COOPERATIVE FISH AND WILDLIFE RESEARCH UNITS PROGRAM

ANNUAL REPORT 2006

Front cover photos: Top: Three 8-week old black bear cubs await processing during a den visit. This was one of 170 litters monitored by the Virginia Unit during a ten-year study of Virginia's black bear population. Photo by M. Vaughn/VA Unit. Bottom, left to right: Zach Jackson, an Iowa Unit master's student with a carp. Photo courtesy of Iowa Unit. Researchers sort endangered mussels from non-endangered mussels in the James River, Virginia. Photo by R. Neves/VA Unit. Amy Williams, an undergraduate technician for the Utah Unit, holds a trapped ground squirrel. Photo T. Edwards/UT Unit. Back cover: Pygmy rabbit. Photo by J. Crawford/OR Unit.

ANNUAL REPORT 2006

COOPERATIVE FISH AND WILDLIFE RESEARCH UNITS PROGRAM

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Above photo: The common tern, *Sterna hirundo*, a species of special concern in New York, continues to nest successfully on small islands in Oneida Lake, New York. Photo by Jeremy T.H. Coleman/NY Unit.

NANCY CONNELLY

Nancy Connelly, an affiliate faculty member cooperating with the NY Unit at Cornell University, on a site visit to Petersburg Harbor, Alaska, to study the navigational needs of small boats and commercial fishing vessels.

Laboratory trials conducted by researchers at the Arkansas Unit demonstrate interaction between a crayfish native to the Spring River of Arkansas, *Orconectes eupunctus*, and a recently documented invasive, *Orconectes neglectus*.

ERIC LARSON/AR UNIT

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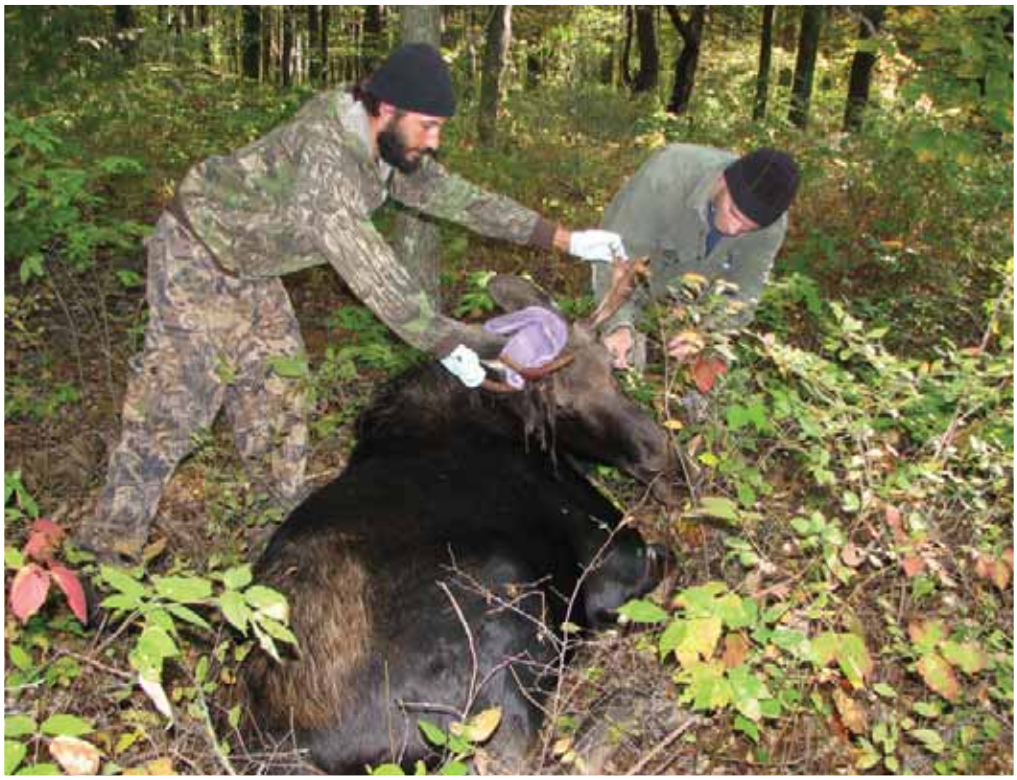


BILL BYRNE

SHILOH SCHULTE/ NC UNIT

Top: Massachusetts Unit researchers place a GPS collar on a bull moose. Bottom: Pelicans at Cape Hatteras National Seashore, North Carolina.

WELCOME

King rail in Arkansas. MICHAEL J. BUDDJAR UNIT

FROM THE CHIEF, COOPERATIVE RESEARCH UNITS

To our Unit Cooperators:

Each year the national Cooperative Research Units (CRU) Program compiles a report of accomplishments that have been achieved through partnerships with the Cooperative Fish and Wildlife Research Units. This information is summarized as part of an effort to improve communications among Cooperators and partners. Again this year, we are distributing the CRU Annual Report prior to the North American Wildlife and Natural Resources Conference to make it available for the National Cooperators' Coalition (NCC) meeting at the conference.

The report follows the general format used over the last two years, with summaries and graphics illustrating broad patterns in research, education, and technical assistance to the program Cooperators and partners. The detailed information on which these summaries and graphics are based is available on the CRU web site at www.coopunits.org. Please take a minute to look up your Unit on the CRU web, and review its accomplishments over the recent past.

This year we are reporting additional material in the annual report on the CRU Strategic Plan, which was completed in the latter part of 2006. The plan highlights three strategic goals for CRU, specific objectives under those goals, and strategies to achieve the objectives. The plan will serve as a strategic "roadmap" for CRU activities over the next five years. In addition, we have added information in the budget and staffing section of the report on a proposed CRU initiative for voluntary separation of retirement-eligible scientists and opportunities for early retirement for others. On approval, this initiative will be implemented with the intention of retaining at least two scientists in all Units.

Please note that the National Cooperators' Coalition is scheduled to meet at the North American Wildlife and Natural Resources Conference on Wednesday, March 21, from 3:00 to 5:00 pm, in the Parlor A-C of the Hilton Portland and Executive Tower in Portland, Oregon. Again this year the NCC has asked the U.S. Geological Survey to provide a briefing on the CRU budget, staffing, and other issues of interest to the Cooperators. I urge you to attend the meeting and participate in discussions with the NCC. Now more than ever, it is important for you to share your perspectives about how to ensure that the program remains healthy and productive in these uncertain times. If you wish to add topics to the meeting agenda, please contact the NCC Chair Bob Davison.

I look forward to seeing you at this year's North American Wildlife and Natural Resources Conference.

Sincerely,

Byron K. Williams

Byron K. Williams
Chief, Cooperative Research Units

Mississippi Unit students Seiji Miyazono and Chris Steffen with an American eel sampled from Wasp Lake, Mississippi.

FROM THE CHAIR, NATIONAL COOPERATORS' COALITION

On behalf of the National Cooperators' Coalition (NCC), consisting of Cooperators and other non-federal parties having interest in the Cooperative Research Units, I want to express our strong support for this highly effective program. The productivity and breadth of the program and its service to Cooperators in FY 2006 was exemplary. Unit scientists continue to make important contributions to the understanding and management of our nation's fish, wildlife and other natural resources while playing a major role in educating the next generation of natural resource professionals.

The 40 Units across the country are crucial to successfully addressing the natural resource management challenges posed by climate change, energy development needs, invasive species, infectious diseases, wildfire, and increased demand for limited water resources. Solving these problems and others requires the Units' management-oriented, community-based approach to research, which relies on interdisciplinary efforts and fosters collaboration and accountability. The challenges also include replacing the unprecedented number of natural resource professionals who will be retiring over the next ten years. The Units are well positioned to meet this need with an established record of educating new natural resource professionals who are management-oriented, well-versed in science, grounded in state and federal agency experience, and able to assist private landowners and other members of the public.

The NCC continues to work with the U.S. Geological Survey and Congress to forge a strong Unit program—one that meets the research, education and technical assistance needs of the cooperators. This past year, the NCC: (1) asked Congress for sufficient funding to provide the federal scientist staffing agreed to with partners so that the return on their continuing investment in the Units is realized and fully leveraged, and (2) completed a long-term vision and strategy to guide the Unit program in the future. In its strategic plan, "NCC Vision and Strategies for the Future of the Cooperative Fish and Wildlife Research Units," the Coalition describes the nature and unique values of the CRU partnership, the challenges facing natural resource research and education over the next decade, and a vision and set of strategies for how the NCC and the CRU Program will collaborate to build on existing successes when addressing these challenges. A cornerstone of the document is a call for the establishment of a competitive, matching fund program within existing CRU legislative authority. This program would support future high priority cooperative research efforts in key areas of natural resource conservation while providing essential training opportunities for new natural resource professionals.

The Third NCC Annual Meeting will be held on March 21, 2007, in Portland, Oregon, in conjunction with the North American Wildlife and Natural Resources Conference. The annual meeting provides an opportunity for all of those with an interest in the CRU Program to come together, gather information, discuss issues, and provide direction for future efforts. I invite USGS staff, Unit Cooperators, and CRU Program supporters to attend and voice their support for this highly successful program.

Robert P. Davison, Chair
National Cooperators' Coalition

ABOUT THE COOPERATIVE RESEARCH UNITS PROGRAM

The Cooperative Research Units Program is a working partnership among the U.S. Geological Survey (USGS), state natural resource agencies, host universities, the Wildlife Management Institute (WMI), and the U.S. Fish and Wildlife Service (USFWS). The Program provides federal and state agencies access not only to unit scientists, but also to facilities and expertise at all cooperating universities. Because scientists and university faculty members have individual interests and a wide range of expertise, the Program collectively represents a broad array of disciplines related to fish, wildlife, and natural resource management, with a wealth of knowledge about virtually every type of North American ecological community.

The first Unit was established at Iowa State College in 1935 by J. Norwood "Ding" Darling. Darling was a visionary who recognized an urgent need for biological information, trained wildlife managers, and dissemination of information to management agencies. Darling did not quit with the establishment of the Iowa Unit, but went on to establish regional units that facilitated the development of a national program. Today, there are 40 Cooperative Research Units in 38 states. In 1960, Congress gave statutory recognition to the Cooperative Research Units Program by enactment of Public Law 86-686, the Cooperative Research Units Act.

The Act reads:

> "To facilitate cooperation between the Federal Government, colleges and universities, the States, and private organizations for Cooperative Unit Programs of research and education relating to fish and wildlife, and for other purposes. Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that, for the purpose of developing adequate, coordinated, cooperative research and training programs for fish and wildlife resources, the Secretary of the Interior is authorized to continue to enter into cooperative agreements with colleges and universities, with game and fish departments of the several States, and with nonprofit organizations relating to Cooperative Research Units: Provided, that Federal participation in the conduct of such Cooperative Unit Programs shall be limited to the assignment of the Department of the Interior scientific personnel by the Secretary to serve at the respective Units, to the provision of assistance (including reasonable financial compensation) for the work of researchers on fish and wildlife ecology and resource management projects funded under this subsection, to supply for the use of the particular units' operations such equipment as may be available to the Secretary for such purposes, and the payment of incidental expenses of Federal personnel and employees of cooperating agencies assigned to the units. There is authorized to be appropriated such sums as may be necessary to carry out the purposes of this Act."

The Act and associated testimony define the mission and partners in the Cooperative Research Units Program. Since the Act was passed in 1960, and as modified by the Fish and Wildlife Improvement Act of 1978, the Program has retained a strong focus on its tripartite mission of education, research, and technical assistance.

RAY CARTHY/FL UNIT

The loggerhead turtle is a species of concern found at Eglin Air Force Base, Florida, and is the subject of ongoing studies by Florida Unit researchers.

Student intern James Stephenson drives a boat during summer 2006 work at Blackwater National Wildlife Refuge, Maryland.

A pygmy rabbit, photographed during a study at the Oregon Unit to determine this species' movements and habitat selection in southeastern Oregon.

Texas Unit researchers collaborated with the Texas Parks and Wildlife Department and the Amarillo and Fort Worth Zoos to erect an artificial bald eagle nest.

EDUCATION

Unit scientists teach university courses at the graduate level, provide academic guidance to graduate students, direct student research projects and serve on academic committees. Unit scientists and affiliated university faculty link the research mission of each unit with student training, thereby providing students with an opportunity to address the real world information needs of state and federal agencies. The Cooperative Research Units Program also sponsors two minority outreach programs that focus on recruitment, training, research opportunities, and placement assistance for undergraduate students.

