Cooperative Research Units

Student Orientation Manual

Revised January 2010

PREFACE

The purpose of this orientation manual is to provide a general overview of the Cooperative Research Unit (CRU) Program, its policies and procedures, and the responsibilities and expectations placed upon participating graduate students. This manual was prepared in response to recommendations of former students, all of whom received their graduate degrees through a cooperative fish and wildlife research unit. Recent graduates suggested that new students would profit from a better understanding of the CRU Program and its 40 cooperative fish and wildlife research units. Although each unit has unique characteristics, all are linked by a common mission and operational style that is largely set by federal legislation. This manual is intended to provide a historical and operational context for graduate student participation in the CRU Program. Some portions of it have been adapted to the specific situations of graduate students at the Texas Cooperative Fish and Wildlife Research Unit.

This manual explains how the national CRU Program was established, how it operates, and what the responsibilities are of unit scientists and unit students. Included in this orientation guide are appendices that highlight select topics. Some topics such as conduct of research, approvals and permits for research projects, safety and others are discussed in much more detail under separate cover in the Cooperative Research Units Policy and Procedures Manual. Below are definitions for key terms used in this manual for reference purposes:

- CRU Program versus unit program: The term "CRU Program" refers to all 40 cooperative fish and wildlife research units. "Unit program" refers to the activities of an individual cooperative research unit.

- Unit/federal scientist: An employee of the U.S. Geological Survey (USGS) who serves as either the unit leader or assistant unit leader of the cooperative fish and wildlife research unit at host universities. In this manual, unit leaders and assistant unit leaders are referred to collectively as "unit scientists."

- Unit student: Refers to any Master's or PhD student whose major advisor is a unit scientist.

- Unit project: Any project, not just those administered by unit scientists, which receives financial and/or logistical support from a cooperative fish and wildlife research unit, as approved by the unit's Coordinating Committee.

- Principal investigator: The primary point of contact for a unit project who is responsible for the project's research activities and associated information products. This may be a unit scientist or a university faculty member affiliated with the unit through projects or some other arrangement.

TEXAS COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

The Texas Cooperative Fish and Wildlife Research Unit (TCFWRU) was established at Texas Tech University by the U.S. Congress in 1988 and was first staffed in 1989. TCFWRU is part of the National Cooperative Research Units Program that resides within the U.S. Geological Survey, and its mission is to conduct and facilitate research and education activities related to natural resource management and conservation. TCFWRU cooperators include Texas Tech University, Texas Parks and Wildlife Department, U.S. Geological Survey, the Wildlife Management Institute, and the U.S. Fish and Wildlife Service. Current efforts of TCFWRU focus on aquatic and terrestrial ecosystems. Specific fields of interest include fisheries and wildlife management, aquatic and wildlife ecology, community ecology, ecophysiology, ecotoxicology, reproductive biology, and fish culture. These research and educational efforts are based on the technical expertise of unit scientists and university cooperators.

TCFWRU Unit Scientists include Dr. Reynaldo Patiño (Unit Leader) and Dr. Clint Boal (Assistant Unit Leader-Wildlife). A third Unit Scientist position is currently vacant. Ms. Tammi Barnett serves as Administrative Business Assistant. Contact information in case of emergencies includes:

- Dr. Reynaldo Patiño: home (806) 793-1677, cell (806) 392-3032
- Dr. Clint Boal: home (806) 798-9666, cell (806) 790-4428
- Tammi Barnett: cell (806) 317-6528
- TTU Campus Police: (806) 742-3931
- University Medical Center Emergency: (806) 775-9450, 775-8200
- Environmental Health & Safety: (806) 742-3876
- Animal Care and Use Committee: (806) 742-3722 x223

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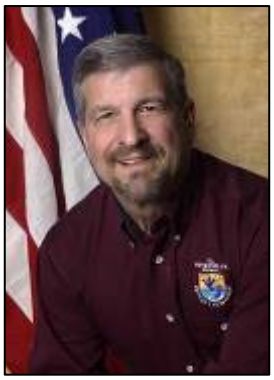
Additionally, we thank the following Cooperative Fish and Wildlife Research Units for allowing us to incorporate sections of their student handbook into this document: Arkansas, Minnesota, North Carolina, and South Dakota.

THE COOPERATIVE RESEARCH UNITS PROGRAM

I. The Face of Past and Current Students



Credit: FWS

"My time at the Louisiana State University Coop Unit prepared me for life as a professional in more ways than I could have imagined. Because of its active relationship with the Louisiana Department of Wildlife and Fisheries and its contracts with the Army Corps of Engineers, I was able to participate in an ongoing evaluation of real life projects by providing fisheries data that was directly used in the Environmental Impact Statements for flood control projects. The professors at the Unit brought a pragmatic insight to scientific analyses that prepared me for a career with the U.S. Fish and Wildlife Service. I believe the Coop Unit System does much more than provide quality instruction in scientific principles. It provides education and experience that builds leaders for the future."

Dale Hall, former Director of the U.S. Fish and Wildlife Service
Master's of Science, 1979
Louisiana Cooperative Fish and Wildlife Research Unit

"My experience as a Coop Unit student at Penn State University provided me the opportunity to work side-by-side with U.S. Fish and Wildlife Service and Pennsylvania Game Commission employees. This allowed me to learn about real world wildlife management while I pursued my Ph.D. Exposure to these wildlife management professionals proved invaluable and set the stage for my career as a state and federal wildlife biologist, and now, as the President of a non-profit wildlife management organization. I would encourage all Coop Unit students to take advantage of the practical knowledge possessed by these individuals both in the classroom and in the field."

Credit: FWS

Steve Williams, President of Wildlife Management Institute;
Former U.S. Fish and Wildlife Service Director
Doctorate of Philosophy, 1986
Pennsylvania Cooperative Fish and Wildlife Research Unit

Credit: B. Bartels

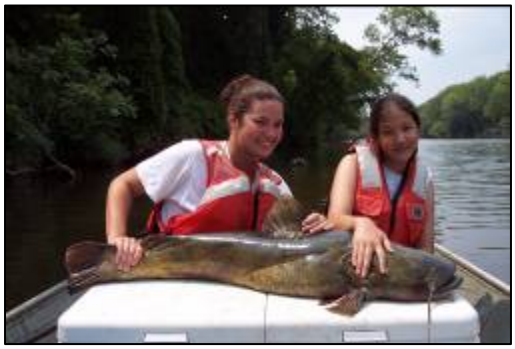
"As a graduate student at Louisiana State University, the Cooperative Research Program gave me a chance to learn how to blend high quality science with accountability to the public and to develop practical skills in the field that have become the core of who I am as a professional. I learned quickly how to explain to the public – in the swamps of Louisiana – why they should care about my work on microplankton. No small feat! Believe me, your time within the Unit Program will give you that chance to be challenged academically and practically…to make mistakes, to learn, to become a skilled, knowledgeable professional. Welcome!"

Leslie Holland-Bartels, USGS Regional Executive Officer;
Director of Alaska Science Center
Master's of Science, 1977
Louisiana Cooperative Fish and Wildlife Research Unit

Credit: Mark Gocke/WY Game & Fish
Hall Sawyer draws a blood sample from an elk in southwest Wyoming. For his Master's study, he researched the habitat selection and movement patterns of wintering elk in the Green River Basin and generated the first habitat use models for elk in non-forested regions of Wyoming.

"The Wyoming Coop Unit has been a perfect fit for my graduate work because my interest is in applied (management-oriented) research. The Coop Unit provides an ideal environment to pursue applied research because it considers the needs of federal and state agencies, while providing access to faculty and other academic resources at the university. The result is a research product that has both academic rigor and the information needed by agencies to improve their management of fish and wildlife resources."

