

EXECUTIVE SUMMARY

The University of Nevada, Reno (UNR) proposes to host through its College of Agriculture, Biotechnology and Natural Resources (CABNR) the Great Basin Cooperative Ecosystem Studies Unit (GB-CESU) with the following academic partners: Utah State University College of Natural Resources (Senior Partner); Desert Research Institute; University of Utah; Oregon State University; D-Q University; Great Basin College; Idaho State University; and University of Nevada, Las Vegas. In addition, UNR includes as cooperators the following organizations with significant interests and programs in the Great Basin: The Rocky Mountain Elk Foundation; The Nature Conservancy; Pyramid Lake Paiute Tribe; Walker Lake Paiute Tribe; Fallon Paiute-Shoshone Tribe; Nevada Department of Conservation and Natural Resources; Community College of Southern Nevada; University of California, Berkeley Museum of Vertebrate Zoology; the Center for Conservation Biology, Stanford University and the University of California White Mountain Research Station. All academic partners and cooperators have active programs in the Great Basin.

The academic partners in the GB-CESU proposal have a wealth of scientific and technical talent to address high priority research, educational and management issues in the Great Basin, including over 500 faculty in the natural resource and environmental sciences. The diversity of disciplinary strengths currently involved in programs and projects within the Great Basin includes the full spectrum of biological, economic, physical and social sciences. The broad array of research libraries, laboratories and museums are offered by the partners and cooperators as resources for the GB-CESU. In addition, the partners have a major network of field experiment stations, many of which are operated in cooperation with the proposed partner federal agencies. Many of the academic partners are currently involved in multi-institutional and multi-disciplinary projects with each other, and all have cooperative projects with federal partners at this time. The diversity of research and education capabilities of the academic partners in combination with the research and management knowledge of the federal partners provides unique opportunities for increased cooperation and coordination to address the highest priority issues and needs within the Great Basin.

The proposed organizational structure adds strengths to the GB-CESU. UNR as Host University will provide all required administrative services and coordinating activities for the GB-CESU and will serve as coordinator of biological, ecological, environmental, economic and social programs. USU as Senior Partner will provide leadership and coordination to the critical areas of RS/GIS, and information resource management and networking services. The organizational structure also recognizes that, depending on the issue or problem area, any individual partner may provide project leadership based on their expertise and resources. This proposal also recognizes the strengths, skills and needs of its cooperators, and their potential contributions to programs as well as the potential for cooperation and assistance of the partners to their projects addressing the high priority needs of the Great Basin.

INTRODUCTION

The University of Nevada, Reno (UNR) proposes to be the Host University through its College of Agriculture, Biotechnology and Natural Resources (CABNR) for the Great Basin Cooperative Ecosystem Studies Unit (GB- CESU) with the following as partner academic institutions: Utah State University College of Natural Resources (Senior Partner); Desert Research Institute of the University and Community College System of Nevada; University of Utah; Oregon State University; D-Q University; Great Basin College; Idaho State University; and University of Nevada, Las Vegas. In addition, UNR includes as cooperators the following institutions and organizations that have a significant stake in the Great Basin: The Rocky Mountain Elk Foundation; the Nature Conservancy; Pyramid Lake Paiute Tribe; Walker Lake Paiute Tribe; Fallon Paiute-Shoshone Tribe; State of Nevada Department of Conservation and Natural Resources; Community College of Southern Nevada; University of California, Berkeley Museum of Vertebrate Zoology; and the Center for Conservation Biology, Stanford University and the White Mountain Research Station. All academic partners and cooperators already are active participants in Great Basin natural resource and environmental research and education programs.

The UNR CABNR proposes a somewhat unique organizational structure of the academic partners. UNR as Host Institution will provide all administrative services and coordinating activities for the GB-CESU as required by the participating agencies and CESU federal management, and will provide coordination of the biological, ecological, economic and social sciences programs for the CESU. Utah State University College of Natural Resources (USU) as Senior Partner, due to its extensive ongoing programs, will provide leadership and coordination to the critical areas of Remote Sensing/ Geographical Information Systems (RS/GIS) and, through the S. J. and Jessie E. Quinney Natural Resources Research Library, information resource management and networking systems within the CESU. This organizational structure is intended to provide coordination of efforts and avoid costly duplications. For example, USU scientists are already working with RS/GIS scientists within the agencies, UNR and others to fill in critical gaps in the GIS database within the Great Basin.