RESEARCH

Cooperative Research Unit scientists conduct investigations to meet the information needs of Unit Cooperators and partners. Unit research is sponsored by state, federal, and non-government agencies to reflect agency needs. A dependence on external funding assures unit responsiveness to state, federal, and other management agencies and effectively links research with management. This linkage provides a framework for science-based decisions implemented by program Cooperators and partners. Units use each individual project as a building block in constructing research programs that provide not only applied science information for management, but also new techniques, scientific theory, and principles at a more basic level. Research programs and staff expertise differ widely among units, reflecting the needs of local Cooperators. The research may be of local, regional, national, or international interest. Projects may involve multiple units and take advantage of the geographic locations of units across the country and the differences in expertise found therein.

TECHNICAL ASSISTANCE

Units provide technical assistance and training to state and federal personnel and other natural resource managers as needed. Cooperators can draw on the expertise of Cooperative Research Unit scientists, cooperating university faculty, and biologists of the cooperating state natural resource agency. Technical assistance includes the interpretation and application of research findings, workshops and short courses, work group participation, and counsel on specific issues for which unit scientists have specialized expertise.

PROGRAM HIGHLIGHTS

Red wolf at Alligator River National Wildlife Refuge, North Carolina.

OVERVIEW OF FY 2006

Fiscal Year (FY) 2006 marks the seventy-first year in which the Cooperative Research Units Program has served the nation through research, education, and technical assistance. It was another remarkable year for the Program and the individual Cooperative Fish and Wildlife Research Units. Despite continuing contraction of the program due to austere federal budgets, federal and university scientists and their students continued to respond to the needs of Unit Cooperators, partners and the natural resources profession.

As you look through this report you will see several recurring themes for CRU. One is the theme of partnerships. The Cooperative Research Units program is based on partnerships to achieve shared goals, and it is through these partnerships that the strengths and resources of each contributing Cooperator are coordinated and combined. By enhancing individual capabilities, partnerships make possible the achievement of goals that Cooperators would find difficult to achieve on their own.

A second theme is service to our Cooperators. Through participation in service activities, unit scientists contribute to university academic programs, address state and federal information needs, and provide technical assistance and educational products. More generally, unit scientists enhance resource management through their service to professional societies, agency work groups, and other conservation organizations.

A third theme is science excellence and productivity. Unit scientists and affiliated faculty continually attract significant research funding from state and federal agencies, publish in a wide variety of peer-reviewed journals, and author and edit numerous books and monographs. Additionally, unit scientists and their university peers serve as leaders in their respective fields and even founders of scientific sub-disciplines.

The final theme focuses on people. The scientists, administrators, and administrative staff of the Cooperative Research Units Program work within a host university's academic environment and interact with state and federal scientists and resource management professionals. University faculty and agency personnel provide a rich environment for creativity, achievement, and excellence.

Although performance accountability in science and government has always been embodied in CRU, it now is playing a more pronounced role in the Program's administration. In addition to conducting quality science, it is important for us to demonstrate and document progress toward specific program goals. In 2006, CRU partnered with the National Cooperators' Coalition to create a five-year strategic plan, which includes a number of strategic goals and performance metrics. The plan's goals and objectives are to be achieved through close collaboration with CRU Cooperators and partners.

In 2006, we initiated a comprehensive "customer feedback" assessment of the CRU Program. As a first step, we conducted a satisfaction survey to evaluate our performance in meeting the information needs of the federal agencies sponsoring our research projects. We also distributed a satisfaction survey to unit students who recently graduated. In 2007, we will survey our university and state Cooperators.

Other program highlights include implementation of the U.S. Geological Survey Fundamental Science Practices, with new CRU policies to assure compliance with the Survey's peer review and science documentation requirements. We documented CRU compliance with federal fiscal management requirements, certifying that we are using sound business principles in the management of the Cooperative Research Units Program. These and other reports showcase our business and partnership practices, our contributions to natural resource policy and management, and the breadth of our service to professional societies and organizations. In 2007, we will continue efforts with program Cooperators and partners to evaluate and improve the services offered by the Cooperative Research Units Program.

CRU LEADERSHIP DEVELOPMENT TEAM

During the summer of 2006, the Cooperative Research Units Program began an internal "Leadership Development" initiative to broaden the awareness and experience of unit scientists beyond their individual units. Participants are offered customized opportunities to address issues of regional and national importance to the CRU Program and the U.S. Geological Survey, and gain insight into the unique differences among units. Participants may attend Cooperator meetings other than their own, participate in short-term work details at the national office, or work on special projects at the regional and national level.

An expanded appreciation of CRU activities and issues will strengthen institutional knowledge of the Program and help us prepare for significant turnover among our most experienced unit and national program staff.

Unit scientists in the Leadership Development program for FY 2006/2007 included: Clint Boal (Assistant Unit Leader, Texas), Steve Chipps (Assistant Unit Leader, South Dakota), Walt Duffy (Unit Leader, California-Fisheries), Bill Fisher (Assistant Unit Leader, Oklahoma), Chris Grue (Unit Leader, Washington), Patrick Jodice (Assistant Unit Leader, South Carolina), Patricia Mazik (Unit Leader, West Virginia), and Craig Paukert (Assistant Unit Leader, Kansas).

Russ Norvell, a doctoral student at the Utah Unit, and his wife Adrianne had the distinct pleasure of escorting Jimmy and Rosalynn Carter on a personal birding tour during the former president's fall 2006 book-signing trip to Salt Lake City, Utah. Russ received this unique honor through his non-game biologist position at the Utah Division of Wildlife Resources.

COOPERATIVE RESEARCH UNITS WEB SITE

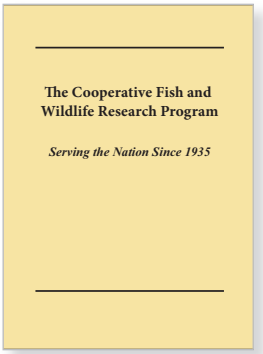
The Cooperative Research Units web site (CRU Web) has become an integral part of our annual business practices and is now used to collect and organize data for individual and unit performance reviews, annual reports, budget documents, and many other reporting purposes.

Recent efforts have focused on improving the web site's functionality to address administrative needs of program staff and information needs of our Cooperators and federal project officers. Please visit our web site (www.coopunits.org) periodically to see what changes and improvements have been incorporated, and provide input on needed future developments and specific information you would like to have available on-line.

SECOND EDITION OF REID GOFORTH'S COOP BOOKLET NOW AVAILABLE

During 2006, Reid Goforth, Don Dennerline, and Kathryn Reis completed a second edition of Reid Goforth's booklet on the CRU Program.

The document focuses on the history and operational format for the Program, and it should be informative to all unit scientists, Cooperators, and students. The current version updates staffing data for each unit and includes a new section describing several contemporary research topics to which unit scientists are contributing. The national office distributed copies of the booklet to the units in April 2006.



To obtain additional copies of the booklet, contact the headquarters' office or download a PDF version from CRU Web (www.coopunits.org).

COOPERATIVE AGREEMENTS RENEWED OR AMENDED FOR SIX UNITS

Cooperative agreements set forth the establishment and operation of Cooperative Fish and Wildlife Research Units and serve as living documents with no expiration date. However, CRU recommends that each unit review and renew its agreement every five years. Our goal is to renew at least four agreements every year. In FY 2006, we achieved that goal by signing new agreements (or amendments) to support the continued operation of the following units: Maine, New York, Montana Fish (amended to add USFWS), Montana Wildlife (amended to add USFWS), Georgia (annual extension), and Utah.

NEW PROGRAM ASSESSMENT TOOL IMPLEMENTED

In FY 2006, the CRU headquarters office initiated a comprehensive program to assess and improve Cooperator and partner satisfaction with unit activities and products. This assessment uses a survey format to query university and state Cooperators, federal agencies sponsoring Unit research projects, and students graduating from the Unit program. We evaluated over 200 federally sponsored research projects this year, and respondents expressed a high degree of satisfaction with the quality of received products. Respondents also offered valuable feedback for how the research work order process could be improved. Once completed, results of all surveys will be incorporated into action plans.

Starting in FY 2007, we will implement the customer satisfaction survey as an additional close-out procedure for all federal work. The survey results will help us identify performance problems and work quickly to resolve them.

Please contact CRU Headquarters if you would like to receive a copy of the FY 2006 survey report for federally sponsored projects.

MATTHEW KAUFFMAN JOINS WYOMING UNIT

Matthew Kauffman joined the CRU Program in July as the Assistant Unit Leader at the Wyoming Coop Unit in Laramie, Wyoming. Dr. Kauffman received his Ph.D. in Conservation Biology from the University of California-Santa Cruz and did post-doctoral research at the University of Montana on elk and wolf interactions in Yellowstone National Park.

RETIREMENTS

KEN HIGGINS RETIRES AFTER 40 YEARS OF FEDERAL SERVICE

Ken Higgins (Assistant Unit Leader, South Dakota) retired on January 3, 2006 after more than 40 years of federal service. He spent the last 20 years at the South Dakota Unit, where he mentored more than 90 graduate students and touched the lives of many more. Higgins remains at South Dakota State University as an emeritus professor while finishing several projects.

JIM WILEY RETIRES AFTER 15 YEARS OF SERVICE TO CRU

Jim Wiley (Unit Leader, Maryland) retired on March 3, 2006. Jim joined the Cooperative Research Units Program in 1991 as the leader of the Grambling Wildlife Education Project, and in 2001 he became unit leader of the Maryland Cooperative Fish and Wildlife Research Unit, serving there until his retirement.

SANDY CLARK RETIRES AFTER FOUR DECADES OF SERVICE AT THE MISSOURI UNIT

Sandy Clark retired as administrative officer on May 1, 2006 after 40 years of dedicated service to the Missouri Unit and the national program. Clark's contributions were summed up by Charlie Rabeni, Missouri's Unit Leader, who said:

"It is difficult to express in words what she has meant to the success of our operation. Such levels of kindness, dedication, selflessness and loyalty are unlikely to be matched anytime soon."

Forty-two of 51 university CRU administrative staff attended this productive and successful meeting, which was hosted by headquarters staff to bring university administrative staff up to date on new and changing federal processes.

ADMINISTRATIVE CONFERENCE HELD IN JACKSONVILLE, APRIL 2006

Unit administrative staff participate in series of conference break-out sessions.

The Cooperative Research Units Program held an administrative conference in Jacksonville, Florida, April 24–28, 2006. This conference is held every three to five years to bring university administrative staff up to date on new federal processes and procedures, and to provide staff with an opportunity to network with other units.

At the conference, CRU headquarters staff honored the following individuals:

SANDY CLARK (Missouri) received a plaque in honor of her upcoming retirement and in recognition of four decades of dedicated service to the Missouri Cooperative Fish and Wildlife Research Unit and the CRU Program.

VANETTA BURTON (Montana-Wildlife) was presented with the Wildlife Management Institute Administrative Excellence Award for 2005 (see page 14 for more details).

JODI MARTIN (Texas) received an Appreciation Award in recognition of outstanding contributions to the CRU Program, including the conduct of on-site, unit-level training for new unit administrative personnel.

BRENDA VAN BEEK (Iowa) received an Appreciation Award for outstanding contributions to the CRU Program, including her service as editor of the Coop Catch-Up Newsletter.

Additionally, CRU headquarters staff presented Length of Service Awards to the following individuals with ten or more years of service to the CRU Program: Judy Christian (Alabama, 18 years), Kathy Pearce (Alaska, 17 years), Joyce Brite (Kansas, 14 years), Theresa DeBarge (Vermont, 14 years), Linda Ohler (Wyoming, 14 years), Terri Symens (South Dakota, 14 years), Carol Yde (Arizona, 14 years), Vanetta Burton (Montana-Wildlife, 11 years), Debra Carroll (Wisconsin-Wildlife, 10 years), Jodi Martin (Texas, 10 years), and Brenda Van Beek (Iowa, 10 years).

THE COOPERATIVE RESEARCH UNITS' FIVE-YEAR STRATEGIC PLAN

In 2006, CRU completed a five-year strategic plan, which was designed to complement the coalition's own forward-looking plan for the CRU Program. Three goals were identified:

GOAL 1: Through the combined capabilities of Cooperators and partners, produce and communicate research information and products to increase the understanding of biological systems and support management decisions regarding fish and wildlife resources.

Objectives under Goal 1 are as follows:

- Objective 1.A. Working with Cooperators and partners, identify priority research and information needs and the support needed to address these needs.
- Objective 1.B. Working with Cooperators and partners, expand the capacity of CRU to address contemporary research and information needs of natural resource agencies.
- Objective 1.C. Increase the visibility and usefulness of research findings and products to users.

GOAL 2: With university Cooperators, contribute to the education and training of the next generation of natural resource professionals, ensuring an appreciation of federal and state agency trust resources and science-based decision making.

The objectives for Goal 2 are as follows:

- Objective 2.A. Link Cooperator and partner research needs with graduate training opportunities in natural resources.
- Objective 2.B. Increase the ability of students upon graduation to work as members of partnership teams that address complex natural resource issues.
- Objective 2.C. Increase educational opportunities for minorities in natural resource fields.