Hall Sawyer, PhD student and former Master's student
Wyoming Cooperative Fish and Wildlife Research Unit
Advisor, Matt Kauffman



Credit: Patrick Cooney, NC Unit
Brewster (left) and Aya Tajiri, a high school scholar intern through American Fisheries Society, sampled the diets of flathead catfish in North Carolina's upper Cape Fear River basin as part of a study to learn how the introduced catfish impacts select native fish populations.

"I joined the North Carolina Coop Unit because I wanted to be associated with a program that was larger than my university during graduate school. The Coop Unit has given me the opportunity to work and interact with some of the top fisheries biologist in the field. It also has allowed me to work with state and federal agencies and has increased my possibilities of getting a job with these agencies when I graduate. I'm very satisfied with my experience with the Coop Unit and look forward to continue working with them during my professional career."

Jessica Brewster, Master's student
North Carolina Cooperative Fish and Wildlife Research Unit
Advisor, Tom Kwak

"For me, Coop Units are the keystone for developing research skills and intellect as a graduate student. They offer a challenging framework for maximizing my performance as a student and a scientist. The collaborative relationship between state and federal government, academy and non-profit organizations is a practical strategy for building a network with all kinds of natural resource professionals. The Coop Unit Program demonstrates the immense value of teamwork – individuals working together to provide high quality answers to our natural resource questions."

Rafael González, Master's student
Mississippi Cooperative Fish and Wildlife Research Unit
Advisor, Francisco Vilella

Credit: Francisco Vilella, MS Unit
To help the U.S. Fish and Wildlife Service develop a new recovery plan for the endangered Puerto Rican nightjar, González is investigating the bird's current geographic distribution and population density in southwest Puerto Rico.

Your future is bright! From 1998 to 2006, approximately 1,000 students received a Master's of Science or Doctorate of Philosophy degree through the CRU Program: over 46% of those graduates obtained a job with either a federal or state agency, 23% worked for a university, 13% worked for a non-federal entity, 10% worked for private industry, and 8% continued their education. Students are encouraged to share their career goals with major advisors throughout the course of graduate studies. It is important for students to communicate to their major advisors what their future plans/interests may be. Knowing whether you are interested in pursuing a PhD, obtaining a teaching position, or landing a job with a management agency, non-profit organization, or private industry can help advisors and committee members and others keep an eye out for opportunities. Unit scientists have a personal interest in seeing their students succeed. In recent years, more than 95% of all program graduates are placed into permanent or temporary positions within one year of their completion of degree requirements.

II. Cooperative Research Units 101

A. History of the Cooperative Fish and Wildlife Research Units

The CRU Program originated in the U. S. Department of Agriculture in the mid-1930s to increase the number of trained wildlife biologists and increase research in support of wildlife management. The history of the CRU Program parallels that of modern wildlife and fisheries science and is replete with famous scientists, news-making discoveries, challenged dogma, political intrigue, unique cooperative relationships, and a parade of successful graduate students.

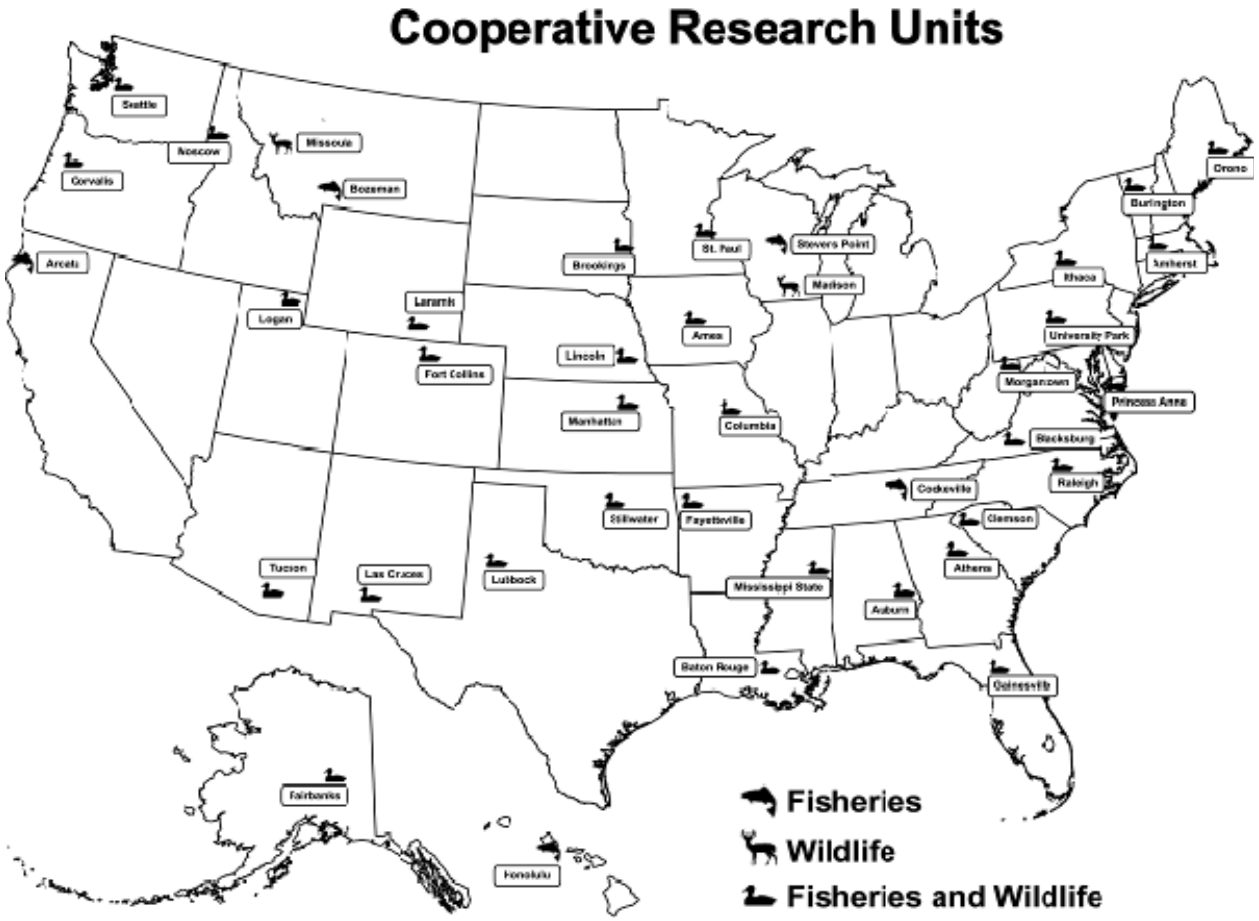
At the 1930 Conference of the American Game Association, Aldo Leopold chaired a policy committee that wrote a critical report about the nation's wildlife. In that report, the committee members explained how the United State's demand for wildlife was outstripping its supply; how wildlife habitat on private lands needed increased stewardship; and how the nation lacked quality-trained wildlife professionals and non-politicized research data to conduct and support wildlife management. The report prompted action from an unlikely source, a cartoonist and political satirist for the *Des Moines Register* (Iowa) named J. Norwood Darling – "Ding" to his readers.

Ding Darling was an avid hunter and saw the problems of over harvest and habitat loss associated with wetland drainage and drought during his hunting trips to South Dakota. At the time, wildlife management was dominated by regulations and their highly politicized enforcement. Little science on habitat, species, or conservation existed. Consequently, Darling persuaded Iowa State College and the Fish and Game Commission to form a cooperative research and training program for wildlife biologists.

The Iowa Cooperative Wildlife Research Unit began operating in 1932, led by Dr. Paul Errington a student of Aldo Leopold. When Darling came to Washington, DC in 1934 to head the Bureau of Biological Survey (now the U.S. Fish and Wildlife Service), he wanted to establish a national CRU Program that operated under the tripartite mission of education, research, and technical assistance. Darling managed to get a number of land-grant colleges and state wildlife departments to participate in and help fund the burgeoning program. He also got funding from the Sporting Arms and Ammunition Manufacturers through their American Wildlife Institute (now the Wildlife Management Institute, http://www.wildlifemanagementinstitute.org). By December 1935, cooperative wildlife research units operated in Oregon, Utah, Ohio, Iowa, Texas, Alabama, Virginia, Connecticut and Maine, with many more eventually to follow. Unit graduates began to fill many top posts in state and federal wildlife agencies.

