

CRISSP Summer Undergraduate Internship Program

OPPORTUNITIES:

The Center for Research on Invasive Species and Small Populations (CRISSP) at the University of Idaho is sponsoring 8-10 undergraduate interns to work with Center Faculty for an 8-week period during June - July of 2006. Summer interns will participate in faculty and/or graduate student research, as well as activities designed to help prepare them for graduate school and a career in science. Interns will receive a salary of \$3600 for the 8 week internship.

SUMMER ACTIVITIES:

Summaries of the Research Projects that will host interns during 2006 are provided below.

In addition to field and laboratory research, the interns will participate in group activities where they will learn about one another's projects, meet with faculty members, attend research and mentoring seminars, learn about graduate school preparation and opportunities, and visit research sites and other areas of interest in the region.

Housing in a University of Idaho residence hall is available at a cost of \$540-560 per month (single studio apartments that include high-speed internet, local phone service, and utilities).

APPLICATIONS (Due April 21):

To apply, submit the following materials electronically to jrachlow@uidaho.edu:

1. Letter of interest indicating your top 3 choices for Research Projects, previous research experience, and career goals.
2. Curriculum Vitae (or Resume).
3. Names and contact information (email and phone numbers) for 3 references.

Please indicate in the email subject line "CRISSP INTERN APPLICATION"

SCHEDULE:

April 21 **Applications Due by 5:00 pm** (Pacific time)

April 28 Selected interns will be notified via email

June 5 Internships will begin (unless other arrangements are made with the PI)

CRISSP Summer Internship Committee
Dr. Janet Rachlow, Chair
Department of Fish and Wildlife Resources
jrachlow@uidaho.edu

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PROJECT TITLE: Community Structure of Shrub-Associated Hemiptera in a Threatened Ecosystem

PRINCIPAL INVESTIGATOR(S): Dr. Sanford D. Eigenbrode. Department of Plant, Soil and Entomological Sciences.

PROJECT DESCRIPTION: The goals of our Palouse prairie research program are to document patterns of invertebrate diversity across the landscape, with a particular focus on trophic relationships among arthropods utilizing native shrubs. The student intern will focus on the insect order Hemiptera, a taxonomic group containing numerous predator and herbivore species of economic and conservation importance. This group is moderately diverse and most species can be identified even if the student lacks previous entomological experience. The relationship of landscape pattern to the diversity and community structure of this sub-community will be analyzed using GIS tools and landscape ecology techniques.

STUDENT INTERN EXPERIENCE / OPPORTUNITY: Research activities for the student intern will include both field and laboratory work. The intern will gain experience in:

- Arthropod sampling and proper sample curatorial techniques
- Identification of several insect orders
- Taxonomy and ecology of species in the order Hemiptera
- Data entry and organization of data for further analysis
- Use of basic statistics programs, ARCMAP, and specialized programs for analyses
- Presenting research findings to peers orally
- Participating in discussions and contributing to work by students working in related areas

PROJECT TITLE: Ecology of Chinook Salmon *Oncorhynchus tshawytscha* Populations in Idaho

PRINCIPAL INVESTIGATOR(S): Dr. Brian Kennedy. Department of Fish and Wildlife Resources.

PROJECT DESCRIPTION: A CRISSP summer intern (or interns) will participate in the first year of a potentially long-term study on juvenile Chinook salmon population dynamics in Big Creek led by Dr. Brian Kennedy. Chinook salmon *Oncorhynchus tshawytscha* populations in Idaho have been listed under the Endangered Species Act (ESA) of 1973 as a result of long term demographic declines. The overall goal of funded projects in Big Creek is to quantify key aspects of Chinook consumption, growth, survival and movements that identify relationships between habitat availability, bioenergetics and salmon performance throughout their freshwater existence.

STUDENT INTERN EXPERIENCE / OPPORTUNITIES: Research activities for the student intern will include both field and laboratory work. The intern will gain experience in:

- Standard aquatic ecology and fisheries methods and techniques
- Observational techniques for studying fish behavior and habitat use

- Snorkeling and backpack shocking for quantifying fish abundance and density, habitat analysis and quantification, macroinvertebrate collection and sorting, and fish stomach sampling

The intern will be based at the Taylor Ranch and will spend approximately 5-6 weeks in the field and 2-3 weeks in Moscow at the University of Idaho conducting lab and preparatory work.

PROJECT TITLE: Determining a Reliable Field Protocol for Effective Lethal Dosing of New Zealand Mudsail Embryos

PRINCIPAL INVESTIGATOR(S): Dr. Christine Moffitt. Department of Fish and Wildlife Resources.