The academic partners in this GB-CESU proposal have a tremendous wealth of scientific and technical talent and resources available to work with the federal participating agencies. These include over 500 scientists, technical experts and educators in the natural resource and environmental sciences plus a diversity of field stations and laboratories. All academic partners in the proposal have academic programs in the natural resource and environmental sciences and in the economic and social sciences that support and address natural resource and environmental protection and management. With the exception of Great Basin College and the Native American Colleges, these include graduate studies programs. In most states, federal facilities and lands are also provided for cooperative research and education programs. The Land Grant Universities in the GB-CESU proposal already host research laboratories and federal scientists from some of the participating CESU agencies and the USDA Agricultural Research Service.

In most cases, the academic partners and cooperators have strong academic and cooperative ties to each other. Faculty in the four institutions within the University and Community College System of Nevada (UNR, DRI, UNLV and Great Basin College) have joint projects within the natural resource and environmental sciences. UNR and USU are jointly involved in planning a number of resource management and rangeland restoration projects with federal and state agencies. The Intermountain Working Group of extension specialists and educators with interests in natural resource management involves participants from Nevada, California, Oregon and Idaho. The Rocky Mountain Elk Foundation has active projects in every state in the Great Basin, and formal cooperative agreements with UNR and USU. The Nature Conservancy is also an active participant in every state in the Great Basin. The Native American Tribes listed as cooperators are active partners in a wide range of natural resource management and environmental projects, and many of their students attend the Native American Colleges listed as academic partners.

The Great Basin is geographically well defined, bounded on the west by the Sierra Nevada range, on the north by the northern edge of southern plains of Idaho, on the east by the Wasatch range of Utah, and on the south by the Mojave desert in southern Utah and Nevada. The challenges to ecosystem health in the Great Basin have been clearly defined by the Bureau of Land Management in two publications – “Out of

Ashes, An Opportunity” in November, 1999, and “The Great Basin: Healing The Land” in April, 2000. The Great Basin Restoration Initiative, proposed and defined in these publications is urgently needed and supported by all partners and cooperators in this proposal. The goals of the Great Basin Restoration Initiative closely parallel the goals of the UNR Nevada Arid Rangelands Initiative, developed in 1998. All academic partners in this proposal have recognized and documented the diversity of problems and issues confronting the Great Basin ecosystem. Restoration of ecosystem health will be a major challenge, which must be preceded by the control of invasive, non-native species and a myriad of other challenges to our native plant communities and wildlife. Our communities and families in the rural Great Basin are at serious economic and social risk, and are willing partners in this restoration effort.

One of the most serious challenges to the Great Basin Restoration Initiative is the lack of understanding of how best to achieve many of the listed restoration goals. The federal land management agencies and their personnel are very good at what they do, but in many situations the science and technology for implementing restoration are not well understood or documented. In recognition of this, the Initiative calls for a significant investment in research and monitoring to increase the effectiveness of restoration programs. The Initiative also calls for grass-roots participation and implementation of restoration activities. The partners and cooperators in this proposal are prepared to work with the agencies in defining the research priorities, providing the science-based knowledge for implementing restoration programs, facilitating the development of local partnerships and priorities through our outreach and extension programs, and assisting in monitoring and evaluation of implemented restoration projects.

Previous discussions with agency partners indicate a growing concern over their ability to identify and recruit qualified personnel for the future. The GB-CESU academic partners propose to initiate immediate discussions with our federal partners to (1) clearly identify their human resource needs, (2) make certain that our academic programs will provide qualified students for employment, and (3) provide direct training and recruitment opportunities through undergraduate student internships and graduate research training in projects that directly relate to priority needs of the agencies. The CESU request for proposals indicates that one or more federal scientists will be located at the host institution and at partner institutions to best meet the needs and interests of the scientists and the CESU. These scientists, in addition to their research contributions, can also be a tremendous asset in resident instruction and in assisting their host institution in training and recruiting students to meet agency needs.