Since 1935, the CRU Program has maintained its three-pronged focus on generating research furthering the understanding of fish and wildlife management; training future natural resource professionals; and helping natural resource managers apply scientific information. In 1960, Congress passed the Cooperative Units Act (Public Law 86-686) to authorize the program and add more wildlife units. The first fisheries units were established in Utah, Colorado, and Georgia with 22 more to follow. In 1978, Congress amended the Cooperative Units Act to authorize the CRU Program as a separate line item in the annual federal budget. During the 1980's, the fisheries units and wildlife units were combined in most states. Today, there are 40 Units in 38 states. Three states (California, Hawaii, and Tennessee) only have Cooperative Fisheries Units. Two states have separate wildlife and fisheries units, an artifact of early program history in which fish units were sometimes placed on different campuses than wildlife units.

Between 1993 and 1996, the CRU Program twice switched federal homes. First, in 1993 former Secretary of the Interior Bruce Babbitt directed the combination of all biological research programs within the Department of the Interior to create the National Biological Survey. For three years the CRU Program was housed at this new agency, but in 1995 Congress voted to transfer all National Biological Survey programs to the USGS and create the Biological Resources Discipline. Since 1996, the CRU Program has operated within the USGS. Today, USGS serves as the primary research arm for the Department of the Interior and supports four scientific disciplines: geology, geography, hydrology, and biology. The USGS employs nearly 9,000 people located in 200 field offices, which includes cooperative fish and wildlife research units.



B. Program Organization

The CRU Program consists of 40 university-based cooperative fish and wildlife research units and a national program office, which is located in the USGS headquarters office in Reston, Virginia. The CRU headquarters office provides the national framework and administrative support for all cooperative fish and wildlife research units. The main functions of the headquarters office include coordinating the interests of national program cooperators, representing the USGS's interest in the CRU Program by participating in coordinating committee meetings, integrating CRU Program activities with USGS initiatives, and most importantly, providing operational assistance and support to CRU staff in the field.

Each cooperative fish and wildlife research unit represents a specific university-based partnership through which the mission of the CRU Program is accomplished. All units are established through a unique cooperative agreement that defines the unit's

purpose, management direction, and responsibilities and contributions of each signatory cooperator. Signatories of cooperative agreements include the unit's host university, the Wildlife Management Institute, the relevant state natural resource agency, USGS, and in many cases the USFWS.

C. Cooperator Support and Contributions to Cooperative Fish and Wildlife Research Units

Each cooperator makes a unique contribution to support a Unit's operation and management. In turn, the contributions of each program cooperator are leveraged against those of other cooperators to facilitate the sharing of financial resources, expertise, facilities, and opportunities. Through this support mechanism, units maximize their ability to achieve the individual research, education, and technical assistance goals of each program cooperator. In general, the cooperators of each unit make the following contributions.

- The **host university** provides administrative staff, office space, research and storage facilities, utilities, libraries and computer services, and a significant waiver of indirect costs associated with project funding. The university also provides unit scientists with faculty appointments.

- The **state natural resource agency** provides funding for the unit's operational expenses and permits access to equipment, personnel, and facilities as needed. Importantly, the state agency may also contribute funding for unit projects.

- The **USGS** pays the salaries and benefits for the three to five federal scientists assigned to a typical Unit. The USGS also provides operating funds and administrative support for each unit.

- The **USFWS** provides access to its facilities; many students conduct their research on national wildlife refuges or at national fish hatcheries. The USFWS also funds specific research projects to address its management needs.

- The **Wildlife Management Institute** assists the CRU headquarters office with the coordination of cooperator interests and directing the research, education and technical assistance activities of individual units.

Credit: Michael Guzy, WI-Wildlife Unit
Susan Vos (Wisconsin-Wildlife Unit) documented the importance of Ft. McCoy's grassland habitat to 62 bird species, 12 of which are species of concern. DOD is using the resultant database to identify conservation strategies specific to grassland birds.

D. Management and Direction of Cooperative Fish and Wildlife Research Units

Each cooperative fish and wildlife research unit functions within the operational systems of its cooperating university and state agency. All units receive guidance from the Coordinating Committee, which is comprised of the signatories to the cooperative agreement. This committee acts like a "board of directors" where all cooperators play a role in defining the unit's mission, establishing the unit's staffing needs, and approving the unit's operating budget and research/technical assistance projects. In turn, the unit leader serves as the "chief executive officer" of the Unit, and he or she is responsible for executing all actions agreed to by the Coordinating Committee.

The Coordinating Committee meeting, which is typically held annually, is the focal point for cooperator review and approval of unit activities. At this meeting, cooperators examine and discuss unit activities, projects, and budgets. In many cases, students are asked to participate in Coordinating Committee meetings to present research findings and give progress reports on ongoing studies. Typically, at least one representative from each cooperating entity will be present and sometimes the host university's president or dean will attend. Normally three to four people from the unit's cooperating state agency will be present to ensure all of the agency's interests in unit program activities have proper representation. The USFWS often sends personnel from its regional and state offices (i.e., local refuge or ecological service office), and the unit leader generally invites all project sponsors, regardless of the sponsors' organizational affiliation. The CRU unit supervisor attends as the USGS representative and may be accompanied by regional USGS officials. Beyond these typical attendees, as many as 30 additional individuals may attend the meetings. Students are typically invited and participate, which provides excellent networking opportunities.

E. Unit Projects and Funding

Unit scientists rely on their working relationships with state and federal agencies to secure funding for research projects, ensuring that investigations conducted are relevant and of high priority to their unit program's cooperators and agency partners. The large majority of research projects support graduate student education and training, which is an identified program purpose.

Unit scientists work with funding agencies to develop a research contract that identifies specific products and delivery dates. These contractual obligations are important to students because they often involve project schedules, including deadlines for collecting and analyzing data, and providing deliverables, such as progress and final reports. Typically, Unit research projects directly support management and policy decisions by the sponsoring agency(s) and so data need to be collected, preserved, and analyzed appropriately to be of the highest quality. Many research projects developed by Unit scientists are based on long standing relationships with partners and sponsoring agencies. It is important for each student to understand the role that they play in conducting research projects for cooperators, which is a balance between a great professional opportunity and a significant responsibility to deliver high quality research products in a timely manner. A student's performance may influence the decision of a

project sponsor to use the unit's services again in the future, or even to continue funding ongoing projects.

III. Unit Scientists: Their Roles and Responsibilities

Scientists directly affiliated with the unit are federal employees of the USGS. Other faculty members may sponsor graduate students at the Unit. Unit scientists serve their Unit as either a leader or assistant leader. Assistant leaders are appointed for their expertise in wildlife or fisheries science of interest to cooperators. In contrast, unit leaders have expertise in either fish or wildlife sciences and are responsible for the overall operation and administration of the unit's program and for maintaining relationships with all cooperators. The responsibilities of each Unit leader include budget, contract and personnel management; policy implementation; property maintenance; and safety supervision. Additionally, Unit leaders oversee their Unit's research program to provide a level of quality control for all projects.

Both leaders and assistant leaders have a primary responsibility for the conduct of scientific research, teaching, and technical assistance. Unit staff need to balance mission-related responsibilities of conducting research, providing support to graduate education, and technical assistance, as well as find opportunities to link these mission functions.

Unit scientists are responsible for bringing a federal science perspective to the campus of their host university. As advisors and mentors, unit scientists play a significant role in teaching students about the science practices of federal agencies, which are not always in synchrony with the scientific practices of academia. Unit scientists are expected to build research partnerships with state and federal agencies and conduct applied science. In other words, their research should help natural resource managers understand nuances of conservation issues and help agency officials develop natural resource policy and management options.