GOAL 3: Optimize the structure, management, and administration of the CRU Program to address contemporary needs of the conservation community more efficiently and effectively.

The objectives for Goal 3 are as follows:

- Objective 3.A. Enhance, develop, or maintain organizational and partnership arrangements that will best meet the complexity of contemporary natural resource needs of program Cooperators and partners.
- Objective 3.B. Improve program operational efficiencies and management.

To see the complete CRU five-year strategic plan, visit: www.coopunits.org.

ERIC LARSON/AR UNIT

Cages are set up midstream for crayfish competition experiments in the Spring River of Arkansas.

THOMAS EDWARDS/UT UNIT

Thomas Edwards points out jaguar tracks during a survey of habitat use by jaguars in Pantanal, Brazil.

HONORS AND AWARDS

U. S. GEOLOGICAL SURVEY RESEARCH GRADE EVALUATION PROMOTIONS

Paul Angermeier, Virginia

William Fisher, Oklahoma

D. Brad Griffith, Alaska

Christopher Guy, Montana Fish

Megan La Peyre, Louisiana

Christine Moffitt, Idaho

Brian Sloss, Wisconsin Fish

Bruce Vondracek, Minnesota

Alexander Zale, Montana Fish

UNIVERSITY PROMOTIONS

Courtney Conway, Arizona.....Promoted to Associate Professor, University of Arizona

Patricia Mazik, West Virginia.....Promoted to Adjunct Associate Professor, West Virginia University

Petra Bohall Wood, West Virginia.....Promoted to Adjunct Professor, West Virginia University

ELECTED SOCIETY POSITIONS

Charles Berry, South Dakota.....Board of Directors, American Institute of Biological Sciences

Scott Bonar, Arizona.....Vice President, Western Division, American Fisheries Society

Steven Chipps, South Dakota.....Secretary/Treasurer, Education Section, American Fisheries Society

Duane Diefenbach, Pennsylvania.....Vice President, Northeast Section, The Wildlife Society

Thomas Edwards, Utah.....Assistant Treasurer, Cooper Ornithological Society

Christopher Guy, Montana Fish.....Past President, Education Section of the American Fisheries Society

Joe Margraf, Alaska.....President, Western Division, American Fisheries Society

Thomas Martin, Montana Wildlife.....President-Elect, Cooper Ornithological Society

Patricia Mazik, West Virginia.....President, Southern Division, American Fisheries Society

Donna Parrish, Vermont.....President, Education Section, American Fisheries Society

Daniel Roby, Oregon.....Chair, Pacific Seabird Group

Carl Schreck, Oregon.....President, International Federation of Fish Endocrinologists

J. Michael Scott, Idaho.....Chair, LaRoe Award Committee, Society for Conservation Biology

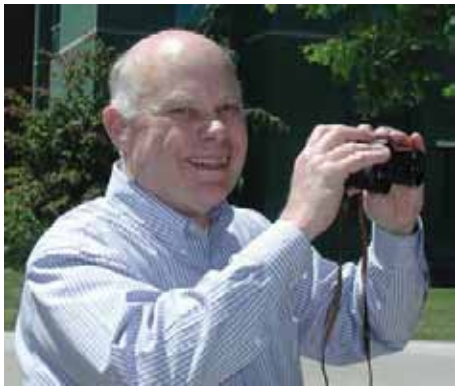
JOE HIGHTOWER RECEIVES AMERICAN FISHERIES SOCIETY'S "EXCELLENCE IN FISHERIES EDUCATION" AWARD

During the 2006 Annual Meeting of the American Fisheries Society (AFS) in Lake Placid, New York, Dr. Joe Hightower (Assistant Unit Leader, North Carolina) was presented with the 2006 Excellence in Fisheries Education Award. The Education Section of AFS presents this award each year to only one individual who has demonstrated excellence in teaching and advising in fisheries education. Hightower is the sixth unit scientist to receive this award in the last eight years.

North Carolina Unit scientist Joe Hightower receives American Fisheries Society's "Excellence In Fisheries Education" Award.

J. MICHAEL SCOTT RECEIVES TWO NATIONAL AWARDS IN 2006

Congratulations to Dr. J. Michael Scott (Unit Leader, Idaho) for receiving the Department of the Interior's Distinguished Service Award, the highest honorary recognition an employee can receive within the Department. The Secretary of the Interior recognized Scott for his career work on biological diversity, endangered species conservation, and the Gap Analysis Program.



J. Michael Scott received two major awards in 2006.

Dr. Scott also received the American Ornithologists' Union Conservation Award for his long and distinguished career in ornithology research and conservation, and his involvement on numerous scientific advisory boards.

DICK NEVES RECEIVES CONSERVATION SERVICE AWARD

Dr. Richard Neves (Unit Leader, Virginia) was awarded the 2006 U.S. Fish and Wildlife Service Northeast Regional Director's Conservation Award in recognition of his extensive research and technical assistance related to the life histories, habitat requirements, propagation, and recovery of freshwater mussels throughout the United States.

COURTNEY CONWAY CHOSEN AS ELECTIVE MEMBER OF THE AMERICAN ORNITHOLOGISTS' UNION

Courtney Conway was elected as an Elective Member of the American Ornithologists' Union in 2006. The honor recognizes scientists who have made significant contributions to ornithological science. Conway is widely recognized for his expertise on survey methods for marsh birds and population demographics of burrowing owls.

COOPERATIVE RESEARCH UNITS AWARD PROGRAM

The Cooperative Research Units National Awards program provides the U.S. Geological Survey and others with the opportunity to recognize extraordinary leadership, contributions, accomplishments, and services of individual scientists and entire units.

Because the FY 2005 Annual Report went to press prior to the determination of last year's awardees, the CRU Award recipients for both FY 2005 and FY 2006 are provided below.

INDIVIDUAL EXCELLENCE AWARDS

MIKE CONROY (Assistant Unit Leader, Georgia) and **MIKE VAUGHAN** (Assistant Unit Leader, Virginia) each received a *2005 CRU Leadership Excellence Award* for participation on the Scientific Review Team for the endangered Florida panther. The review team worked for more than a year to review and synthesize the available scientific literature on the Florida panther, and authored an in-depth review of the quality of science used for its conservation and recovery plans.

BARRY GRAND (Unit Leader, Alabama) received a *2005 CRU Leadership Excellence Award* in recognition of his exemplary leadership service to establish the Gulf Coast Joint Venture program housed at Auburn University. The program is a high priority for the U.S. Fish and Wildlife Service and is intended to develop biologically driven, eco-regionally based partnerships for bird conservation.

CYNTHIA LOFTIN (Assistant Unit Leader, Maine) received a *2005 CRU Service Excellence Award* for serving as the chair of the University of Maine's Institutional Animal Care and Use Committee and for other service to the university. She also serves as Associate Editor for the Journal of Wildlife Management.

DAN MAGOULICK (Assistant Unit Leader, Arkansas) received a *2005 CRU Service Excellence Award* for the technical assistance he provided to the Fisheries Division of the Arkansas Game and Fish Commission. Magoulick helped the Coldwater Fisheries Division develop and initiate a large scale, multi-year project investigating the food habits, movements and survival of hatchery-raised trout in the White River of Arkansas.

STEVE DESTEFANO (Unit Leader, Massachusetts) received a *2006 CRU Leadership Excellence Award* for his outstanding leadership of the Massachusetts Unit and commitment to the Commonwealth of Massachusetts. Destefano's investment of time and energy has led to a more collaborative and productive relationship with the Unit's Cooperators, re-establishing a flourishing and functional Unit.

COURTNEY CONWAY (Assistant Unit Leader, Arizona) received a *2006 CRU Service Excellence Award* for his exceptional scientific productivity. In 2006, he published eight papers and had nine more in press, received international recognition from the American Ornithologists' Union, and received university recognition for excellence in teaching and promoting diversity on campus.

CHARLES BERRY (Unit Leader, South Dakota) received a *2006 CRU Service Excellence Award* for his long record of service to federal, state and university Cooperators and for his extensive outreach efforts. Berry has served as a resident expert on riverine fishes in South Dakota for over two decades. He routinely represents state interests on local and national committees, and he has founded an apprenticeship program to introduce Native American students to careers in fish and wildlife management.

COURTNEY CONWAY/AZ UNIT

A burrowing owl perches atop a nesting burrow. Arizona Unit scientist Courtney Conway is conducting research on this species, which is a U.S. Fish and Wildlife Service Bird of Conservation Concern in the United States.

TED SIMONS (Assistant Unit Leader, North Carolina) received a *2006 CRU Scientific Excellence Award* for extraordinary scientific accomplishments identifying and quantifying sources of measurement and misclassification error in avian count data. His research and methodology represent the cutting edge of scientific knowledge in survey design and methods.

ROBERT ANTHONY (Unit Leader, Oregon) received a *2006 CRU Scientific Excellence Award* for his role as lead author on The Wildlife Society monograph entitled, "Status and Trends in Demography of Northern Spotted Owls, 1985–2003." The report was a landmark analysis of complex demographic data that Anthony and his colleagues collected over a near 20-year period among 14 study areas in Washington, Oregon, and California.

UNIT EXCELLENCE AWARDS

THE PENNSYLVANIA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT received a *2005 CRU Excellence Award* for its outstanding performance in meeting the research information needs of its Cooperators. Both the Pennsylvania Game Commission and the Pennsylvania Fish and Boat Commission have repeatedly expressed their appreciation of the Unit's high quality research and information in guiding their fish and wildlife management efforts.

THE ARIZONA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT received a *2005 CRU Excellence Award* for establishing and maintaining strong relationships with its state and university Cooperators. Scott Bonar, Unit Leader, has demonstrated outstanding leadership skills with a wide range of federal and state Cooperators. Courtney Conway, Assistant Unit Leader, is internationally recognized for his work on marsh bird monitoring and burrowing owl biology. Melanie Culver, Assistant Unit Leader, is a recognized conservation geneticist who has developed an important new area of research at the Arizona Unit.

THE WISCONSIN COOPERATIVE FISHERY RESEARCH UNIT received a *2006 CRU Excellence Award* in recognition of its outstanding scientific contribution to the natural resource management priorities of the State of Wisconsin and for providing quality-driven student education. Unit Leader Mike Bozek and Assistant Unit Leader Brian Sloss have developed a quality research program that provides the Wisconsin Department of Natural Resources (WI-DNR) with reliable fisheries information for its management decisions.

THE WISCONSIN COOPERATIVE WILDLIFE RESEARCH UNIT received a *2006 CRU Excellence Award* in recognition of its outstanding scientific contribution to the natural resource management needs of the State of Wisconsin. Unit Leader Christine Ribic continues to provide critical, scientific information to WI-DNR regarding habitat management strategies for grassland nesting birds in agricultural systems. Mike Samuel, Assistant Unit Leader, has been a central figure in research on chronic wasting disease, a high-profile management issue for WI-DNR.

THE MONTANA COOPERATIVE FISHERY RESEARCH UNIT received a *2006 CRU Excellence in Management Award* for its high level of productivity, strong relationships with Unit Cooperators, and productive and creative environment for graduate education. Unit Leader Al Zale and Assistant Unit Leader Christopher Guy have developed new, contemporary courses that meet the changing needs of their host university, and they teach other courses as necessary to support the fish and wildlife program at Montana State University. In addition to conducting important research for the state agency, Zale and Guy also participate actively on a variety of university committees and workgroups.


TED SIMONS/NC UNIT

KEITH MACNEIR/PA UNIT

Top: Volunteers participate in audio playback research experiments conducted by North Carolina Unit scientist Ted Simons to identify sources of measurement and misclassification errors in avian count data. Bottom: Pennsylvania Unit graduate student Sonja Christensen conducts telemetry on a deer population at Assateague Island National Seashore.

WILDLIFE MANAGEMENT INSTITUTE'S ADMINISTRATIVE EXCELLENCE AWARD

The Wildlife Management Institute's Administrative Excellence Award recognizes an outstanding or extraordinary service that an administrative assistant provides in support of the CRU Program. It is not possible to overstate the role that these members of the Unit family play in the day-to-day, functional operation of individual units and the national program. We are grateful to WMI for providing a mechanism to recognize their contributions.

VANETTA BURTON, Montana Cooperative Wildlife Research Unit, received the *2005 Administrative Excellence Award* for continued excellence in performance of her duties and for her role in effectively managing various activities of the Unit while the Unit Leader position was vacant.

DONNA ROBERTS, Florida Cooperative Fish and Wildlife Research Unit, received the *2006 Administrative Excellence Award* for her outstanding performance that brought a new standard of organization and performance to the Unit, and for her exceptional work that enabled the Unit to integrate financial and project information in a manner that is a consistent with the formatting requirements of both the university and USGS.