PROJECT DESCRIPTION: The New Zealand mudsnail (NZMS) has a maximum length of 5 mm, and in native freshwater lakes and streams of New Zealand the populations are controlled by predation and parasites. Through various means, NZMS have been distributed to locations throughout the world to waters of North America, Europe, Japan, and Australia, and have reproduced to reach high densities of up to 7500,000 /m² causing disruption of ecosystem dynamics. Disinfection protocols have been developed for sampling gear, surfaces, and water sources, however, we have recently found in our laboratory that stressed individuals will release their broods at the time of death. These small “baby” snails are functional and are less than 0.3 mm in length, not easily seen by unassisted eye, and if they survive could start a new colony. In this project the student intern will assist graduate students and staff in establishing profiles of lethal killing and model the lethal response of baby snails to various strategies that could be used in field and/or hatchery conditions. We will provide a set of effective killing strategies that can be used for disinfection protocols for hatcheries, anglers, and field biologists.

STUDENT INTERN EXPERIENCE / OPPORTUNITIES: Research activities for the student intern will include laboratory work. The intern will gain experience in:

- Testing bleach, copper screens, ozone, and other agents that could be used for potential lethal treatments for “baby” snails
- Conducting time series trials and determine killing rate of several concentrations over time
- Determining a suitable set of concentrations to test short term LD50 or 100 trials
- Modeling lethal responses with survival analysis and probit models

The intern will be based in Moscow and will conduct field trials at the CNR Fisheries Wet Laboratory, and the Aquaculture Lab. The student will prepare a presentation and set of protocols to be distributed to agencies, and will present findings at the NZMS workshop in Montana held in August.

PROJECT TITLE: Research on the Ecology of Invasive Knapweed

PRINCIPAL INVESTIGATORS: Dr. Cort Anderson, Dr. Sanford Eigenbrode, Dr. George Newcombe, Dr. Tim Prather, Dr. Mark Schwarzlaender, Dr. Alexey Shipunov, Dr. Linda Wilson, and PhD student Anil Raghavendra. Departments of Fish and Wildlife Resources; Plant, Soil and Entomological Sciences; and Forest Resources. Expertise in the group includes: Chemical Ecology, Entomology, Evolutionary Biology and Phylogenetics, Mycology and Plant Pathology, Plant Ecology, and Weed and Invasion Biology.

PROJECT DESCRIPTION: The overall goal of this study is to improve management of one of the worst invaders in Idaho, spotted knapweed, by understanding the effects of symbionts on the plant. In a collaborative research project involving the listed investigators, we have already shown that endophytes affect growth of knapweed and its competitors in greenhouse experiments. However, experiments to date have been performed in the absence of mycorrhizae. But in nature, knapweeds are known to be mycorrhizal. The objective of the research is to determine the extent to which growth and reproductive success of spotted knapweed is affected by endophytes in the presence or absence of mycorrhizae.

STUDENT INTERN EXPERIENCE / OPPORTUNITIES: Research activities for the student intern will include both field and laboratory work. Working with graduate students, a postdoc and faculty, the intern will gain experience in:

- using the standard ‘Brundrett methods’ of collecting, clearing and staining roots for AMF mycorrhizal fungi.
- caring for and measuring research plants in the greenhouse.
- participation in ongoing endophyte research.
- distinguishing fungal structures from root cells using differential interference microscopy.
- learning about experimental design, data collection and data management through hands-on experience and day-to-day responsibility.

The intern will be based in Moscow when conducting lab and greenhouse work, and will participate in field trips in Idaho to collect samples. **As biotic exchange becomes more and more important globally, this opening is a general opportunity to gain experience in Invasion Biology.**

RELATED READINGS:

Callaway, RM *et al.* 2001. Compensatory growth and competitive ability of an invasive weed are enhanced by soil fungi and native neighbors. *Ecology Letters* 4: 429-433.

Marler, MJ, Zabinski, CA, and Callaway, RM. 1999. Mycorrhizae indirectly enhance competitive effects of an invasive forb on a native bunchgrass. *Ecology* 80: 1180-1186.

PROJECT TITLE: Identifying Markers for Strains of Rust *Puccinia chondrillinae*, the Biological Control Agent for Invasive Rush Skeletonweed (*Chondrilla juncea*)

PRINCIPAL INVESTIGATOR(S): Dr. Mark Schwarzländer, Dr. George Newcombe, Dr. Cort Anderson, and Dr. Alexey Shipunov. Departments of Plant Soil and Entomological Sciences; Fish and Wildlife Resources; and Forest Resources.

PROJECT DESCRIPTION: Rush skeletonweed (*Chondrilla juncea* L.) is an invasive plant in Idaho that has recently begun to accelerate its spread, both within Idaho and in other states. The most successful biological control agents introduced for rush skeletonweed are strains of the rust *Puccinia chondrillinae*. These strains show varying degrees of pathogenicity on rush skeletonweed. This project will use genetic markers to characterize rust strains currently present in the U.S., a necessary precursor to studies of the efficacy of these strains in control of skeletonweed.