When appropriate, unit scientists facilitate federal and state agency access to university capabilities to help the agency address pressing natural resource issues. Examples of "university capabilities" include, but are not limited to, the expertise of a university faculty member or a state-of-the-art laboratory. In such situations, the unit scientists help the university develop and manage the resulting project's contract.

It is important for Unit students to recognize the multiple hats worn by the unit's federal scientists when conducting their official duties. Compared with other university faculty, unit scientists have a different set of responsibilities, and often additional responsibilities given their affiliation to the USGS and direct employment by the federal government.

IV. What It Means to Be a Unit Student

Graduate students participating in the CRU program are officially university students; units do not grant degrees. CRU students must abide by the same rules,

regulations, and requirements that apply to other university graduate students. Students supported by a research or teaching assistantship are employees of the university and have specific responsibilities to fulfill as research/teaching assistants.

In many cases additional responsibilities will be conferred to Unit students through their affiliation with the local Cooperative Fish and Wildlife Research Unit, the USGS, and the state natural resource agency. For example, USGS has specific requirements for the conduct of science, safety training, and project reporting that will be different from those required by universities or other cooperators. Unit students are expected to assist their advisor in fulfilling federal requirements and those of other cooperators.

Overall, one of the most important roles played by Unit students is to serve as an ambassador of the local unit and for the program in general. This is not an additional task, but is easily accomplished through adherence to professional standards, including a strong work ethic and a willingness to interact and communicate with cooperators and partners. Through customer surveys, CRU sponsoring partners often report a desire to interact more thoroughly with Unit students. Interestingly, past Unit students have identified an accompanying interest to engage more thoroughly with project sponsors and cooperators. Bridging this gap boils down to taking the initiative to go the extra mile to connect with Unit cooperators and partners. Many opportunities exist for Unit students to participate in state agency reporting and planning meetings or to attend state commission meetings. Other local federal cooperators are also typically interested in Unit student activities that can be communicated by participating in regular seminar series or by volunteering to give a brown bag overview of project research. Often such proactive communication and outreach activities are rewarded with networking opportunities and the development of professional contacts that may last a career.

Credit: Peter Craig, NPS
Lance Smith (Hawaii Unit) determined how coral species survive stressful conditions in select localities to help USGS and NPS manage coral reef ecosystems in the midst

It is also typically a good business practice to acknowledge unit and project sponsors when addressing colleagues at a meeting and when preparing a publication or giving a presentation. You must comply with a unit scientist's request for urgent or important project updates or presentations and for seemingly less important "bean counting" information, such as the amount of gas purchased for a federal vehicle. Essentially, everything Unit students do reflects on the Unit program as a whole.

Below is a description of additional responsibilities for all Unit students. This section is not intended to be comprehensive, but is meant to help students develop awareness about the program and to elicit questions that can be discussed in further detail.

A. Student Responsibilities

Time and Attendance

Research or teaching assistantships require a set number of work hours each week, typically 20 hours per week. This paid work is in addition to standard graduate program activities. Like any other university employees, research and teaching assistants are entitled to time off during official university holidays. Although graduate research or teaching assistants do not accrue personal leave at most universities, vacation time can be scheduled in consultation with your major advisor provided that it does not conflict with research activities or schedules. Requests for a vacation from research activities must be cleared with your major advisor well in advance of the planned leave and before making irreversible commitments (e.g., do not purchase your vacation plane ticket before consulting with major advisor about your leave plans).

Permits

There are a variety of requirements to conduct research, including acquiring necessary permits to handle and collect fish and wildlife. It is important to always know what permits are needed for trapping animals, collecting data, and accessing property (private and federal). Permits, especially collectors' permits for animal capture, need to be up to date and carried at all times when working in the field or laboratory.

Use of Unit Property

Units acquire and maintain a number of property items for field and laboratory research and office work. Although these items are listed on the unit's property inventory, they may belong to the federal or state government or the university. Unit property is typically available for teaching and research activities but not for personal business or use. Many pieces of equipment (boats, laboratory equipment) may serve multiple projects making it a good business practice for students to acquire a thorough understanding of how the unit checks out equipment, and apportions equipment to projects based on need. Students should not lend Unit equipment to others; such requests are appropriately directed to the Unit leader. Students are responsible for keeping unit property in good working order and securing property in an identified safe location. Unit leaders should be made aware of any concerns about safe property storage. Equipment or items found to be malfunctioning, broken, or lost should be recorded and one of the unit scientists should be immediately notified.

Unit vehicles have their own set of administrative rules for use and borrowing. Use of a unit vehicle assumes that students will comply with basic rules like keeping the vehicle as clean as possible, ensuring that it is running properly at all times, recording all

necessary maintenance information relevant to the field/business trip (e.g., gas and oil purchases, miles traveled), and submitting this information (including purchase receipts) to the unit administrative assistant. If the vehicle breaks down during a field trip, contact one of the unit scientists or the unit administrative assistant as soon as possible. Depending on the unit, some or all types of vehicular repairs may need prior authorization.

Similar common sense rules apply to the use of watercraft. If you will be operating a motorboat (65 feet or less in length) when conducting your research, you must complete the Motorboat Operator Certification Course (MOCC). Certification is valid for 5 years; re-certification is available online and in the classroom. In general, this policy does not apply to individuals who are employed by a USGS cooperator or have their work directed entirely by a cooperating entity (e.g., state natural resource agency). However, these individuals must complete MOCC training if they intend to borrow a USGS-owned watercraft. The only time at which a non-certified individual can operate a watercraft is when he or she is operating the boat to gain experience for motorboat certification. This individual must have a certified motorboat operator overseeing him or her at all times.

Some basic safety items include (before and after trip) inspection of the boat and trailer to confirm the trailer lights are working properly; trailer bearings are greased; the towing vehicle can accommodate the tongue weight of the trailer; the hull of the boat is safe; and the boat motor (if applicable) is in good operating condition. Providing a float plan to your major advisor before departing on a water-based research excursion is a good safety practice.

Budgetary Matters

Unit projects have specific research accounts to cover the cost of equipment, supplies, and services needed to conduct specific research duties. It is strongly recommended that students understand the unit's purchasing and documentation protocols. Adherence to established protocols will minimize the time required to obtain needed items. Below is a list of general steps to follow when planning the acquisition of any item or service; the unit administrative assistant should be contacted for more specific guidance.

1. Always discuss purchasing needs with your major advisor; without his or her approval, funds cannot be drawn from your research account.

2. Plan purchases well in advance to allow time for processing and delivery. Depending on the item to be purchased, this may be days, weeks or even months.

3. Check with the unit administrative assistant to identify approved vendors for the item(s) you need.

4. Provide the unit administrative assistant with purchasing requests and all of the information needed to complete the purchase order and other forms the approved vendor may require.

5. Submit all purchase receipts to the unit administrative assistant.

6. If an emergency purchase (e.g., repairing equipment during a weekend or while working in a remote area) is needed, contact one of the unit scientists to obtain authorization, generate a record of the conversation, and provide the unit administrative assistant with the purchase receipt to facilitate reimbursement.

7. Never pay cash for any item without prior authorization; reimbursements for unapproved purchases are not guaranteed (including emergency purchases).

Official Travel

Whenever travel is required for official research activities or a professional society meeting, it is necessary to submit the appropriate travel authorization form or information to the unit administrative assistant. It is important to obtain official travel status before embarking on your trip, which protects you from tort claims and makes you eligible for worker's compensation should an accident occur.

It is also a good business practice to make sure your major advisor (or unit administrative assistant) is aware of your trip plan or schedule for all field research activities. This plan should identify the sites where work will occur along with the date/times of planned departure and return to campus. This simple heads up with a few critical details of the work location enables unit staff to appropriately respond should emergency services be needed. This is especially important to do when your research involves potentially hazardous situations such as the use of air or watercraft.