UNIVERSITY AND OTHER PARTNER AWARDS

Administrative personnel may also receive recognition from their host universities and other unit partners. Below is a summary of the meritorious awards that were presented to unit administrative assistants in FY 2005 and FY 2006.

Judy Gray, Oklahoma Unit ..... 2005 Distinguished Service Award
Oklahoma State University

Jodi Martin, Texas Unit ..... 2005 Chancellor's Award of Excellence
Texas Tech University

Hattie Saloka, Minnesota Unit ..... 2005 College of Natural Resources
Outstanding Achievement Award
University of Minnesota

Cheryl Duplechain, Louisiana Unit ..... 2006 Louisiana State University Foundation
Staff Outstanding Service Award

Brenda Van Beek, Iowa Unit ..... 2006 Iowa Department of Natural Resources
Partnership Award

BUDGET AND STAFFING

Willet nest on Cape Lookout National Seashore, North Carolina.

BUDGET OUTLOOK FOR FY 2007

As of this writing, the Department of the Interior is operating under a continuing resolution and the CRU appropriation for the remainder of FY 2007 is expected to be similar to that of FY 2006. It is uncertain at this time whether federal cost of living salary and benefit adjustments will be provided under the continuing resolution. If not, the CRU will need to absorb these additional costs in its operating budget.

Since FY 2001, USGS appropriated funding for the CRU Program has changed minimally, while uncontrollable costs related to mandated federal pay increases have risen substantially. Annual uncontrollable but uncompensated costs have ranged from $300,000 to $500,000, and the cumulative impact of these costs has been a net loss of over $2 million in spending power, or roughly 12 percent of CRU's annual budget since FY 2001. During this time period, the program has redirected the cost savings from vacated positions and reduced Headquarters operations to cover salaries and benefits of the remaining unit scientists and staff. In FY 2007, about 96 percent of our federal appropriation will be dedicated to salaries and benefits. This percentage is significantly higher than in recent years—typically salaries have comprised 89 to 92 percent of our budget—even though we had 18 vacancies at the end of FY 2006.

Despite the reductions and redistributions of funding, overall program costs are expected to exceed next year's appropriation. This continues a pattern over the last several years in which expenditures have consistently exceeded appropriations. Until now, it has been possible to manage CRU budgets by carrying forward dollars from past fiscal years to the new year. These "carryover" dollars have been used to offset shortfalls in appropriations. However, they have diminished over time, to the point that by the end of FY 2007 all carryover funds will be exhausted. Absent an increase in CRU appropriations in FY 2008, program costs will exceed available resources for the first time.

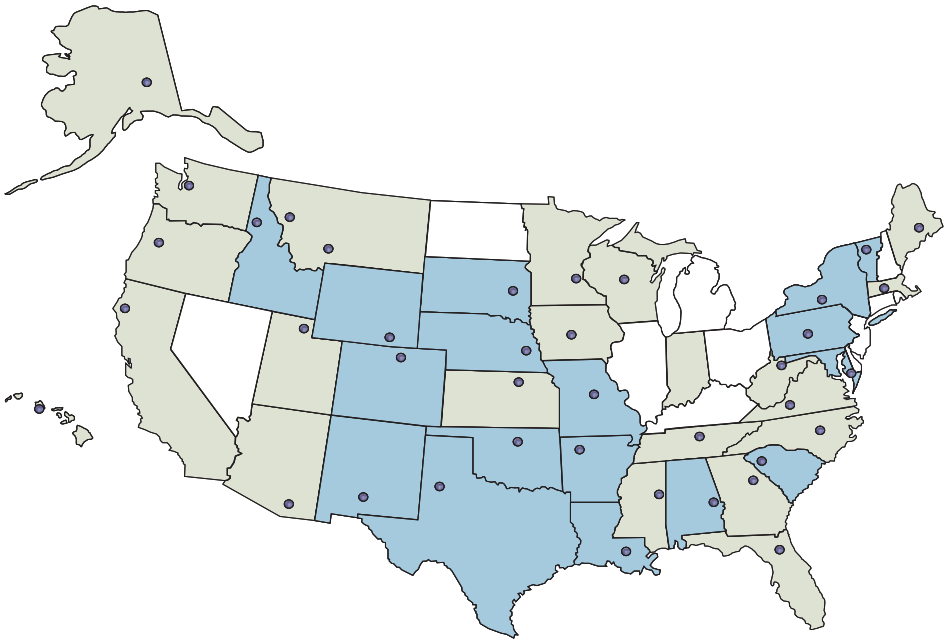
To meet the budget challenges we face in FY 2007 and beyond, further staffing reductions will be needed. Operational funds (non-personnel costs) comprise only 2 to 3 percent of our FY 2007 budget, and offer little or no capacity for redirection of funds to cover salaries. Therefore, we must look beyond the possible salary savings from unplanned retirements, and proactively plan for staffing reductions. A staffing plan has been submitted that will: (1) provide equality in staffing levels among units, (2) recognize two persons as the minimum functional staffing level per unit, (3) maintain our partnership network, (4) allow for rapid re-staffing and renewal of optimal unit size when budgets recover, and (5) sustain past efforts to build a cadre of unit scientists for the future.

BUDGET OUTLOOK (*CONTINUED*)

To this end, in August 2006 we notified all employees and Cooperators of the CRU Program about our request for authorization of a Voluntary Separation Incentive Program and Voluntary Early Retirement Authority (VSIP/VERA) in FY 2007. These authorities are commonly referred to as buyouts and early outs. We anticipate that the VSIP/VERA opportunity will be offered on a limited basis to some unit scientists, primarily at units that currently have three or more CRU employees. VSIP/VERA will not apply in cases that would result in staffing levels of fewer than two persons.

We have requested authority to offer VSIP/VERA for up to ten positions. The number of applications accepted will depend in part on other announced retirements and departures from the program. It is important to emphasize that VSIP/VERA is an opportunity but not a requirement for eligible unit scientists. Scientists whose positions are covered by the offer may decline to participate. Salaries recovered will be re-allocated to continuing operational and personnel costs.

Based on our present analysis of our financial picture and the prospects for continued level funding, we anticipate that normal attrition, combined with the proposed VSIP/VERA offering, will lead to eight to ten new science vacancies during FY 2007. This will bring the total number of vacant, unfunded unit science positions to 26 to 28, affecting as many as 26 units.



Seventeen states (blue fill) had at least one unit scientist vacancy at the close of FY 2006.

STAFFING UPDATE

FEDERAL POSITIONS FILLED

Assistant Unit Leader, Wyoming Unit.....Matthew Kauffman–new hire from University of Montana
July 9, 2006

Unit Leader, New Mexico Unit.....Colleen Caldwell–promoted from Assistant Unit Leader, New Mexico
June 11, 2006

Unit Leader, Wyoming Unit.....Wayne Hubert–promoted from Assistant Unit Leader, Wyoming Unit
November 27, 2005

Unit Leader, Texas Unit.....Reynaldo Patiño–promoted from Assistant Unit Leader, Texas Unit
June 11, 2006

FEDERAL POSITIONS VACATED

Unit Leader, Maryland Unit.....Jim Wiley–retired
March 3, 2006

Assistant Unit Leader, South Dakota.....Ken Higgins–retired
January 3, 2006

Administrative Operations Assistant, Headquarters.....Kim Soto– transferred to USGS Office of Communications
April 21, 2006

Administrative Operations Assistant, Headquarters.....Melissa Gruber–resigned
April 15, 2006

Student Intern, Headquarters.....Anna Zukowski–resigned
June 26, 2006

WAYNE HUBERT/WY UNIT

Patrick Lionberger, a Wyoming Unit master's student advised by Wayne Hubert, holds a sauger sampled from the Wind River system in Wyoming during a study to determine the location of nursery areas needed by this game fish species.

SCIENCE FOR RESOURCE MANAGEMENT

DAVID EDMUNDS/UNIVERSITY OF WYOMING

Fred Lindzey, retired Assistant Unit Leader for Wildlife at the Wyoming Unit, takes a tonsil biopsy from a white-tailed deer to determine infection by pathogen causing chronic wasting disease.

CONTEMPORARY TOPICS

Cooperative Fish and Wildlife Research Units link the expertise of unit scientists and cooperating university faculty with issues that are important to state and federal Cooperators and partners in the conservation community. Unit scientists and affiliated faculty work with these Cooperators and partners to identify information needs and conduct research to address those needs. Cooperator and partner interests are expressed by their willingness to fund high-priority research projects. The result is a research collaboration between agencies and units that contributes directly to the conservation and management of natural resources. The following pages provide a look at unit research addressing contemporary topics—research which demonstrates cost-effectiveness to agency Cooperators and informs their management and policy decision making. This section was prepared by members of the FY 2006/2007 CRU Leadership Development Program (see page 6) and concludes with a more in-depth look at unit research in the arena of energy development.

HABITAT RESTORATION

An adult Caspian tern carries a juvenile salmonid in its bill to feed nestlings at Rice Island in Oregon's Columbia River estuary.

DAN ROBY/OR UNIT

Habitat restoration is an important priority for federal and state agencies. Unit scientists are committed to working toward restoring and conserving our natural resources. Unit projects help guide ongoing restoration and conservation activities, help scientists and resource managers revise models and methods used to formulate management actions, and help scientists and managers re-evaluate monitoring programs and provide important feedback on the success of those management actions.

The **Louisiana Unit** is examining the use of native oyster shells to protect eroding shorelines in high and low energy sites in coastal Louisiana. Resource managers typically use limestone rock, metal sheet pile, and concrete mats as armoring material. Unit scientists documented that the use of native oyster shell reduces shoreline retreat at low energy sites, even through two tropical storm events. Oyster shells are abundant, more cost-effective and efficient, and also provide a perfect substrate to build a sustainable living reef. (*Contact: Megan La Peyre*)

The **Missouri Unit** is developing models to effectively construct shallow-water habitat in the lower Missouri River. In 2003, the U.S. Army Corps of Engineers spent over 10 million dollars to construct shallow-water habitats. Unit scientists produced models of shallow-water habitat that will reduce construction costs, while providing more ecologically beneficial habitat to riverine fishes, turtles, and water birds. Potential savings is estimated to be in the hundreds of thousands of dollars. (*Contact: David Galat*)

The **Minnesota Unit** is determining the best and most cost-effective method to improve water quality in streams. Unit scientists determined that stream water quality could be improved by removing a small fraction of agricultural land (approximately 4,000 hectares) from production and placing vegetated buffers around sinkholes in southeast Minnesota. By placing buffers around sinkholes, resource managers can achieve approximately 3 percent of the U.S. Department of Agriculture's sediment load reduction goals for Minnesota streams and also curb nitrogen and phosphorus loading by 19 percent and 5 percent, respectively. (*Contact: Bruce Vondracek*)

The **Oregon Unit** used bioenergetics modeling to demonstrate that Caspian terns consumed 10 to 20 million juvenile salmonids throughout the Columbia River Basin. In partnership with state and federal managers, unit scientists relocated the Caspian tern colony to another island that is closer to the Pacific Ocean in hopes that the terns would feed more on marine fishes and less on salmonids. This novel, large-scale relocation project was extremely successful and reduced tern predation by 70 percent, meaning that 6 to 9 million fewer salmonids are lost to tern predation annually. (*Contact: Dan Roby*)

POPULATION ESTIMATION

ROB MUTCH

The black-tailed prairie dog.

One of the most common yet challenging tasks for fish and wildlife biologists is the development and implementation of surveys for fish and wildlife populations. By their very nature, mobile and secretive animals are difficult to observe, and issues such as rarity, declining populations, and detectability often make designing a statistically valid and logistically feasible survey difficult. For decades unit scientists have worked with Cooperators to develop and enhance survey techniques that meet the needs of biologists without creating unreasonable demands on time and resources. These projects have benefited a wide array of rare and common species and communities. Unit scientists are again at the forefront of this demanding field as they develop and assess surveys that will benefit fish and wildlife resources throughout the country.

The **North Carolina Unit** is conducting computer simulation studies to determine how biases associated with detection probability and measurement error may compromise the validity of avian, point-count monitoring data. New approaches to sampling bird abundance and empirical estimates of sampling precision and accuracy will contribute to higher data quality for thousands of point-count-based monitoring programs worldwide. (*Contact: Theodore Simons*)

The **Texas Unit** is devising new sampling protocols for estimating population sizes of black-tailed prairie dog colonies. Compared to previous techniques, this new design results in approximately a 77 to 90 percent reduction in the time required to estimate colony sizes. This method is being employed by the Texas Parks and Wildlife Department. (*Contact: Clint Boal*)

The **Oklahoma Unit** is developing a standardized, rapid bio-assessment sampling protocol for assessing the biotic integrity of fish assemblages in non-wadeable, prairie rivers. Using this protocol, biologists can reduce the personnel and time required to collect the majority of fish species, thereby increasing the number of sites that can be sampled over large geographic regions. (*Contact: William Fisher*)

The **West Virginia Unit** is developing a more efficient method of measuring sediment deposition in streams. The Unit designed a new sampler that combines a base and sediment trap, which allows samples to be obtained more efficiently than previously possible. This new technique improves the efficiency of conducting long-term monitoring programs in stream systems. (*Contact: Stuart Welsh*).

