

**ENDANGERED KANAB AMBERSNAIL USE OF NATIVE AND NON-NATIVE HOST
PLANTS IN GRAND CANYON, ARIZONA**

**FINAL 1996 REPORT
NAU PROJECT NO. BIO 351Z**

**GLEN CANYON ENVIRONMENTAL
STUDIES OFFICE**

JAN 2 1997

Peter W. Price, Lawrence E. Stevens

**RECEIVED
FLAGSTAFF, AZ**

and

Clay B. Nelson

**Department of Biological Sciences, Box 5640
Northern Arizona University
Flagstaff, AZ 86011**

31 December, 1996

Submitted To:

**Terry May, Sponsored Projects Coordinator
Northern Arizona University
Flagstaff, AZ 86011**



BIOLOGICAL SCIENCES

GLEN CANYON ENVIRONMENTAL
STUDIES OFFICE

JAN 2 1997

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FLAGSTAFF, AZ

Mr. Terry May
Sponsored Research Office
Northern Arizona University
Flagstaff, AZ 86011

DATE: December 31, 1996

Dear Mr. May:

Enclosed please find a copy of our 1996 final technical and administrative reports entitled, "ENDANGERED KANAB AMBERSNAIL USE OF NATIVE AND NON-NATIVE HOST PLANTS IN GRAND CANYON: 1996 ANNUAL REPORT". This report constitutes completion of the 1996 research associated with NAU project No. BIO 351Z.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Peter W. Price

Lawrence E. Stevens

Department of Biological Sciences, Box 5640
Northern Arizona University
Flagstaff, AZ 86011

encl: 1996 Final Technical and Administrative KAS Report
cc: D. Bills, L. Garrett, C. Karas, R. Quartaroli

1996 Kanab Ambersnail Annual Progress Summary

A proposal for research on endangered Kanab ambersnail use of native and non-native host plants in Grand Canyon, Arizona was funded by the Bureau of Reclamation on 9 September 1996. The proposed work involves these phases: laboratory study, habitat establishment, and initial establishment of an experimental Kanab ambersnail population. The U.S. Fish and Wildlife Service Recovery Plan (1995) for Kanab ambersnail states that 10 additional Kanab ambersnail populations are to be discovered or established before the species can be downlisted, and least one of these populations is expected to be in Arizona. Recovery activities are proceeding and will require considerable time. Meanwhile, ecosystem management of the Colorado River in Grand Canyon depends on the ability of the Bureau of Reclamation to conduct habitat building flows. Our feasibility study will help determine Kanab ambersnail habitat requirements and life cycle, and the feasibility of establishing an experimental population at Glen Canyon Dam.

Phase I of this project consists of 5 specific objectives involving literature review, host plant propagation, and ambersnail life history. Host plant propagation has been initiated; however objectives and phases involving research on ambersnails will not be initiated until mid-summer of 1997 when ambersnail egg masses are collected from Vaseys Paradise.

SPECIFIC OBJECTIVES FOR PHASES I AND II

1. Literature Review

- A comprehensive review of all relevant literature pertaining to Kanab ambersnail, succineid ecology, parasitism of molluscs, genetic isolation, geographic speciation, the two host plant species, and host plant shifts among invertebrates.
- #### **2. Data collection and analysis regarding propagation of ambersnail host plants, as well as growth rates, seed longevity, and plant life cycle information.**
- September 1996: Both Kanab ambersnail host plants were collected at Vaseys Paradise, and have been successfully growing in the NAU greenhouse.
 - January 1997: Construction of 5 plexiglass plant/snail enclosures will begin. Each enclosure will contain 5 individual compartments approximately 10 gallons in volume. A layer of gravel, sand, and soil will be put in each compartment where randomly selected host plants will be placed. Drainage holes, a screen top with a lid, multispectral lights, and a fan will be used to provide optimal growing conditions for the plants. Each enclosure can be modified for experimental manipulation.
 - February 1997: Plants will be placed in plexiglass enclosures and growth rates will be monitored on a weekly basis.

- March 1997: After greenhouse plants have been established, experiments involving response to varying levels of nutrients, and light intensities will be performed.

NAU greenhouse experiments will provide essential information regarding host plant propagation and ideal growth conditions. This information lays the foundation for future establishment of Kanab ambersnail host plants. Once this information is gained, collection of ambersnails and analysis of their life history may begin.

3. Planning Kanab ambersnail habitat construction with interagency consultation.

- March 1997: Pilot analysis of light conditions, rodent density, survey issues, and water quality will be performed at Glen Canyon Dam.
- Meet with dam operators to discuss project construction.
- May 1997: Initiate construction of Kanab ambersnail habitat and propagation of host plants.

4. Collect data on survivorship, growth rates, and fecundity for two generations (two growing seasons) of the Kanab ambersnail reared on each of the two host plant species in the NAU laboratory, developing an ambersnail life history model.

- June 1997: Kanab ambersnail egg masses or young snails will be collected at Vaseys Paradise and placed in laboratory enclosures. Data pertaining to snail survivorship, growth rates, ovipositional preference, and fecundity on the two host plants will be collected.

EXPENDITURES FOR 1996

- None to date.