Professional Meeting Attendance

Each unit encourages graduate student participation in professional society meetings. Attending professional society conferences provides excellent opportunities to visit with other students and biologists who share research interests, gather new information about fisheries and wildlife conservation and management, and establish contacts with potential employers. Approval is required to attend a professional meeting well in advance of the conference. Typically, presenting research results is a prerequisite for justifying the use of a portion of project funds to cover travel expenses and conference registration fees. Be aware that many university departments have nominal funds to assist graduate students traveling to professional meetings. It is important to maintain a record of all expenditures during the trip so that travel reimbursements can be expeditiously processed. Given the limited funding generally available to support student travel, be prepared to help reduce your personal travel costs by traveling with and sharing lodging with fellow students. Unit leaders will approve transportation to professional meetings in a unit vehicle on a case-by-case basis.

Information Security: Protection of Research Records and Documentation

Credit: Steve Chipps, SD Unit
Benjamin Holcomb (South Dakota Unit) conducted limnological studies on Angostura Reservoir in the Black Hills to develop water clarity prediction models for the Bureau of Reclamation.

Research records and documentation are usually in the form of field and laboratory notebooks, data sheets, and electronic data files such as field data recorders, maps, and reports that are stored on your computer. Regardless of the type of records you maintain during your graduate training, it is the student's responsibility to maximize the security of those records when they are in the student's control.

Loss of data and documentation can be costly as you pursue your research degree and to the university when it addresses contractual requirements for project sponsors. Damages to data integrity and unauthorized data use can create problems for management agencies if they have to defend use of student data when formulating a management decision. Data sets that contain personal information (e.g., social security numbers and medical records) or politically sensitive information concerning a policy, decision, regulation, or sensitive species must be managed with extreme care; for example, if data sets reveal where an endangered species is located, unauthorized access to that information may jeopardize protection of that species.

Ask your major advisor for specific recommendations and requirements regarding data security. The following recommendations represent a few commonly applied protocols.

- Back up computer files regularly to an external storage device, such as an external hard drive, a network drive, CD, and/or a flash drive. Weekly backups are recommended.

- Copy field notes and laboratory notebooks and store duplicate copies in a different locations. Weekly generation of note copies are recommended, or immediately after returning from a field trip during which copier machines were unavailable.

- Use logical controls on software and data, such as passwords, firewalls, and data encryption, to monitor and control access to information and computing systems.

- Physically control your workplace environment and computing facilities by locking doors and limiting access to your office, lab, and computing facility.

- Practice reasonable personal security to prevent theft of data and equipment containing data from your home, office, hotel room, car, etc.

- Restrict access to data records, whether electronic or in hard copy, to only those individuals needing access.

- Store files in multiple locations as a precaution against fire or theft, etc.

It is imperative that the integrity of project information be preserved; not just for each student's personal use, but for the research sponsor and future students and investigators who may use the data to study a related question. "Integrity" means that the project's data, documentation, and records remain under the direct control of the investigative team until the team decides to release the project's information to other scientists, natural resource managers, or the general public. Moreover, no one can create, alter, or delete any aspect of the project's information without the investigative team's explicit authorization. Until it is time to release research information, all data, records, and documentation must be securely protected at all times. It is each student's responsibility to protect all project information from unauthorized access and use, disclosure, loss, destruction, modification, or disruption. If an incident of theft or vandalism of data occurs, report it immediately to the unit scientists, and they will inform campus security.

Most information collected by unit students is not sensitive or confidential and, therefore, will be accessible to managers and the general public via the appropriate media at the appropriate time. Students must adhere to the scientific principles of quality control and/or peer-review when releasing data. Management agencies and the general public must be assured that scientific information reported is of the highest quality.

Upon graduation and prior to leaving the unit, you should transfer to your Unit Leader all data, field notes, and reports in either electronic or hard copy form, whichever is appropriate as identified by your major advisor. The USGS requires that research record files be maintained by the unit and/or transferred to the management agency that funded the investigation. However, students typically retain copies of study data and records to prepare research publications or for other purposes, as long as permission is received from the appropriate authority.

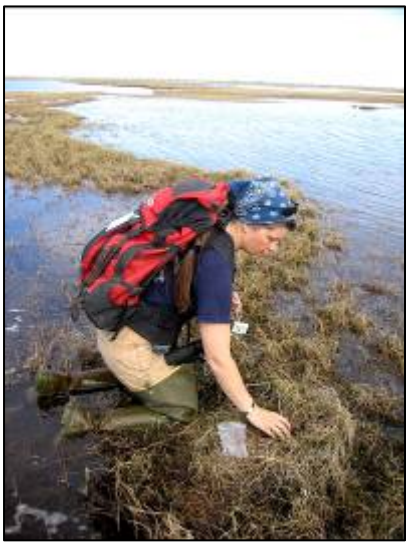
Personal Conduct

Unit students represent all unit cooperators when doing research. The public will probably see unit students as "university" students conducting unit business and research projects, which is entirely appropriate. The CRU program is working well when unit-sponsored students are seamlessly connected to the larger population of university students. It is also not uncommon for the general public to identify unit students as state or federal employee because of vehicle license plates (state or federal) and associated decals.

Unit cooperative agreements often state that students are employees of the university; therefore, the university is responsible for student actions and behavior.

Universities have a student code of conduct that is the basic guideline reflecting university-student relations and defines expected behavior, conduct, and judicial procedures.

Unit scientists join with the university in taking a strong and clear stand on matters of academic dishonesty. Plagiarism and cheating on tests, assignments, research papers, theses/dissertations, or other academic activities are unacceptable. The issue of plagiarism in particular can be confusing. Plagiarism is the act of presenting another person's ideas as your own. When incorporating thoughts and hypotheses of other authors into your own writings, you must always cite the source of your borrowed ideas. It is unethical to present the work of someone else as your original hypothesis, data interpretation, conclusion, or recommendations. To learn more about plagiarism, visit http://www1.esc.edu/personalfac/hshapiro/writing_program/Orientation/main/plagiarism.htm.



Credit: Abby Powell, AK Unit
Among the Kuparuk oil fields in Alaska's North Slope, Rebecca Bentzen (Alaska Unit) placed data loggers in the nests of king eiders to investigate factors influencing nesting success among the breeding birds.

Unit scientists also join with the university in taking a strong stand against sexual harassment. Sexual harassment represents unwelcome sexual advances or any other verbal or physical conduct of a sexual nature. Harassment is a particularly harmful and illegal form of discrimination that violates expectations of fair and respectful treatment.

The CRU Program joins with all cooperators in a commitment to provide equal opportunity for education and employment of all persons without regard for age, race, religion, gender, sexual preference, national origin, or disability. Additionally, the program sponsors cultural diversity initiatives for students who want to explore career options in the natural resources field; see minority programs at http://www.coopunits.org for more information.

Graduate assistantships can be terminated. Termination is usually at the discretion of the major advisor within the regulations of the university. A student can be terminated for violating the "student code" regarding honesty, sexual harassment, and discrimination. A student also can be terminated because of his or her low work ethic or inability to perform required duties. The unit scientist may terminate a student's stipend or resign as his or her advisor if the student is not performing at a desired level, fails to complete reports, or does not collect required data.

Evaluation of personal conduct begins in the corridors of your department. A research group of faculty and students is like an extended family, dependent on one another. Throughout the graduate training experience, students interact with unit scientists, student peers, and departmental staff and faculty. Individuals are judged by

how hard and intelligently they work, the quality of research efforts and scientific presentations, the talent or skill contributed to the department, and a student's conduct toward others.

Conduct of Science

Unit students typically participate in research projects that are designed to provide managers of federal and state agencies and leaders of non-government organizations with the critical information they need to make resource use and/or conservation decisions. The CRU Program places a high value on meeting the expectations of its funding partners, which many times also are the same expectations of the program's cooperators. It is each student's responsibility to conduct high-quality research that generates defensible data and objective interpretation of the results. Part of the defensibility of research will be determined through scientific peer-review, which will become increasingly critical as research project results become finalized. The peer-review process will assess many of the features of each student's graduate project that graduate advisory committees addressed early on, including experimental or study design, research scope, sampling procedures, and associated methodologies.