This proposal recognizes that the GB-CESU would be a part of and receive oversight from a national CESU Joint Coordinating Group, and proposes that its planning, goals and direction would come from a GB-CESU Management Committee including academic partner and federal agency representatives. The Management Committee will work with the GB-CESU leader to develop a charter, identify and prioritize research and education needs and opportunities, develop program and annual plans, work with the agencies to develop specific projects either collectively or as institutional teams, develop adequate support for project implementation, and evaluate projects and GB-CESU programs. It is emphasized that, as Host Institution, UNR may have direct cooperative projects with federal agencies, may serve as coordinator of multi-institutional projects, or may serve as a conduit for other research and education projects to be conducted by another partner within the GB-CESU that would assume primary responsibility for the particular project.

ROLE AND MISSION STATEMENTS

THE UNIVERSITY OF NEVADA, RENO (Host Institution)

The University of Nevada, Reno (UNR) is the Land Grant University within the University and Community College System of Nevada. UNR as Carnegie I Research University is, first and foremost, a center for scholarship and learning, with responsibilities that extend to the citizens of Nevada, the nation and world. The UNR mission weaves teaching, creative activity and service into a seamless fabric. Although the mission has traditionally centered on undergraduate education, in the last two decades, it has expanded to include a full spectrum of graduate and professional programs. Through outreach and distance education, the university continues to grow and serve a broader range of citizens. The university emphasizes building partnerships that strengthen linkages with communities, business and industry, state and federal agencies, and public and private organizations critical to the economic health and well-being of the state, nation and world.

The Mission of the **College of Agriculture, Biotechnology and Natural Resources** is to build human capacity and capability through efforts directed at improving the quality of life for people by increasing their learning and understanding. Through the Agricultural Experiment Station, research is conducted to discover new information relating to natural resource preservation and management, agriculture and human ecology. Through programs of instruction and outreach, research based information becomes knowledge. Central to the mission is the protection, utilization and management of soil, water, air, plant and animal resources, the economic vitality of the agricultural industry, and the quality of our environment. Of equal importance is our concern with the utilization of food in health promoting human diets and the social and economic well-being of individuals, families and communities.

The College is providing a leadership role within the UNR system to foster communication and improve collaboration among the various colleges, departments, institutes, centers and their scientists and educators with interests in natural resource and environmental conservation, management and improvement. The Arid Rangelands Initiative, administered by the College and funded by a special congressional appropriation, supports high priority multidisciplinary research and outreach projects with our agency partners and others that address issues of concern in the restoration, management and improvement of our arid rangelands. The Consortium for Great Basin Studies brings all university, federal and state agencies, and public and private organizations together to increase communication and awareness of the diversity of program needs, programs and projects in progress, and to garner support for the highest priority needs of the Great Basin ecosystem.

UTAH STATE UNIVERSITY COLLEGE OF NATURAL RESOURCES (Senior Partner)

Utah State University (USU) is a Carnegie I Research University that integrates teaching, research, extension and service to meet its unique role as Utah's Land Grant University. The College of Natural Resources (CNR) educates students and working professionals in the natural resource disciplines, conducts research on the science and management of natural resources, and extends information about natural resource management for the benefit of Utah, the nation and the world. CNR programs cover the biotic, abiotic, social and economic dimensions of natural resource systems.

DESERT RESEARCH INSTITUTE (Partner)

Desert Research Institute excels in environmental research and the application of technologies to improve people's lives throughout Nevada and the world. This mission is implemented by fostering scientific talent for the advancement and integration of terrestrial, hydrologic, atmospheric, and anthropologic sciences. Scientific understanding is applied to the effective management of all natural resources while meeting Nevada's needs for economic diversification and science-based educational opportunities.

The primary purposes of the institute are to: 1) foster and conduct fundamental scientific, economic, social or educational investigations and applied research for government or private agencies or individuals; 2) encourage and foster a desire in students and faculty to conduct research; 3) discover and develop talent for conducting research; 4) acquire and disseminate knowledge related to projects undertaken; and 5) promote all research within the system generally.

