow me to obtain postgraduate employment in the Department of Natural Resources.

Procedures:

- **What steps will you follow in conducting this study?**

Identify all commercially important species of Minnesota fishes from preserved specimens
Identify all important native and invasive species of Minnesota aquatic plants
Identify all ecologicaly important genera of Minnesota fishes and stream invertebrates from preserved specimens
Identify logistical and statistical features of active and passive sampling techniques, including a demonstrated mastery of these techniques in the field
Understand trophic dynamics of lakes, rivers and wetlands, particularly how these food webs may be manipulated for alternate ecological goals (trophy fishing, recreational fishing, endangered species conservation)
Demonstrate deep understanding of fisheries management tools, particularly mathematical modeling (fish population size and age-structure analysis) and stakeholder management (fisheries regulations and basic U.S. fisheries laws)
Demonstrate ability to load, trailer, park, and unload johnboats and pontoon boats at public landings.

- **How will you structure your time in order to accomplish these steps? (e.g., approximately how much time will be spent reading, writing, in lab, consulting, etc.) If off-campus, specify where these activities will take place.**

8 h./wk	Weekly readings of books and journal articles
4 h./wk	Weekly practice of field techniques
5 h./wk	Weekly writing and statistical assignments
1 h./wk. (averaged)	Oral and laboratory exams
2 h./wk. (averaged)	Trips to fisheries labs (Bell Museum in St. Paul, DNR-Fisheries Offices in New Ulm and/or Waterville)

- **How frequently, in what way(s), and for what purpose(s) will you confer with your instructor during the study. Be as specific as possible.**

Date/Time Method Purpose

I will meet with Dr. Carlin for 1.5 hours every other week, with an additional 4 hour period of lab activity and/or testing each month. See the Assessment section of this form.

I will arrange visits to fisheries and ichthyology facilities that will include Dr. Carlin.

<u>Materials and Resources:</u> What materials, resources, and equipment will you use in order to complete the study? List books and articles which you are likely to read.

Fisheries Management and Conservation, by Michael R. Ross. (1996)
Encyclopeida of Fishes, 2nd ed. edited by John R. Paxton and William N. Eschmeyer (1998)
Fishes of the Minnesota Region by Gary L. Phillips, William D. Schmid and James C. Underhill. 1982.
Fishes: a field and laboratory manual on their structure, identification, and natural history. by Gregor M. Cailliet, Milton S. Love and Alfred W. Ebeling. (1996)
Fisheries Ecology by Tony J. Pitcher and Paul J. B. Hart (1982)
A Dictionary of Ecology, Evolution and Systematics by Roger J. Lincoln (1998)
The Dictionary of Ecology and Environmental Science, edited by Henry W. Art (1993)
Fishes of Wisconsin by George C. Becker (1983).

<u>Assessment:</u> What end products and other means of evaluation will you have at the conclusion of this study? (e.g., lab reports, research papers, annotated bibliographies, journals, tests, quizzes, evaluations from outside the college community, self-evaluation reports). The final grade for the study will be on a letter grade scale (e.g., ABCDF).

Product	Due Date	Portion of Final Grade
Lab exam – fish anatomy	Feb 20	10%
Writing assignment on fish biology	Feb 25	5%
Lab exam – fish identification	Mar 5	15%
Writing assignment on fisheries models	Mar 10	5%
Biology dept. fish collection – curation	Mar 25	5%
Mid-term exam on readings	Mar 25	15%
Lab exam – plant and insect identification	Apr 5	10%
Writing assignment on fisheries regulations	Apr 10	5%
Boat handling demonstration	May 5	5%
Sampling gear oral exam	May 5	10%
Professional, active participation	May 22	15%

Grades will be assigned according to the following criteria: A (93.4-100%), A- (90-93.3%), B+ (86.7-89.9%), B (83.4-86.6%), B- (80-83.3%), C+ (76.7-79.9%), C (73.4-76.6%), C- (70-73.3%), D (60-69.9%), F (less than 60%)