While scientific peer-review provides an independent assessment of the quality and defensibility of research results, the most critical driver of science quality rests with you and how you and your technicians behave while conducting your research. Many graduate projects are field intensive, requiring a significant physical and mental investment to collect data. It is at those times when conditions are most challenging that is critically important to adhere to approved protocols for sampling or collecting data. Shortcuts are the bane of defensibility. Although it is difficult to predict how your research results will be used by others, reflect on whether you could reasonably defend to others what you have done and how you did it.

Ethics

Ethics represent a set of values that guide the actions of a person or group. Ethics include concepts of right and wrong and responsibility. The purpose of this discussion is to make students aware of professional ethics and associated responsibilities to practice ethical science.

Unit scientists are federal government employees who, by law, are held to a high standard of ethics. They are reminded of their ethical responsibilities during required annual training classes. Unit scientists must practice ethical conduct to ensure that every citizen can have complete confidence in the integrity of the Federal Government. They must respect and adhere to the fundamental principles of ethical service. There are 14 principles of ethical service for government employees. Your major advisor can provide further counsel on these norms of ethics.

Students and major advisors alike also follow professional "codes of ethic." When becoming a member of a professional society, expectations will exist to accept the

responsibility of managing natural resources for the benefit of those resources and for the public. Additionally, societies will provide their own specific set of conduct guidelines. Many of the principles reflect common sense, and differ little among fish and wildlife societies and other professional organizations.

An example of professional conduct guidelines for the American Fisheries Society is available online at http://www.fisheries.org/afs/education_standardsofprofessionalconduct.html .

Some of these guidelines relate to unit graduate students irrespective of discipline:

- Use proper scientific methodology; document your conclusions and interpretations.
- Speak for yourself and not for your society, university, or unit without the entity's explicit approval.
- Acknowledge the professional work of other scientists when building on their ideas.
- Treat your colleagues in a just and fair manner.
- Serve your employer professionally, "without prejudice or conflict of interest."
- Present your professional qualifications in a truthful manner.
- Make a clear distinction between your stated opinions and accepted knowledge or facts.

A special responsibility for fish and wildlife students is strict compliance with game and fish laws and regulations. However, CRU expects its student participants to go beyond basic adherence to fish and wildlife regulations, by setting positive examples in your outdoor activities. As a hunter, do you count "unretrieved harvest" as part of the bag? As an angler, do you adhere to practices that reduce pain in fish? Do you hunt or fish at your research site, where you may have unique knowledge of habitat and populations? Is that "fair chase"? As a hiker, biker, river runner, or camper, do you minimize your footprint?

Many ethical codes for professional societies are about science practices. In their article entitled "Ethical Problems in Academic Research," Judith P. Swazey, Melissa S. Andersen and Karen Seashore Louis reported that 44% of the graduate students and 50% of the faculty members they surveyed in 1993 had been exposed to two or more types of misconduct and questionable research practices (*American Scientist* 81: 542-553). According to this finding, students will observe activities that challenge the integrity of academic science every day. The CRU Program expects unit students to respond appropriately to these challenges using a professional code of ethics as a guide.

Safety

The following discussion addresses safety responsibilities for unit students. A comprehensive list of reference safety material is provided under separate cover in the Cooperative Research Units Policy and Procedures Manual. Treated here are some

general rules and safety guidelines for students and technicians when conducting research. Safety programs for unit activities are shared by unit cooperators. Universities provide safety programs and guidance for most student activities. USGS safety programs in certain specialty areas may go beyond those typically addressed by university safety programs.

It is the goal of the CRU Program and its cooperators to provide an enjoyable and safe working environment for all faculty, staff, and students; however, the very nature of field and laboratory research in fisheries and wildlife involves elements of personal safety risk. Although Unit students are technically university employees, unit students are expected to comply with the safety policies and training requirements of USGS in addition to those of the host university. You must also comply with USGS safety requirements because your research will be conducted under the supervision of a federal unit scientist. As an advisee of a federal scientist, unit students must complete the same safety training programs tat apply to their major advisor.

Students and major advisors are expected to work together to ensure that students complete the necessary training requirements and abide by all USGS and university safety policies that pertain to unit activities including research projects. It is the responsibility of each major advisor to help students determine what safety training is needed and how to get it. Major advisors also make sure that students receive proper safety awareness for other issues (e.g., vaccinations). It is the student's responsibility to develop a plan and time schedule with their advisor for completing all safety and health training requirements and to submit proper documentation of training completions to the major advisor.

Each unit student will have unique training needs; hence, it is impossible for anyone external to the student and major advisor to track whether necessary training requirements have been completed. Failure to receive the necessary safety training could result in dire consequences for students and advisors should an accident occur. Typically, a review of training records is part of the procedure in completing an accident report. Deficiencies in training records could result in the forfeiture of tort coverage under the federal government making individuals personally liable for all damages. Clearly, the student and advisor share responsibility to conduct a hazard assessment of the work to be done, and to obtain and document completion of appropriate training. This is a significant responsibility that should be taken very seriously.

To maintain a safe working environment for everyone, it is imperative that safety violations and issues be immediately reported to your major advisor. All accidents need to be reported (and documented) to the unit leader, whether or not someone is injured.

Insurance and Personal Liability

As a participant in the CRU Program, and being recognized as a student and employee of the university (and as a volunteer of USGS), the host university has primary responsibility for insuring student health and safety. This includes affording students with

liability protection should they be injured or involved in an accident while conducting degree program activities. Each state and university offers students its own set of accident, health, and liability protection. Major advisors should be consulted to learn what set of benefits and protection is available to students during their degree program.

In addition to the above medical/liability package, students may receive protection under the Federal Torts Claim Act if their activities are being conducted to help USGS achieve its mission, and if they have USGS volunteer status. To obtain "USGS volunteer" status, students must provide unit administrative staff with a signed copy of the Individual Volunteer Services Agreement before project activities are initiated. This form will be evaluated and approved by the unit leader or assistant unit leader. This form is required for non-federal employees to participate in federal activities and/or to operate federal vehicles, boats, etc.

Joseph Zydlewski, ME Unit
Using acoustic tags, Christopher Holbrook (Maine Unit) followed the movements of juvenile and adult Atlantic salmon to learn how the fish navigated its way past dams along Maine's Penobscot River.

Because students are entitled to medical and liability protection from multiple sources (i.e., the university and federal government), assignment of responsibility is determined on a case-by-case basis. Consequently, students should view the above information as general guidance and not as legal opinion. With that said, when involved in a unit activity after receiving appropriate training and filing the proper forms, students should receive accident/medical/liability protection for work-related injuries from one or all of the unit cooperators. Bear in mind that the university and state and federal governments may deny coverage if their stated rules are disregarded when carrying out unit activities. Examples of actions that could cause students to lose accident and liability coverage are:

- Driving a university or government vehicle in the course of your work while under the influence of alcohol or drugs.
- Driving a university or government vehicle for non-work/non-approved activities (e.g., driving the vehicle home for lunch, using it to pick up friend at airport).
- Operating a university or government vehicle in a reckless manner, including failure to obey traffic regulations.
- Operating specialized equipment without required training.
- Failure to abide by Occupational Health and Safety regulations during the conduct of your work.

APPENDIX I

Student Selection and Financial Support

A. Student Selection

The Cooperative Research Units Program and its individual cooperative fish and wildlife research units were designed to provide advanced academic training for graduate students in fisheries, wildlife and other natural resource fields. Because each unit is affiliated with a university, unit students are selected through the normal application process of each host university. There is no federal application process, and there is no set number of students accepted each year.