FISH AND WILDLIFE HEALTH

PATRICK JODICE/SC UNIT

Felicia Sanders of the South Carolina Department of Natural Resources assists on a South Carolina Unit project assessing the impacts of ticks on brown pelicans at Cape Romain National Wildlife Refuge, South Carolina.

By maintaining healthy fish and wildlife populations, resource managers increase their ability to maintain healthy ecosystems, which ultimately translates into direct benefits for human populations. Wildlife health issues include topics such as pesticide and heavy metal contamination, parasite infestation, and disease. For many of these issues, responsibility for monitoring and management can include a variety of state and federal agencies and be of concern to various stakeholders such as hunters, anglers, and recreationists. Consequently, the CRU Program is in a unique position to work with its state and federal Cooperators to determine the extent and severity of fish and wildlife health issues across the nation and to establish cost effective management practices aimed at controlling or minimizing the negative effects of those issues.

The **California Fisheries Unit** is studying the ecology of the polychaete *Manayunkia speciosa*, which is the intermediate host for two parasites that infect and cause mortality in out-migrating juvenile Chinook salmon and steelhead trout in the Lower Klamath River. Specifically, the Unit is developing a plan to monitor the abundance and evaluate the effectiveness of various management actions of *M. speciosa* in the Lower Klamath River. This research focuses on one of the major

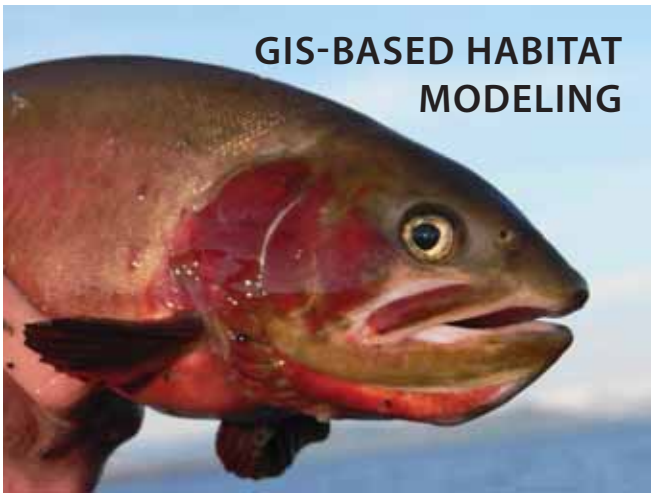
manageable causes of decreased salmon survival in the Klamath River and provides an effective means for enhancing fish survival without drastic impacts on any major river user groups. (Contact: *Margaret [Peggy] Wilzbach*)

The **West Virginia Unit** is conducting a state-wide assessment of mercury and PCB contaminant burdens in fish. Unit scientists determined that using composite samples of fish (3 to 6 fillets) versus testing individual fillets is more cost effective and did not significantly change the results. Since mercury samples run 20 dollars per sample and PCB samples can run over 80 dollars per sample, this is a substantial savings for fishery managers. (*Contact: Patricia Mazik*)

The **Wisconsin Wildlife Unit** is studying the infection rates for chronic wasting disease in white-tailed deer populations to facilitate the development of efficient yet accurate state-wide surveillance efforts. Scientists from the Wisconsin Wildlife Unit demonstrated low (less than one percent) infection rates in fawns. The Wisconsin Department of Natural Resources has used the results to concentrate CWD testing on adult deer, thereby increasing the efficiency of its surveillance efforts and reducing its testing costs by approximately 20 percent. (*Contact: Mike Samuel*)

The **South Carolina Unit** is assessing the impact of soft ticks on the health of nest-bound brown pelican chicks, a species that may be declining in the state. Scientists determined that low to moderate tick infestations did not impact chick growth or increase stress levels. Researchers also determined the most efficient means for surveying for ticks on chicks. The state agency is using this information to refocus their efforts on increasing fledgling pelican survival and improving survey designs for assessing the degree of tick infestation in pelican colonies. (*Contact: Patrick Jodice*)

GIS-BASED HABITAT MODELING



WAYNE HUBERT/WY UNIT

A sexually mature cutthroat trout from Yellowstone Lake.

Over the past decade, geographic information systems (GIS) technology and geospatial analyses have emerged as an important and cost-effective tool for managing fish and wildlife habitat and facilitating conservation planning. Geospatial data overlaid on a GIS map are used to determine hotspots of biological diversity, predict suitable habitat for fish and wildlife species, or identify habitats in need of restoration. For example, the Gap Analysis Program, which is employed widely throughout the United States, uses GIS maps of species distributions, their habitats, and land stewardship in a conservation effort to keep common species common. Unit scientists across the nation are employing GIS and geospatial analyses to aid the management of fish and wildlife resources.

The **Virginia Unit** developed a GIS-based model that predicts that 33 to 66 percent of stream reaches within the Roanoke and Nottoway River Drainages offer unsuitable habitat for the federally endangered Roanoke logperch. Because the USFWS often requires the Virginia Department of Transportation (VDOT) to conduct surveys for Roanoke logperch in areas where its occurrence is uncertain and road construction or maintenance projects are needed, this information is expected to eliminate the need for these surveys for some highway projects and generate cost savings for VDOT. (*Contact: Paul Angermeier*)

The **Missouri Unit** is completing a GIS-based habitat modeling project that uses historical smallmouth bass collections to develop a map of every stream segment in the state and identify each stream segment's potential to contain quality smallmouth bass populations. One use of this information will be the elimination of field visits among state and federal agency personnel for project reviews, which leads to possible savings of 10,000 dollars per year. (*Contact: Charles Rabeni*)

The **Wyoming Unit** is identifying the spawning habitat and pre-spawning staging areas of native cutthroat trout in Yellowstone Lake. For decades native cutthroat has attracted fishermen to Yellowstone Lake, but in 1994 biologists discovered that non-native lake trout also inhabited the lake. The National Park Service (NPS) initiated a program to control the introduced lake trout because of their potential to severely deplete native fish. Using GIS technology, this project is making it possible for the NPS to focus its efforts on reducing lake trout numbers in a more cost effective manner. (*Contact: Wayne Hubert*)

The **Minnesota Unit** and affiliated faculty at the University of Minnesota developed protocols for generating geospatial data that depicts the boundaries, roads, trails, water bodies, facilities, and vegetative classifications of national wildlife refuges (NWR) in the Midwest region. Additionally, the scientists evaluated alternative habitat mapping technologies relative to the requirements of the NWR Comprehensive Conservation Planning Program. The U.S. Fish and Wildlife Service is using the results of this project to guide its development of individual refuge plans throughout the Midwest. (*Contact: David Andersen*)

INNOVATIVE TECHNOLOGIES

ADAM WATTS/FL UNIT

Scott Bowman and Kyuho Lee show off the Florida Unit's unmanned aerial vehicle (UAV), used for aerial surveys of vegetation and wildlife.

The development of new and innovative technologies in natural resource management allows decision and policy makers to manage America's natural resources more effectively. These technologies provide considerable benefits by providing unique identification of populations or individuals, more precise estimates of population demographic parameters, and cost savings through reduced field and laboratory data analysis time. Unit scientists are on the forefront of these new technologies and are using them to provide solutions for resource management questions throughout the country.

The **Florida** and **Idaho Units** are each evaluating the use of unmanned aerial vehicles (UAVs) for wildlife population and habitat assessment. The UAV provides another option for aerial remote sensing when cost, logistic, or safety concerns make manned-aircraft flights unfeasible. A UAV might cost about 10,000 dollars and survive hundreds of hours, resulting in large operational cost savings while vastly reducing the safety risks associated with manned aircraft. (*Contact: H. Franklin Percival*)

The **Arizona Unit** is developing monitoring techniques for five rare native cats in the Southwest: jaguars, ocelots, mountain lions, bobcats, and jaguarondi. Unit scientists are developing a comprehensive program to secure data using infrared-triggered photography and DNA sampling from hair snares and scats. The program is non-obtrusive and exceptionally accurate and cost effective, providing a foundation for long-term conservation and management. (*Contact: Melanie Culver*)

The **Virginia Unit** is developing new methods for determining where to place highway wildlife underpasses for bears. Unit scientists used barbed wire strands to capture hair of bears crossing the highway. Additionally, they conducted DNA analysis of the hair samples to determine the number of individual bears that crossed the roads. The standard procedure to determine road crossings using radio telemetry or remote camera can cost 500 dollars per bear or 250 dollars per camera. The costs of the new technique were less than 350 dollars per analysis, resulting in a savings of about 75 percent in manpower and equipment. (*Contact: Mike Vaughan*)

INVASIVE SPECIES

D.L. GUSTAFSON

The New Zealand mudsnail is an invasive species found in many waterways of the western United States.

Among the most challenging threats to native fish and wildlife populations and the ecosystems in which they live is the introduction and spread of non-native invasive species. The impact of invasive plants, fish, and wildlife on their native counterparts affects endangered species as well as more common yet equally important game species throughout the world. Unit scientists play a key role in studying the effects of invasive species on native systems and determining how to control and eliminate these species cost-effectively.

The **Idaho Unit** is developing the first effective method to control New Zealand mudsnails, an invasive species located in many waterways of the western United States and Lake Ontario as well as fish hatcheries. The new technique seeks to contain and eliminate the snails from water sources and is being used by the U.S. Fish and Wildlife Service as well as various state and tribal agencies. (*Contact: Christine Moffitt*)

The **Montana Fishery Unit** is developing techniques to increase the success rate of native fish restoration projects by developing more efficient and effective eradication techniques of non-native fish. Research results indicate that piscicide toxicity is rapidly degraded by sunlight but is less affected by water turbulence. Models are being developed to provide federal and state rotenone applicators the ability to predict rotenone toxicity such that concentrations can be appropriately fortified. (*Contact: Al Zale*)

The **Alabama Unit** is assessing the use of various herbicides for the control of the invasive alligator weed in waterfowl impoundments on Eufaula National Wildlife Refuge (ENWR). Alligator weed is an invasive non-indigenous species that provides little or no nutritional value to waterfowl and that has become a dominant plant in ENWR waterfowl impoundments. Recent research results demonstrate that single herbicide applications can be effective at controlling alligator weed and restoring native plants within managed wetlands. (*Contact: Barry Grand*)

The **South Carolina Unit** is assessing the risk faced by declining and endangered species from the non-native and invasive red imported fire ant. This risk assessment will help resource managers focus their conservation efforts on those species that are in the greatest jeopardy. In turn, this tool will shorten an intractably large list of potentially impacted species to a more critical list that includes an assessment of relative risk. (*Contact: Craig Allen*)

UNIT SCIENTISTS AT THE FOREFRONT OF ENERGY DEVELOPMENT RESEARCH

MARK GOCKE/WY GAME AND FISH DEPARTMENT

Hall Sawyer, a former master's student advised by Fred Lindzey, draws a blood sample from an elk in southwest Wyoming. They used helicopter net-gunning to capture and equip 40 elk with GPS collars so they could study the habitat selection and movement patterns of a desert elk population. This study provided agencies with the first habitat use models ever developed for elk in non-forested regions, which will be valuable tools for improving management and evaluating the potential effects of different land-use decisions.

OIL AND GAS DEVELOPMENT IN WYOMING

Through the eyes of Fred Lindzey, one can discern the subtle changes that have swept Wyoming's sagebrush ecosystems, grasslands, and mountainous forests in recent decades. For 20 years, Lindzey served as the Assistant Unit Leader for the Wyoming Cooperative Fish and Wildlife Research Unit. And for 20 years, he studied the dependency of mule deer, Rocky Mountain elk, and pronghorn antelope on Wyoming's open landscape. With time, Lindzey saw oil and gas development evolve into an expansive grid of drilling wells and roads that crept into the wintering grounds of America's favored big game animals.

To investigate the effects of development on the movement patterns of ungulates, Lindzey received funds from the Bureau of Land Management, Wyoming Game and Fish Department, Rocky Mountain Elk Foundation, Ultra Petroleum, and other entities. The initiation of this research was critical because of the rapid pace of new discoveries of oil and gas reserves on the wintering grounds of western ungulates. However, managers do not have enough biological information to understand how such development may impact these animals.