UNIVERSITY OF UTAH (Partner)

The mission of the University of Utah is to educate the individual and to discover, refine and disseminate knowledge. As a major teaching and research university, the flagship institution of the Utah state system of higher education, the University of Utah strives to create an academic environment where the highest standards of scholarship and professional practice are observed and where responsibilities of students are conscientiously met. It recognizes the mutual relevance and interdependence of teaching and research as essential components of academic excellence. It welcomes students who are committed to learning and who conform to high academic standards. The right of free inquiry is zealously preserved; diversity is encouraged and respected; critical examination and creativity are promoted; and intellectual integrity and social responsibility are fostered. The University is fully committed to the goals of equal opportunity and affirmative action, which are designed to ensure that each individual be protected with the opportunity of full, unhampered, and responsible participation in every aspect of campus life.

OREGON STATE UNIVERSITY DEPARTMENT OF RANGELAND RESOURCES (Partner)

The Department of Rangeland Resources, as a part of the Oregon State University through the College of Agricultural Sciences, is committed to the missions of the College and University system to meet the needs of its students and the citizens of Oregon, the nation and the world. A commitment to quality undergraduate and graduate education is the cornerstone of the Department's teaching efforts. An integrative, problem-solving teaching style, emphasizing scientific-based findings is incorporated into all classes taught by the Department. A strong research program is the fundamental basis of our teaching, extension and international programs. The faculty has determined that the Department has an advantage in the studies of the forest/rangeland interface, including juniper woodlands, and has emphasized research in this area. This includes specialties in agroforestry, watershed, grazing management, riparian studies and water quality. The Department recognizes that extension is an integral part of the University's mission. Extension programs provide education and timely information based on current research to help Oregonians solve problems and develop skills related to applied rangeland ecology and management. The Department recognizes that most of the world's natural resources are outside of the United States, and the international opportunities to receive and share knowledge for both the faculty and students provide significant educational and cultural benefits.

D-Q UNIVERSITY (Partner)

The mission of D-Q University is to provide quality education, community involvement, and learning opportunities for all California Native American Indians, and all those beyond California's borders, that have a desire and ability to learn. The curriculum will include the spiritual and cultural truths of the past, the realities of the present, and preparation for the future. The six major institutional objectives are to:

- Create programs of quality education and learning that Native peoples can apply to their own cultural frame of reference.
- Create opportunities for Native American students to gain actual experience in technical and academic skills development.
- Preserve and build Native American cultural heritage as a valid area of scholarship and inquiry.
- Serve as a learning center for Native American communities by establishing the opportunity for the development of local instruction.
- Serve Native American communities by developing localized instruction that will enhance the capability of tribal governments and their programs of service to their people.
- Create programs of teaching and learning that allow for the improvement of self-image and self-worth of Native Americans.

GREAT BASIN COLLEGE (Partner)

The mission of Great Basin College is to provide superior, student-centered, post-secondary education in central and northeastern Nevada. The College offers five types of educational opportunities: university transfer courses, occupational and technical studies, developmental courses, community education and selected baccalaureate programs, along with student support services and special business-education partnerships. In addition to campus-based education programs, the College is committed to providing educational opportunities and access, using the newest distance technologies whenever feasible. The college is committed to its diverse and changing community by providing an open academic environment where students of all ages and backgrounds can discover their potential and achieve their life goals.

Great Basin College recognizes that its location within northeastern Nevada and the Great Basin provides unique opportunities for education and research partnerships. Our faculty, though small in number, offer strong teaching and research capabilities. The region offers unique biological and ecological resources for education and research programs. Native American reservations and peoples are an important component of the region's resources and culture. Mining, ranching, wildlife and diverse recreation opportunities are important to the region's economy, families and communities. The public and private land resource management issues and biological, ecological, social and economic issues are a microcosm of those confronting the entire Great Basin ecosystem.

IDAHO STATE UNIVERSITY, CENTER FOR ECOLOGICAL RESEARCH AND EDUCATION (Partner)

The role and mission of the Center for Ecological Research and Education (CERE) is to support a strong program in basic and applied ecology. The primary roles of CERE are to support ecological research programs and research-based training in Ecology and to facilitate collaborative and multidisciplinary research among the Ecology faculty and with other scientists both on and off the University campus. CERE provides infrastructure to meet critical research needs including data management and analysis, report and proposal preparation, and technical assistance; conducts research that addresses ecological questions of regional importance; provides an intellectual framework for collaborative research, thereby facilitating multi-investigator, multidisciplinary and multi-institutional projects; and serves as a training center for students and faculty by providing support for graduate students, faculty and postdoctoral fellows, by involving undergraduate students in research, and by sponsoring seminars and workshops.