B. Types of Student Support

Most unit students receive financial assistance when entering graduate school, but the type and amount of support varies by university and prevailing circumstances. Regardless of which type you received (or hope to receive), make sure you understand all of the conditions associated with your financial assistance package. For instance, what expenses (e.g., tuition/fees, living stipend, and equipment purchases) does your financial award cover? Is the money already deposited into an account; if not, when will the money be received? What deliverables must you produce to keep the financial assistance? Will the financial award expire before your expected graduation date? It is your responsibility to understand and accept all of the conditions relevant to your financial award. Remain mindful of your projected graduation date, as determined by your advisory committee, because if you do not complete your degree requirements on time you may not receive additional financial support. A description of the most common financial awards for graduate students is provided below.

<u>Graduate Research Assistantships</u>

Research assistantships are the most common form of financial assistance among unit students. A unit scientist often is able to support and advise a graduate student because a government agency and/or private entity asked the unit to investigate a specific natural resource issue. Depending on what has been agreed to in the research contract, the project sponsor may provide funds that cover the graduate student's stipend and all or a portion of the graduate student's school expenses plus additional funds and/or in-kind support for specific research activities. The unit must generate specific products (e.g., final report, database) that the project sponsor requests to address its natural resource problem. Consequently, if you have a research assistantship, you need to know what the specific objectives and timelines are for your contracted research products and services. You should visit with your major advisor to learn how this assistantship links to your thesis/dissertation research project. Although the contracted research project and your thesis or dissertation project are often one and the same, this is not always the case.

Generally, like any other graduate students at the host university, unit students on a research assistantship receive, in addition to their stipend, out-of-state tuition/fee waiver and full or partial health insurance. In addition to these personal benefits, they may also have a research account that supports the purchase of research related equipment and supplies and limited travel compensation for project related business (e.g., attending a professional meeting to present research findings for your contracted project). Meet with your major advisor to learn what your compensation and benefits are under your research assistantship. Additionally, discuss what is expected of you so you can maintain your assistantship. Typically a research assistant must work at least 20 hours per week on the contracted research project. However, unit students typically

work more than the required minimum because they are expected to interweave their own research interests and degree requirements with the assigned research project.

Graduate Teaching Assistantships

Universities often employ graduate students to assist faculty members with the instruction of laboratory classes and other courses. Generally, these assistantships are arranged by graduate students and their major advisor through discussions with university departments and programs. For some students, the teaching assistantship is a voluntary assignment that either supplements or temporarily supplants the individual's research assistantship. For others, assisting an instructor is a required responsibility during his or her graduate training (i.e., in addition to the research assistantship). Regardless of why you may receive a teaching assistantship, view this position as an opportunity to learn by teaching and to make the transition from being a student who seeks advice to a professional who shares his or her knowledge with others. Make sure you understand what compensation (e.g., living stipend) and other benefits (e.g., tuition/fee waiver, health insurance) go with your teaching assistantship and remember that no teaching assistantship will provide funding for the operational aspects of your research project.

Fellowships

Fellowships are scholarship awards that offer students great freedom in their academic studies and intellectual pursuits. A variety of organizations (such as your university, Environmental Protection Agency, and National Science Foundation) administer fellowship programs to support scholarly work by a master's or doctoral student, but each program differs in purpose, funding, and expectations. Unlike research and teaching assistantships, fellowships may not stipulate the fulfillment of specific duties or delivery of required products, but this is not always the case. Thus, if you have a fellowship, make sure you understand the benefits, duration, and expectations of your award. To learn more about fellowship opportunities, consult your major advisor or other officials at the university.

Federal Appointments

Many federal agencies hire students through either the Student Temporary Employment Program (STEP) or Student Career Experience Program (SCEP). Both forms of student educational employment allow graduate students to pursue their degrees while working for a specific agency as either a part-time or full-time federal employee; however, STEP and SCEP appointments depend on the availability of federal funds and a willingness of the agency to mentor participating students. Key differences between the programs are as follows:

1. SCEP – Participating students must receive federal work experience in a field that relates to their educational and career goals. Upon graduation, SCEP students may be eligible for non-competitive conversion to a career, career-conditional or term position within a federal agency if they meet the qualifications of the targeted position, have completed at least 640 hours of career-related work through the SCEP appointment, received their degree within 120 days of the conversion date, and are recommended for the targeted position.

2. STEP – These positions cannot exceed a 1 year term but extensions in 1 year increments are allowed. STEP students do not have to conduct assignments that are relevant to their academic/career goals, nor are they eligible for non-competitive conversion to a career, career-conditional or term position within a federal agency upon graduation. However, STEP students are eligible for non-competitive conversion to SCEP as long as they meet the qualification requirements for the targeted position.

If you wish to learn more about the above student educational employment programs, consult your major advisor to determine if STEP and SCEP appointments are available in the

agencies with which they work. You also can retrieve general information about STEP and SCEP appointments at the website for Office of Personnel Management, https://www.opm.gov/employ/students/intro.asp.

C. Types of Project Support

In most cases, unit scientists raise financial and logistical support for graduate research projects in the CRU Program. Before any agreed upon funds can be transferred to a unit and before research activities can commence, the unit scientist, host university, and funding agency must develop a research contract that specifies what type of research services and information products the agency will receive and the unit research team will provide. In some cases, PhD candidates and post-doctoral fellows either help a unit scientist identify information needs and solicit project funding, or they lead this entrepreneurial activity with minimal oversight from a unit scientist. Product expectations and delivery deadlines are associated with each research contract, and as a member of a research project team, you are obligated to meet the stipulations of the research contract. Failure to meet those contractual obligations can lead to termination of project funding.

Depending on which entity is contributing funds to your research project, money is transferred from the sponsoring agency to the unit and university in one of two ways. For projects receiving financial support from a federal agency, the project sponsor must use legislative authorities, such as the Economy Act (http://www.thecre.com/fedlaw/legal25/economy-act.htm), to transfer money to USGS. After USGS has access to the designated project funds, staff in the headquarters office for the CRU Program issues the university a Research Work Order (RWO). This RWO has a finite life and budget and identifies what the objectives and requested deliverables are for the contracted research project. All RWOs must support research and all must incorporate a graduate student on the research team.

State agencies and other funding organizations use different contracting mechanisms to acquire research and other services from the unit. Regardless of how the money from these funding entities reach the unit, the university typically serves as the research account's administrator because the money is sent directly to the university.

Your unit also receives "base funding" from the cooperating state agency and sometimes the university. These funds primarily support the unit's operation but occasionally may be used to support research. Use of these funds is determined cooperatively by unit staff and the contributing entities.

APPENDIX II

For people who care about the American West
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Western Roundup
Printable Version

Weathering the academic storm
by Erin Halcomb

Dan Donato's controversial study on salvage logging turned his life upside-down

Conifer seedlings catapulted Dan Donato onto the national stage early last year. Before that, he was just another Oregon State University student, working on his Ph.D. in fire ecology and loving the days he spent outside with colleague Joe Fontaine, documenting the comeback of birds, mammals and plants after Oregon's epic Biscuit Fire. Then, in January 2006, Science *published a sliver of their findings that bucked conventional wisdom: Conifer seedlings re-grew abundantly on their own after a forest fire, but comparatively few survived the harvesting and hauling of salvaged logs.*

Critics immediately denounced the findings, which contradicted an earlier report by Oregon State University professor John Sessions saying salvage logging and replanting would be necessary to recover the Biscuit's conifers. Professors and Forest Service scientists badgered Science *to pull the article, and the Bureau of Land Management withdrew (but later reinstated) funding for Donato's study. Reps. Greg Walden, R-Ore., and Brian Baird, D-Wash., bullied Donato at a congressional hearing, and all the while, ecologists, conservationists and other forest scientists cheered for him.*

The furor made front-page news, but Donato shied away from reporters. In April, he finally agreed to an interview about his interests, his research, and what it's like to go from an unknown forestry geek to a controversial star overnight. We talked while he was at home, studying for his Ph.D. qualifying exam and listening to a Chicago Cubs game.