Lindzey and other scientists at the Wyoming Unit have made great strides in understanding species distributions, critical habitats and population trends for Wyoming's ungulates and greater sage-grouse. One of those studies was the first of its kind in the nation. Between 1998 and 2002, the Unit's research associate, Hall Sawyer, worked with Lindzey to investigate the movement and habitat selection patterns of mule deer in the Green River Basin.

During their investigation, Sawyer and Lindzey made three significant observations. First, they documented the longest mule deer migrations ever recorded and found that deer wintering in the Green River Basin summered 40 to 100 miles away in five different mountain ranges. This suggested that impacts observed among the wintering deer populations could influence deer numbers throughout northwest Wyoming. They also identified several bottlenecks along the migration routes where mule deer movements were restricted to narrow regions. The most critical bottleneck was reduced from one mile in width to less than half a mile due to housing development and roadways.

Second, after oil and gas development commenced on the Pinedale Mesa, Sawyer and Lindzey identified major habitat shifts within the treatment population. Low, medium, and high-use areas identified prior to development were compared to those identified during development. The investigators found that the deer shifted their movements to areas further away from well pads as development progressed. These results suggested that deer were displaced to less traditional habitats.

Third, a steady decline in mule deer abundance was observed in the treatment area, though there was not a similar decline in the control population. Equipped with these findings, the scientists provided project sponsors with specific biological information about the Green River Basin's mule deer population, and a model for implementing effective wildlife monitoring plans. These observations can help to inform future energy development activities in the basin.

AL ZALE/MT-FISHERY UNIT

Montana Fishery Unit student Windy Davis and her assistant Ryan White collect data on coalbed groundwater discharge at Dry Creek.

OTHER ENERGY-RELATED STUDIES

Master's student Windy Davis at the Montana Fishery Unit is assessing how coalbed methane production, including the disposal of coalbed groundwater, influences fish assemblages in the intermittent streams of the Powder River Basin.

Five doctoral students at the Alaska Unit are collecting baseline information on the movements, population dynamics and foraging habits of king eiders, shorebirds and ravens that inhabit Alaska's North Slope.

Doctoral students Kevin Doherty and Brett Walker at the Montana Wildlife Unit are studying the breeding ecology of greater sage-grouse on the Powder River Basin of Montana and Wyoming, as well as the bird's behavioral response to coalbed methane development.

Scientists at the South Dakota Unit are evaluating how switchgrass and warm-season grass mixtures, both of which are cultivated for biofuel production, influence grassland bird diversity in North and South Dakota, Minnesota and Nebraska.

In 1994 to 1995, Assistant Unit Leader Ken Higgins at the South Dakota Unit worked with his research associates and graduate students to study the impacts of wind turbines on raptor abundance and nesting density at Minnesota's Buffalo Ridge Wind Resource Area. One unique contribution of their project was the creation of exemplary research methods and protocols that scientists still use today when investigating the influence of wind-power development on wildlife.

In 2006, Assistant Unit Leader Petra Bohall Wood at the West Virginia Unit collaborated with faculty at West Virginia University to model the density and distribution of five high-priority, forest-dependent songbirds in the mountaintop mining region of Kentucky and West Virginia. They were able to overlay the predicted densities and distributions for each bird species on a map of proposed mining sites and identify if the potential habitat for each bird species would fall within the area of the permitted mining activity.

Unit Cooperators and partners continually look toward the Units for expertise during the decision-making process regarding energy technologies, exploration, and development on public and private lands.

MATTHEW SHUMAR/WV UNIT

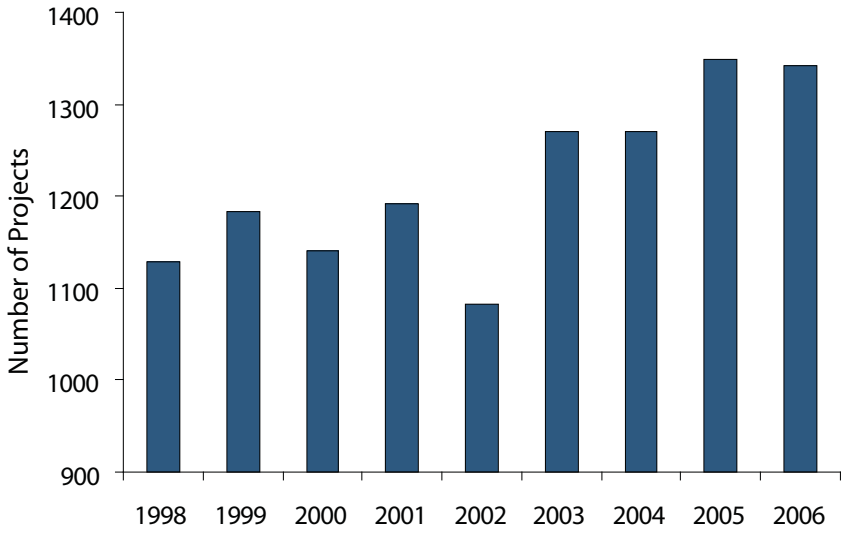
The Cerulean warbler is one of the high-priority, forest dependent birds that breeds in the mountaintop mining region of West Virginia and Kentucky.

PROJECTS AND FUNDING SOURCES

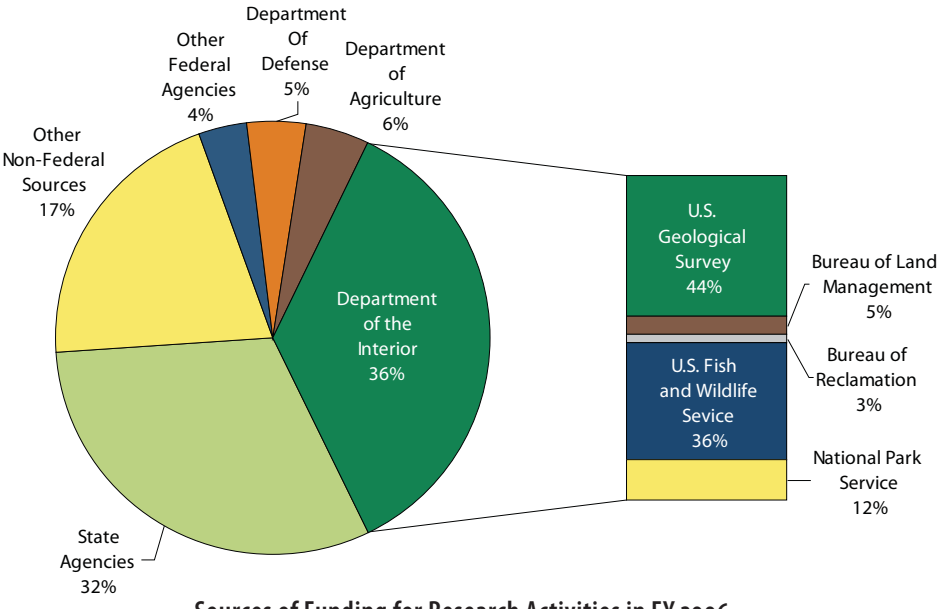
A 5-week old black bear cub born at the Virginia Tech Center for Bear Research is weighed as part of the Virginia Unit's research on cub growth and development.

BY THE NUMBERS

Funds appropriated to the Cooperative Research Unit Program are used to staff, support, and manage the U.S. Geological Survey's participation in this partnership program. Ninety percent of FY 2006 program dollars were allocated to staff salaries and benefits, a percentage that has typified the program over time. The research and technical assistance activities of individual units are supported by reimbursable funds from state, federal, and local governments and non-government organizations. The size and number of new and continuing projects varies annually based on Cooperator and partner needs and available funds.



CRU Research Projects, FY 1998–2006

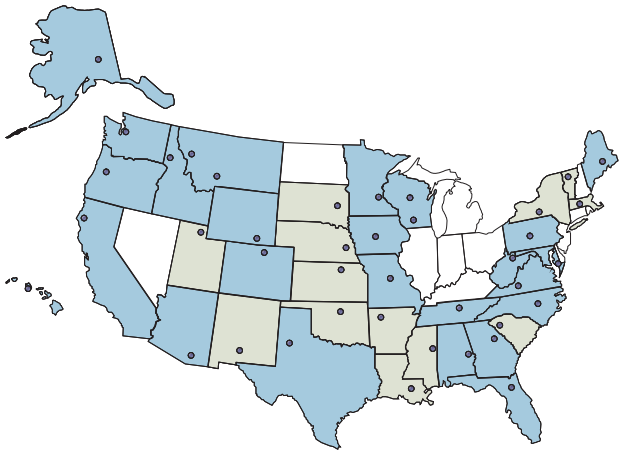


Sources of Funding for Research Activities in FY 2006

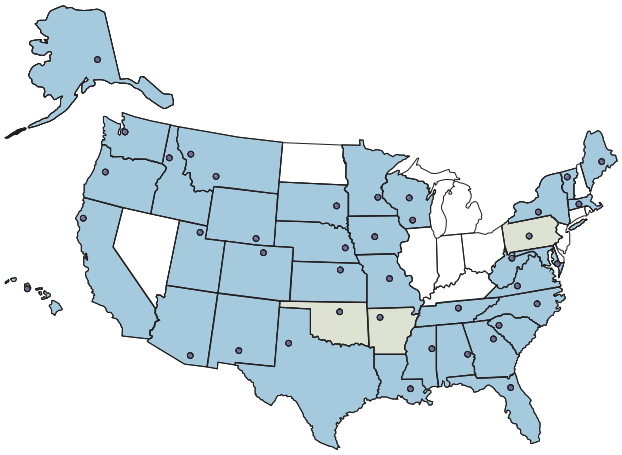
U.S. GEOLOGICAL SURVEY INITIATIVES

COLLABORATION WITH SCIENCE CENTERS

Cooperative Fish and Wildlife Research Units provide USGS science centers with access to facilities and faculty expertise at CRU host universities. The provision of this service enables USGS scientists to respond more effectively to the priority issues among federal land and resource managers. Access to units and their host university capabilities crosses all political and bureau jurisdictional lines, and links expertise with scientific needs throughout the country. In FY 2006, 25 units collaborated with USGS science centers on 66 projects that addressed a diverse range of topics, including highway crossings for wildlife, propagation techniques for the Topeka shiner, avian use of contaminated water sources, monitoring protocols for mussels, molecular assessment of disease agents in amphibian populations, and the effects of terrestrial materials and overfishing on coral reef integrity.



Twenty-five Cooperative Research Units (blue fill) had 66 active projects in FY 2006 that were at least partially funded by USGS Science Centers.



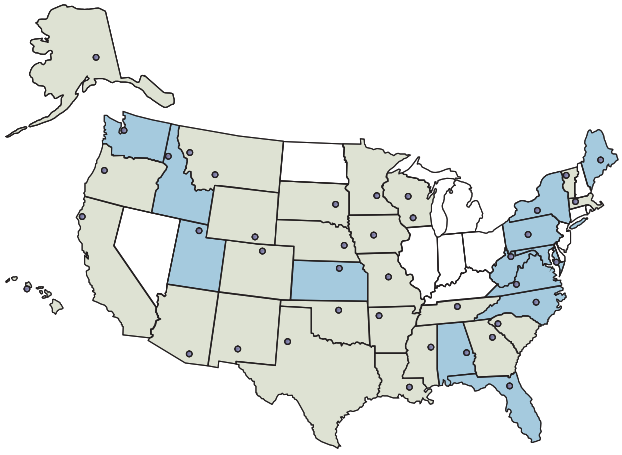
Thirty-seven Cooperative Research Units (blue fill) had 183 active projects in FY 2006 that were funded by USGS initiatives other than Science Centers or GAP.

ASSISTANCE TO USGS IN ADDRESSING ISSUES OF PRIORITY TO THE DEPARTMENT OF THE INTERIOR

In addition to the science centers, Cooperative Fish and Wildlife Research Units play an important role in helping the USGS implement regionally and nationally coordinated programs and initiatives that support the science needs of other Department of the Interior agencies. In FY 2006, 37 units helped to address 183 priority issues of Department of the Interior agencies through national USGS programs, such as Amphibian Monitoring Research and Inventory, Fire Science, Global Change, and Invasive Species.

PARTICIPATION IN THE NATIONAL GAP ANALYSIS PROGRAM

The U.S. Geological Survey's National GAP Program originated through the Cooperative Research Units Program under the leadership of Mike Scott at the Idaho Unit. The GAP Program characterizes and geo-references vegetation types as predictors of vertebrate distributions. Patterns of biological richness and species diversity are mapped against land ownership patterns to identify gaps in protection efforts for areas with high biodiversity. In FY 2006, 13 units conducted 18 GAP related research projects to assist local, state, and federal governments with their land use planning and species protection efforts.