STUDENT INTERN EXPERIENCE / OPPORTUNITIES: Working with graduate students, faculty, and postdocs, the intern will:

- Learn appropriate sampling protocols for collecting rust isolates from skeletonweed
- Learn DNA extraction procedures
- Use PCR to amplify the ITS region of the rust strain(s)
- Sequence the amplified DNA fragments
- Analyze the sequence data, and identify variant rust strains
- Compile and compose a report on the results generated by the project

The intern will be based in Moscow and will spend approximately 5-6 weeks conducting laboratory analyses. The intern will participate in field trips in Idaho, Oregon, and northern California to collect rust samples.

PROJECT TITLE: Effects of Preservation Method on DNA Degradation in Feathers

PRINCIPAL INVESTIGATOR(S): Dr. Lisette Waits. Department of Fish & Wildlife Resources.

PROJECT DESCRIPTION: The objectives of this project are to: 1. Determine the temporal rate of DNA degradation in feathers subjected to four different preservation methods (submersion in 70% ethanol, submersion in Longmire lysis buffer, desiccation by silica beads, frozen) and a control (no preservation method); and 2. Collect non-invasive samples from the rare juniper titmouse in south western Idaho and apply appropriate preservation method.

STUDENT INTERN EXPERIENCE / OPPORTUNITIES: Research activities for the student intern will include both field and laboratory work. The intern will gain experience in:

- Monitoring avian species associated with juniper/aspen habitats
- Collecting non-invasive samples from nests after fledging or nest failure
- Practicing organizational skills, learning to keep thorough laboratory records, and learning laboratory techniques
- Extracting DNA from feathers and using agarose gels to visualize DNA
- Using statistical programs to analyze DNA amplification success

The intern will be based in Moscow and will spend approximately 5-6 weeks conducting analyses in the Laboratory for Ecological and Conservation Genetics in the College of Natural Resources. The intern will participate in 3 field trips to southwestern Idaho to monitor avian species and to collect non-invasive genetic samples.

PROJECT TITLE: Research on the Ecology of Invasive Hawkweed

PRINCIPAL INVESTIGATOR(S): Dr. Linda Wilson, Dr. George Newcombe, Dr. Tim Prather and Dr. Cort Anderson. Departments of Plant, Soil and Entomological Sciences; Forest Resources; and Fish and Wildlife Resources.

PROJECT DESCRIPTION: The overall goal of this study is to develop an IPM decision support tool to restore hawkweed-invaded lands that are based on ecologically sound, sustainable principles of management of soil fertility and maintenance of competitive vegetation. The three objectives of the research are to: 1) Determine the effects of soil nitrogen, phosphorus, and potassium on hawkweed competitive dynamics; 2) Determine the gap size limit for successful

community closure, and enhancement of diversity; and 3) Determine the importance of arbuscular mycorrhizal fungi in the invasion success of exotic hawkweeds.

STUDENT INTERN EXPERIENCE / OPPORTUNITIES: Research activities for the student intern will include both field and laboratory work. The intern will gain experience in:

- Measuring and monitoring vegetation in the field, including estimating percent plant cover and density
- Caring for and measure research plants in the greenhouse
- Collecting, pressing, and curating invasive hawkweeds and associated species
- Staining hawkweed roots, preparing slide mounts, and operating a compound microscope to evaluate and describe mycorrhizal fungi associated with hawkweed
- Developing a field plot plan and systematically applying fertilizer treatments and conducting follow-up evaluations
- Extracting DNA, running PCR, interpreting microsatellite data

The intern will be based in Moscow when conducting lab and greenhouse work, and will participate in field trips to collect samples.

PROJECT TITLE: Genetic Connections among Fragmented Populations: Pygmy Rabbits in Idaho and Montana

PRINCIPAL INVESTIGATOR(S): Dr. Janet Rachlow. Departments of Fish and Wildlife Resources.

PROJECT DESCRIPTION: The goals of this research are to identify barriers to gene flow across multiple spatial scales for pygmy rabbits in the sagebrush steppe of southern Idaho and western Montana. This research is part of a PhD project (Wendy Estes-Zumpf) investigating dispersal and landscape genetics in pygmy rabbits.

STUDENT INTERN EXPERIENCE / OPPORTUNITIES: Research activities for the student intern will include both field and laboratory techniques. The intern will assist in:

- identifying sign from pygmy rabbits and locating individuals for trapping
- using wire-box traps to capture animals
- handling live animals (restraining, marking, and collecting measurements)
- collecting and preparing tissue samples for genetic analyses
- completing lab analyses (extracting DNA, running PCR, interpreting microsatellite data)

The intern will be based in Moscow and will spend approximately 5-6 weeks conducting analyses in the Laboratory for Ecological and Conservation Genetics in the College of Natural Resources. The intern will participate in 2-3 field trips to southern Idaho and southwestern Montana to collect tissue samples from rabbits.