HIGH COUNTRY NEWS Where did you grow up, Dan?

DAN DONATO I'm a native Oregonian. I grew up in between Portland and Mount Hood before video games took off, so I spent most of my youth in the local woods.

HCN What book are you reading now?

DONATO *Burning Questions* by David Carle. It's about Harold Weaver and Harold Biswell — two pioneering fire ecologists. These were the first guys to espouse the idea that low-intensity surface fires are really important to how forests function. Their ideas weren't popular at first; they went through some less-than-pleasant times — and that strikes a bit of a chord for me.

HCN It reminds you of last year — when you went from grad student to celebrity? What happened?

DONATO Yeah, what did happen? We wrote a paper. We challenged some widespread assumptions, specifically that there's a lack of natural regeneration after a big fire. The Biscuit Fire was actually being put up as the poster child, and we were sitting on two full years of data that showed not only were seedlings establishing, they were surviving. So we felt like if we were going to have a fully informed public dialogue, it was our responsibility to get those numbers out. And it wasn't well received by everybody.

HCN But your paper wasn't just about seedling re-growth. It said that salvage logging harmed re-growth and increased fire risk.

DONATO Yes, salvage is the issue du jour in post-fire management discussions. A lot of ecology is being discussed in terms of salvage, and our paper was no exception. But, by far, the most controversial part was the fact that there were seedlings — there wasn't supposed to be any seedlings for logging to damage.

HCN Were you surprised by the reaction?

DONATO Yeah. Totally. We realized once it came out that people on all sides were taking it like the gavel came down on post-fire management. We were blown away by that.

HCN You keep referring to "we." You were part of research group of six, but singled out. Why?

DONATO At first, we decided that I'd be the first author and do the media stuff — and that'd be fun. And it was, at first. It's great when the scientific community is interested in your work, but I think the media latched on to the David-versus-Goliath angle, and to be honest, for folks who don't like what the data said, it was easier to cast the study aside if it was just a rogue graduate student and ignore the fact that there were other researchers — with over 75 years of combined experience.

HCN How did the group react?

DONATO They were great. They went through most everything I did, though their names weren't all over the press. Joe Fontaine — the other graduate student — testified before the state Senate. We would meet in the lab room (which became the "war room" after the shit hit the fan) and write all of our papers and media statements together. We became really close.

HCN After your paper was released in *Science*, you lost funding, regained funding, testified at congressional hearings, spoke at public forums, and formally responded to critics in the journal. Did I miss anything?

DONATO There were countless meetings and presentations of our research, across the country. We also took agency folks out in the field to show them the sites and explain our study. That was really positive; a lot of people said it changed their perception of our study — favorably. I wish we could have done that more to dispel some of the rumors.

HCN So there was some positive?

DONATO Yes. It's definitely been a good learning experience, enlightening and emboldening. But it wasn't very fun. It was good to put a study out there that withstood so much scrutiny. Most papers get published, read by a few people, and that's pretty much it. We got so many levels of scrutiny on this little one-pager. And it survived. That's when you know you've done good work. Now there's other science coming out that's finding similar conclusions — that seedlings duke it out with the

shrubs and come out on top. That's congruent with our primary conclusions, and that's very gratifying.

HCN What was the hardest thing?

DONATO Being caught in the middle of this polarized debate. I know forestry is in part a social science, that people have preconceived notions and they'll believe what fits more than the facts at hand; but two professional statisticians gave public testimony on our findings, and still some people believed that felling big dead trees on little seedlings didn't kill them, or that we were making up the data. That was really hard to swallow.

HCN How long did all this go on?

DONATO It's still going on. It's a year and a half later and I'm talking to a reporter. But it totally consumed my waking hours for about six months. When the paper first came out, I didn't sleep for about five days. The media storm and the intense reactions really shook me up. I'm normally a wallflower. I was taking classes, and for the first time I had to take an incomplete — I just couldn't keep up.

HCN You received a bachelor's of science in oceanography and in forest ecology in 1998, but didn't enter graduate school until 2003. What did you do in between?

DONATO I worked as a biologist all around the Western U.S. and Alaska. I surveyed for goshawks, desert tortoises and Canadian lynx, did botany work and fire-effects studies. I worked seasonally for different agencies and in between jobs, traveled around with whatever money I could save up — living-out-of-my-car kind of a thing.

HCN What do you do for fun?

DONATO I'm a water junkie. I love being in, and on, the water. The garage is full of boats — raft, sea kayak, canoe, much to my wife's chagrin.

HCN So what else is in your garage?

DONATO A bunch of fishing rods, backpacking equipment, some woodworking stuff, gardening tools, a chain saw.

HCN Husky or Stihl?

DONATO Stihl — of course.

HCN Work and play, you've spent a lot of time in the woods. What's been your coolest experience?

DONATO Walking through a forest as it's burning, coming face to face with a mountain lion, viewing both oceans at once from the top of a mountain.

HCN Do you have any regrets about last year?

DONATO Not really; things went down favorably for us overall. But we maintained a low profile. Sometimes I think it would have been good to be more vocal about calling out the crazy criticisms. You know, there was a bit of a what I call now the Weapons of Mass Destruction phenomenon —

where rumors about the way things went down just got repeated until they gained traction.

HCN So where are you with your research now?

DONATO We're done collecting data and now we're crunching numbers. There's a giant mound of data — like a huge beast I have to tame. I'm writing papers — and we have three already in the review process.

HCN Any advice to offer from this?

DONATO Yeah, when I see other researchers intimidated or hesitant about their results, it's really poignant for me. I really encourage people not to self-censor. Ask important questions regardless of outside controversy. Do solid work. Stick to your guns. But stay humble.

HCN The Cubs game over?

DONATO Yes, it is.

HCN Who won?

DONATO Not the Cubs — one thing harder than last year is being a Cubs fan.

By Erin Halcomb

The author recently finished her tenure as an HCN intern and will soon be perched in a fire lookout in southern Oregon.

APPENDIX III

USGS Code of Scientific Conduct

1. I will act in the interest of the advancement of science and contribute the best, highest quality scientific information for the U.S. Geological Survey and the Department of the Interior.

2. I will conduct, process data from, and communicate the results of scientific activities honestly, objectively, thoroughly, and expeditiously.

3. I will be responsible for the resources entrusted to me, including equipment, funds, my time, and my employees' time. I will promptly and accurately collect, use, and report all financial resources under my control; and promptly, thoroughly, and accurately report all scientific work.

4. I will fully disclose all research methods used, available data, final reports, and publications consistent with applicable laws and policy.

5. I will respect, to the fullest extent permitted by law, confidential and proprietary information provided by communities, Indian tribes, and individuals whose interests and resources are studied or affected by scientific activities or the resulting information.

6. I will maintain scientific integrity and will not engage in fabrication, falsification, or plagiarism in proposing, performing or reviewing scientific activities and their products.

7. I will welcome constructive criticism of my scientific activities, will welcome and participate in appropriate peer-reviews, and will critique others' work respectfully and objectively. I will substantiate comments that I make with the same care with which I report my own work.

8. I will be diligent in creating, using, preserving, documenting, and maintaining collections and data.

9. I will adhere to established quality assurance and quality control programs.

10. I will follow the Department's records retention policies and comply with Federal law and agreements related to use, security, and release of confidential and proprietary data.

11. I will adhere to appropriate standards for reporting the results of scientific activities and will respect the intellectual property rights of others.

12. I will, to the extent possible and practical, differentiate among facts, opinions, hypotheses, and professional judgment in reporting the results of scientific activities to others, including scientists, decision makers, and the public.

13. I will be responsible for the quality of any data I collect or any interpretations I make, and for the integrity of conclusions I draw in the course of my scientific activities.

14. I will place quality and objectivity of scientific activities and reporting of their results ahead of personal gain or allegiance to individuals or organizations.