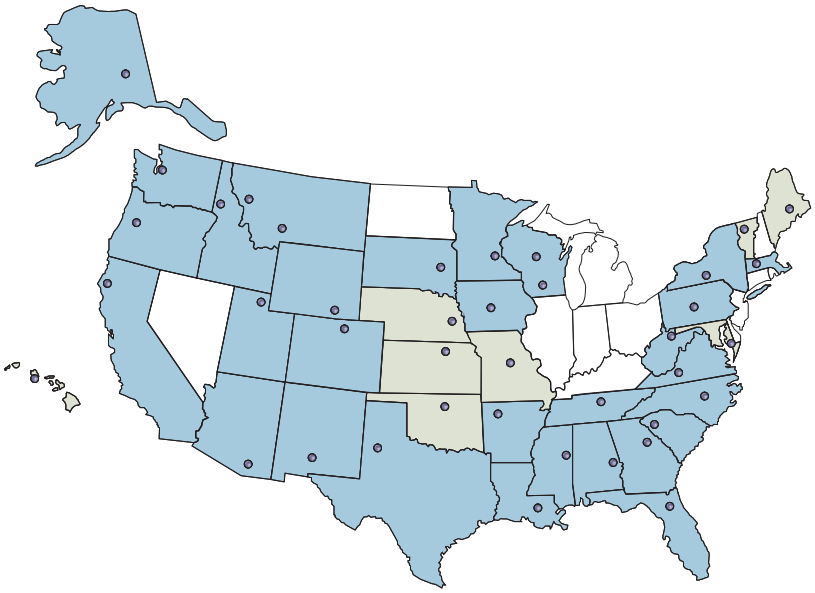


Thirteen Cooperative Research Units (blue fill) conducting 18 GAP research projects in FY 2006.

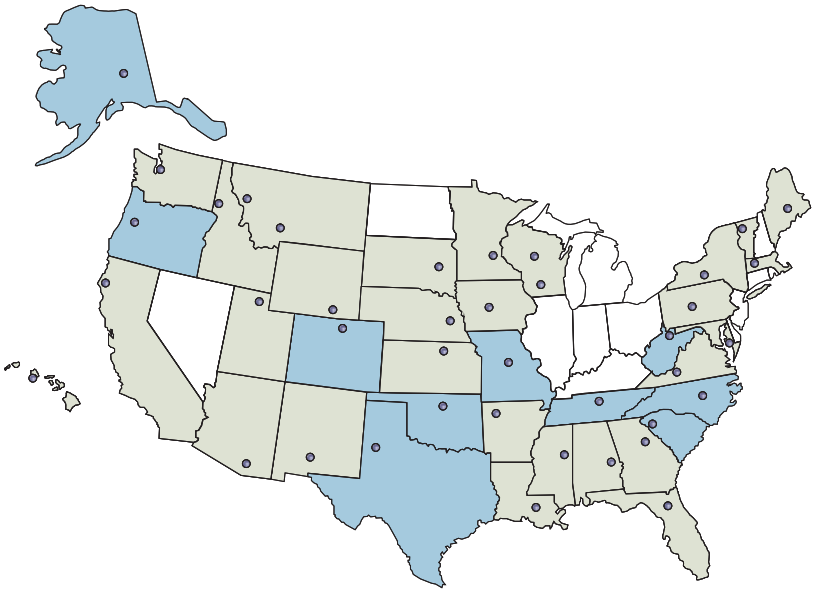
OTHER DEPARTMENT OF THE INTERIOR INITIATIVES

U.S. FISH AND WILDLIFE SERVICE AND NATIONAL PARK SERVICE

U.S. Fish and Wildlife Service and National Park Service managers seek out CRU expertise throughout the country to address specific needs, regardless of the unit's location. Units also respond to agency information needs at a local level, through collaborations with national park or national wildlife refuge managers and biologists and other local agency personnel.



In FY 2006, 31 Cooperative Research Units (blue fill) participated in 138 projects that were funded, at least partially, by the U.S. Fish and Wildlife Service.



In FY 2006, 10 Cooperative Research Units (blue fill) participated in 12 projects that were funded, at least partially, by the National Park Service.

MARK STURM

Pennsylvania Unit student Sonja Christensen fits a radio-collar on a white-tailed deer on Assateague Island National Seashore, Virginia.

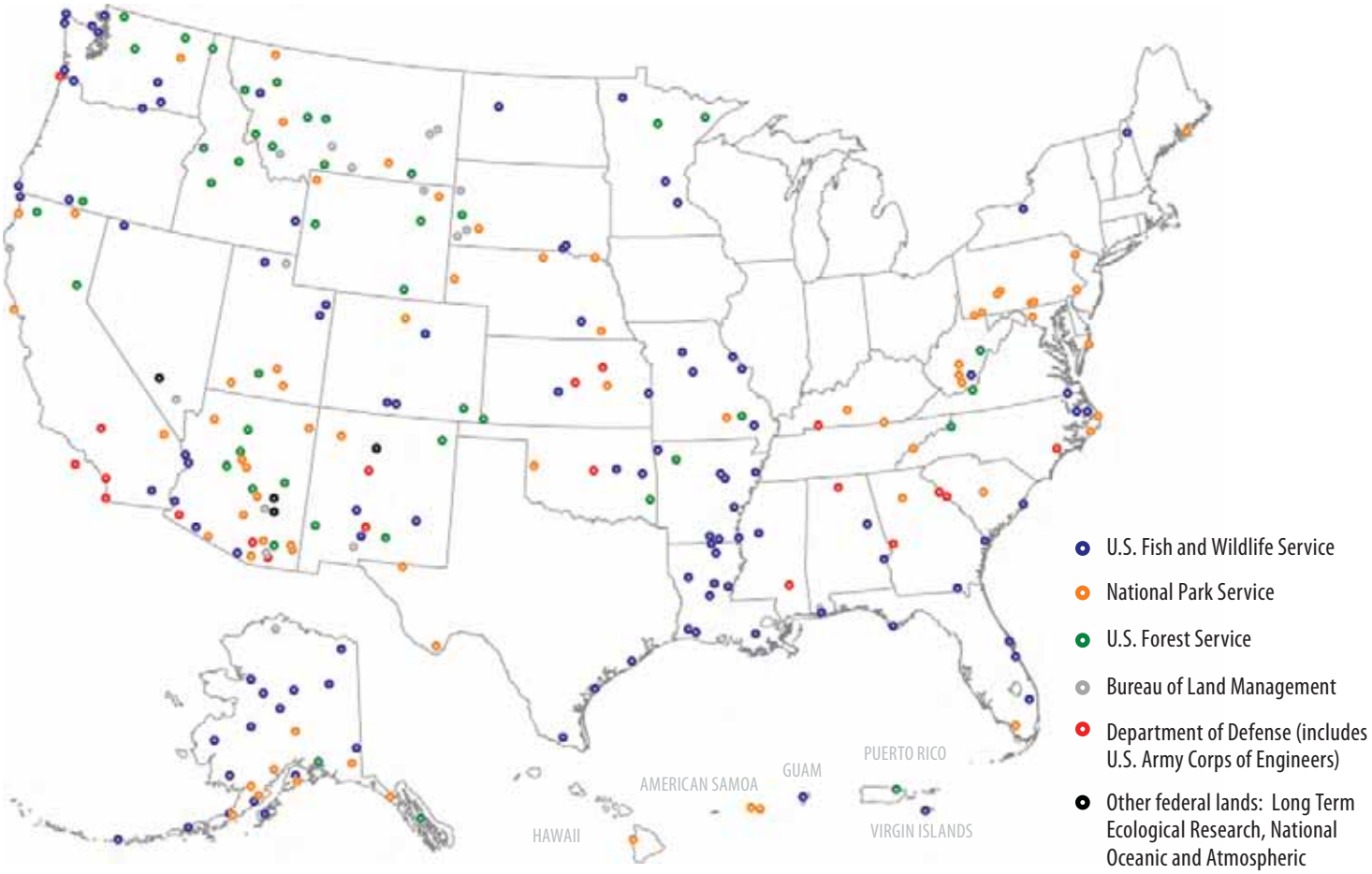
SITE-SPECIFIC RESEARCH SUPPORTING FEDERAL RESOURCE MANAGEMENT

Unit scientists focused much of their research on issues of importance to federal land and resource managers, and conducted many site-specific research projects on federal lands in FY 2006. Many of these projects were conducted for the Department of the Interior, at U.S. Fish and Wildlife Service, National Park Service, and Bureau of Land Management sites. Projects also were conducted at sites managed by the U.S. Forest Service, the Department of Defense, and a number of other federal agencies. Lastly, several Units, such as Arizona, Idaho and Louisiana, were involved in regional and national studies that compiled and synthesized information from over 100 refuges, national parks and water management districts.

Site-specific research often represents a collaborative partnership between an individual unit and the federal agency managing a particular site, with the collaborating federal agency providing much logistical and operational support for the work. Sites identified on the below map include those federal lands where unit scientists conducted research during FY 2006.

MICHAEL ASHDOWN

New York Unit graduate students Meredith Gore and Michael Wegan who conduct black bear studies in New Jersey and New York, respectively, share a day of field work at Fort Drum Military Reservation that includes assessment of cubs.



Locations of Site-Specific Unit Research Focused on Federal Lands in 2006

Locations of International Research in 2006

INTERNATIONAL RESEARCH AND ASSISTANCE

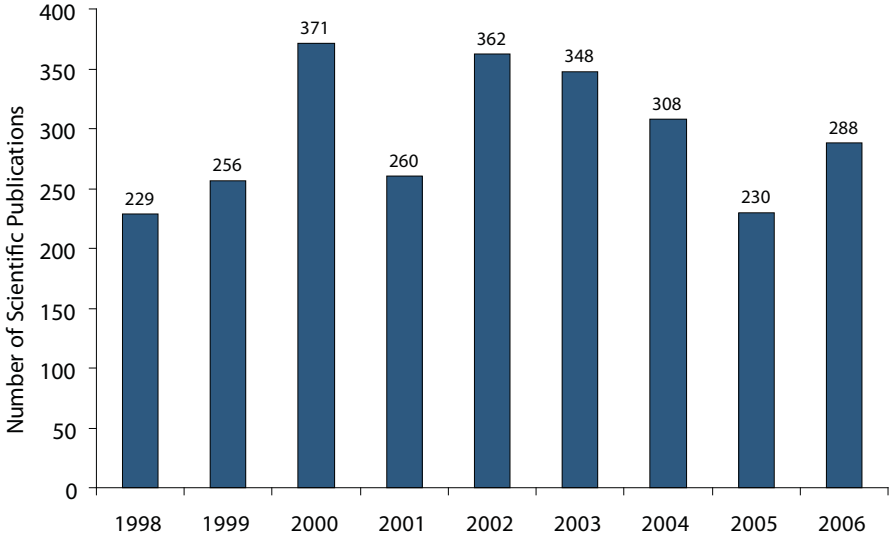
Unit scientists, participating university faculty, and graduate students work through the Cooperative Research Units Program to address large-scale patterns of habitat change, global climate change, migratory birds, endangered species and other natural resource issues throughout the world. This often presents opportunities for the exchange of students, broadens the aspects of university international programs, and increases the opportunities for scientific advancement. During FY 2006, 46 unit scientists participated in 93 activities with international colleagues from 35 countries via project collaborations, field work, technical assistance, workshops, graduate training and the like (see map above). Thirty of these scientists made a total of 40 trips to conduct activities in 24 of the countries. The countries with the most frequent collaborations were Mexico (12 scientists, 19 activities), Canada (12 scientists, 13 activities), Australia (5 scientists, 5 activities), Japan (5 scientists, 5 activities), United Kingdom (4 scientists, 4 activities), and the Peoples Republic of China (3 scientists, 4 activities).

THOMAS EDWARDS/UT UNIT

Utah's Assistant Unit Leader Thomas Edwards works with scientists from 11 European nations to study the effects of global warming at the landscape level. Here, he and his colleagues research lichens on Aletsch Glacier, Switzerland, as indicators of global climate change.

SCIENTIFIC PUBLICATIONS

Cooperative Research Units Program scientists, students, and other personnel publish, on average, about 300 peer-reviewed scientific publications per year. Annual fluctuations reflect changes in Unit staffing and funding levels as well as the unpredictable nature of publication cycles due to shifting research completion dates.



Number of Peer-Reviewed Articles Unit Scientists Published 1998–2006

RALPH ARWOOD/FL UNIT

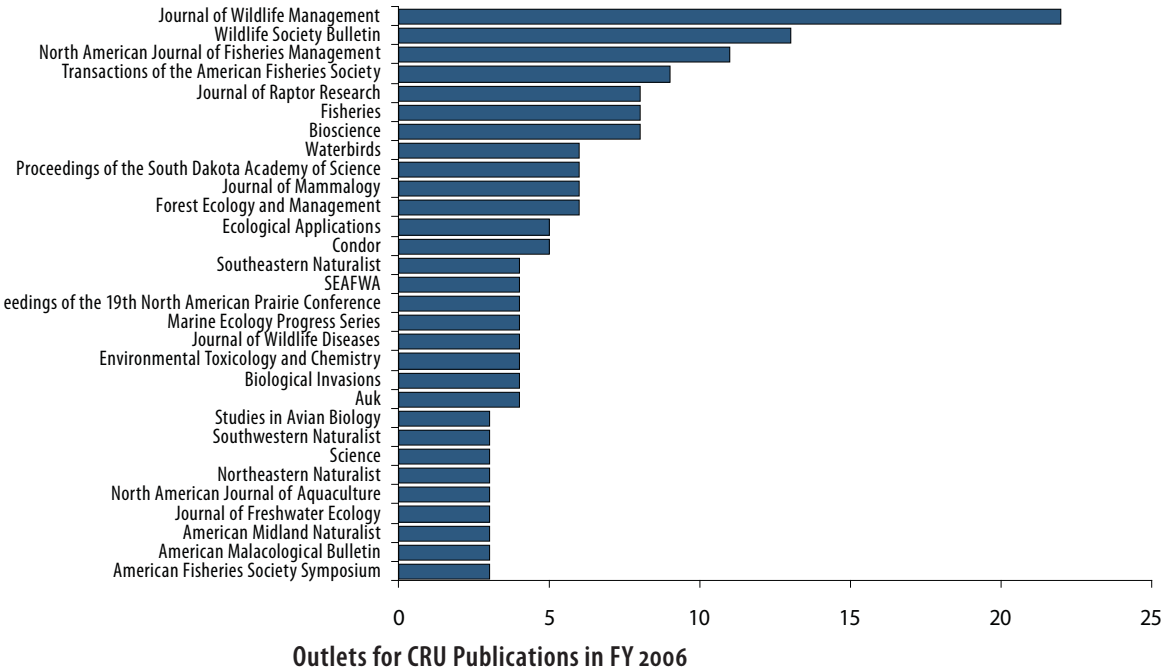
THOMAS EDWARDS/UT UNIT

CRAIG PAUKERT/KS UNIT

Top: Capturing an alligator in Big Cypress National Preserve. Middle: Releasing a ground squirrel. Bottom: The northern redbelly dace, a state threatened species in Nebraska, collected in a Nebraska sandhill stream.

TOP OUTLETS FOR COOPERATIVE RESEARCH UNITS PUBLICATIONS

In FY 2006, unit scientists and students published a majority of their research findings in widely read land and resource management journals and symposia proceedings, thereby continuing the Program's history of providing accessible information to address resource manager needs. However, the breadth of Cooperative Research Unit science addresses a complexity of topics, leading to the publication of research results among a wide array of scientific outlets. In fact, during FY 2006 unit scientists and students published their research papers in 117 different journal outlets, including symposia and conference proceedings.



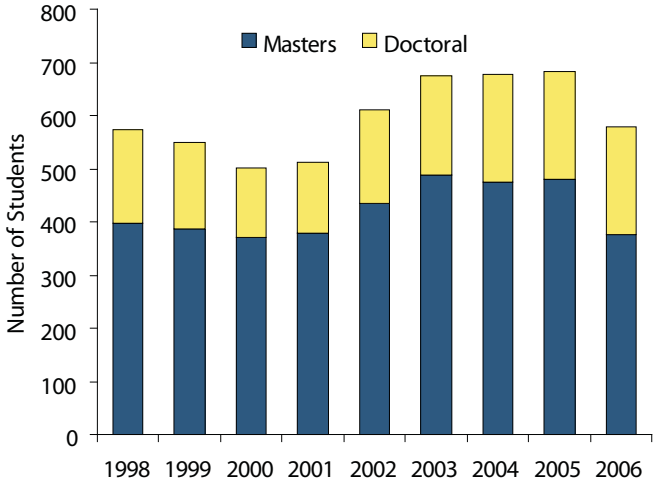
Outlets for CRU Publications in FY 2006

ACADEMIC TRAINING

Kristen Pitts, Kansas Unit graduate student, with a longnose gar from the Kansas River.

GRADUATE STUDENT ADVISING

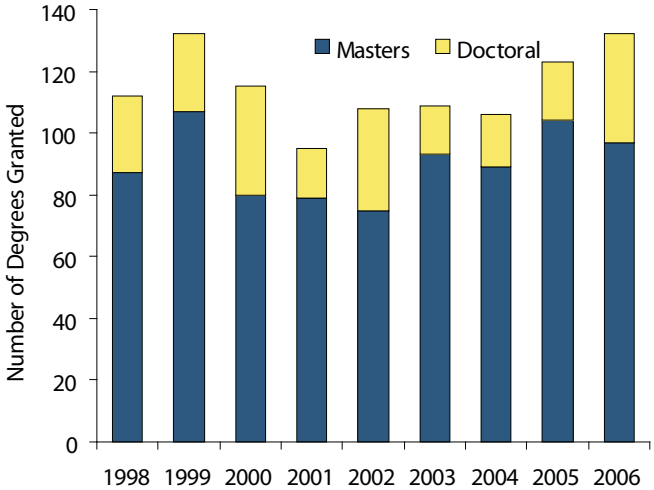
Cooperative Research Unit scientists participate actively in the academic programs of participating universities. These activities focus on graduate education, including formal classroom instruction as well as academic and research advising for students. Unit scientists are encouraged to recruit a culturally diverse group of candidates to train in natural resource science and management and are recognized as faculty members with rights and responsibilities commensurate with their faculty appointments. A total of 578 students were advised by federal scientists in FY 2006.



CRU Graduate Students 1998–2006

GRADUATE DEGREES AWARDED TO STUDENTS ADVISED BY UNITS SCIENTISTS

Graduate degrees at both the master's and doctoral level are awarded by host universities to students mentored by scientists of the Cooperative Fish and Wildlife Research Units. The units also expand training opportunities for undergraduates, linking undergraduate and recently graduated Baccalaureates with real world field and laboratory experiences that complement their academic coursework. A total of 132 unit students were awarded graduate degrees in FY 2006: 97 Masters of Science; and 35 Doctorates of Philosophy.



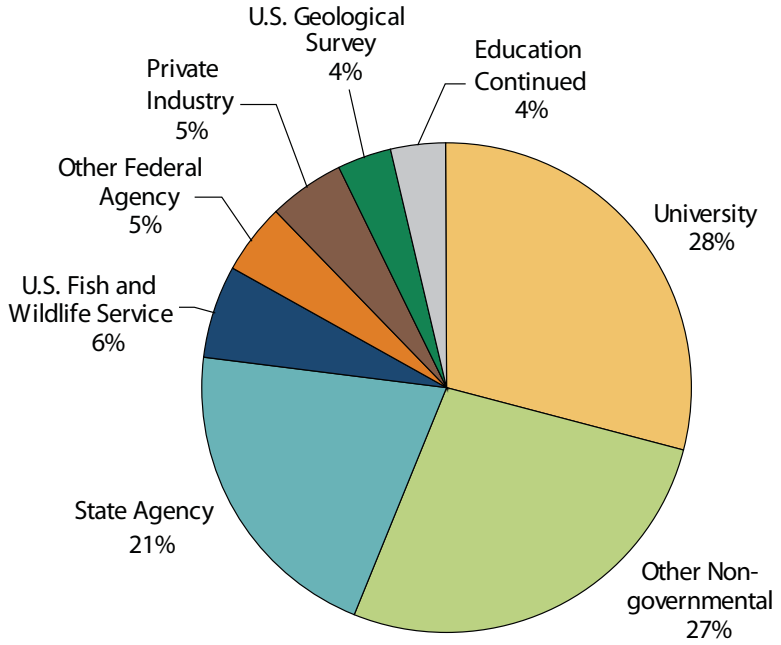
CRU Graduate Students Receiving Degrees 1998–2006

JOSEPH ZYDLEWSKI/ME UNIT

Maine Unit graduate student Christopher Holbrook tags an adult Atlantic salmon sampled from the Penobscot River.

EMPLOYMENT OF GRADUATING UNIT STUDENTS

Unit students are in high demand by state and federal agencies. Cooperative Fish and Wildlife Research Units help students blend their academic programs with real world natural resource issues that many state and federal agencies face. Because most CRU projects are funded by federal agencies, students often work closely with agency personnel while carrying out their student research, and are thereby provided with opportunities to interact with professionals in their field of study and to learn about their sponsoring agency. At the same time, this interaction provides agencies with a resource for evaluating potential future employees. Collectively, graduating unit students found employment with a diverse set of employers in FY 2006, including federal and state agencies, universities, and private companies.



Employers of CRU Students Graduating in 2006

CRU PROGRAMS ENHANCE CULTURAL DIVERSITY IN NATURAL RESOURCES

The Cooperative Research Units Program works with all units to increase opportunities for ethnic and cultural diversity in our student population; however, our efforts are not limited to just units. The CRU Program also sponsors two initiatives that seek to enhance diversity among undergraduate students. These programs provide opportunities for students across the nation to gain appreciation for fish and wildlife resources, to explore career options, and to receive personalized mentoring and training in the natural resource fields. The intent of these undergraduate-focused programs is two-fold: (1) broaden natural resource appreciation within America's ethnically and culturally diverse communities; and (2) provide state and federal resource agencies with an opportunity to diversify their workforces.

UNIVERSITY OF ARIZONA PROGRAM

In 1988, Eugene Maughan, former leader of the Arizona Cooperative Fish and Wildlife Research Unit, helped establish one of the Cooperative Research Units Program's longest running and most successful minority training programs. This program directs training opportunities among Hispanics and Native Americans at the undergraduate and graduate levels.

This year, nine undergraduates participated in the Arizona program, four of whom received their Bachelor's degree. Congratulations to graduates Joshua Bridges, now a research assistant in the Department of Plant Sciences, Tara Luckau, a research assistant in the Arizona Research Laboratories, and Christina Contreras, a lab technician for the Department of Ecology. Graduate Judith Ramirez is now a Master's student at the Arizona Unit. Ramirez is exploring the migration route of the lesser long-nosed bat, which is an endangered species in Arizona and Mexico, and hopes to determine how many populations of this species still exists.

CORA VARAS/UNIVERSITY OF ARIZONA

Arizona program participants during a spring meeting. The students meet regularly to share ideas and discuss personal issues.

NATIONAL COOPERATIVE FISHERIES SCHOLARS PROGRAM AT THE UNIVERSITY OF ARKANSAS-PINE BLUFF

The Cooperative Research Units Program initiated its minority outreach partnership with the University of Arkansas-Pine Bluff in 1982, and in 2001 the partnership was reconstructed to form the National Cooperative Fisheries Scholarship Program (NCFS). The goal of NCFS is to provide opportunities for minorities to receive training in fisheries biology and natural resource conservation and management as well as exposure to various career options and post-graduate educational opportunities. Each year UAPB recruits two individuals from across the nation and provides scholarships and work opportunities for accepted students. Once in the program, the students must fulfill rigorous scholastic requirements and are expected to acquire work experience with a university, agency or a Cooperative Research Unit.

In 2006, the NCFS program had eight participants, two of whom are scheduled to graduate in spring 2007. Several students gained work experience through internships at the University of Florida and UAPB, Blackwater National Wildlife Refuge, USDA Agriculture Research Service, and Missouri Department of Conservation. Additionally, five program students presented results of their internship research as either a paper or poster at various conferences in Arkansas, across the nation, and overseas.

MIKE EGGLETON

Jamila Payton, a National Cooperative Fisheries Scholar at the University of Arkansas-Pine Bluff, accepts her Outstanding Poster award at the Association of Research Director's Meeting in Atlanta in April 2006.

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Mississippi kite gathering nest material. CLINT BOAL/TX UNIT

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BARRY GRAND/AL UNIT

Alabama Unit research assistant Brian Petersen radio tracks northern bobwhites in Conecuh National Forest, Alabama.

Grasshopper mouse. RON E. VANNIMWEGEN/KS UNIT

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David Ausband of the Montana Wildlife Unit places a radiocollar on a wolf as part of a monitoring research project in Idaho.

CHARLES BERRY/SD UNIT

A South Dakota Unit graduate student searches for bird mortalities along transect lines around a wind turbine.

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A lake whitefish is pulled out of Lake Michigan in a commercial gill net. Wisconsin Fisheries Unit scientists are researching the whitefish's genetic stock structure to identify and delineate stocks in and around Lake Michigan to allow more effective management of this historically important commercial fishery.

End

The Cooperative Fish and Wildlife Research Units Program would like to thank each of our cooperators for their continued support.

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