UNIVERSITY OF NEVADA, LAS VEGAS (Partner)

The University of Nevada Las Vegas is a rapidly growing state university. Among the strategic planning goals for UNLV are: 1) to become more student focused; 2) to hire, motivate and reward superior faculty; 3) to increase research, scholarly activity and national recognition; and 4) to grow selectively, serve the region and achieve national distinction. The College of Science will play a key role in the growth and development of UNLV, with over two-thirds of the University's current externally funded research being through the college. **The Harry Reid Center for Environmental Studies** is the largest scientific research laboratory and research institute of the University of Nevada, Las Vegas. Its principal mission is conducting multidisciplinary academic and applied research on environmental problems and for the development of environmental monitoring technology.

NOTE: Additional institutions and organizations are listed as "cooperators" rather than as partners. Their roles and interests in the Great Basin CESU are described under the COOPERATOR section.

DESCRIPTION OF COOPERATORS

The University of Nevada, Reno (Host)

Contact: Dr. David G. Thawley, Dean
College of Agriculture, Biotechnology and Natural Resources
University of Nevada, Reno
Reno, NV 89557
Tel.: 775-784-1610; **Fax:** 775-327-2275; **Email:** thawley@mail.ag.unr.edu

Co-contact Dr. Hudson A. Glimp, Professor
College of Agriculture, Biotechnology and Natural Resources
University of Nevada, Reno
Reno, NV 89557
Tel.: 775-784-4254; **Fax:** 775-784-1375; **Email:** hglimp@mail.ag.unr.edu

The University of Nevada, Reno (UNR) is the Land Grant University within the University and Community College System of Nevada. It includes the College of Agriculture, Biotechnology and Natural Resources (CABNR) programs in agriculture, natural resources and environmental sciences, and programs in the Colleges of Cooperative Extension, Arts and Sciences, Engineering, and the Mackay School of Mines that are relevant to the Great Basin CESU. The UNR has strong research, undergraduate and graduate education, and outreach and extension programs in the full spectrum of program areas normally a part of the Land Grant University system. The CABNR also provides the leadership for the Consortium for Great Basin Studies, which involves all university system, state and federal agencies, and other public and private organizations in Nevada with interests and programs in the Great Basin. A copy of the consortium program goals, interests and participants is attached to this proposal as appendix I. The web site for the consortium is www.ag.unr.edu/cgbs.

Programs at the University of Nevada, Reno that are relevant to Federal land management, environmental and natural resource sciences include:

College of Agriculture, Biotechnology and Natural Resources:

- Nevada Arid Rangelands Initiative. The Arid Rangelands Initiative mission is to provide the science-based knowledge and skills required to manage for healthy and productive rangelands, provide abundant renewable natural resources, and support the economic and value-based sustainability of our rural communities and families and our urban stakeholders. The initiative is a multidisciplinary approach involving faculty from several departments and colleges, other institutions, and state and federal agency partners to address the highest priority issues affecting rangeland health. Initial funding through congressional appropriations and matching funds from the college is supporting projects including rangelands restoration, cheatgrass and noxious weed control, livestock and wildlife interactions, rural economic impact analyses, and natural resource conflict resolution.
- Department of Environmental and Resource Sciences. The Department combines the disciplines of natural resource management, conservation biology, environmental science, and hydrology and has strong cooperative relationships with other departments in CABNR and other colleges and the Desert Research Institute. Undergraduate and graduate students are provided the diversity of courses from the multiple disciplines, yet are allowed to focus on an increased depth of study in any given area. Multidisciplinary research programs emphasize: range and forest plant communities including management strategies to increase plant productivity for utilization by wildlife and livestock; how interactions among soil, water and climatic processes affect plant growth and vigor; and utilizes this knowledge in dealing with fire ecology, invasive species, and rangeland restoration ecology; studies involving water and soils in the closed hydrologic basins of the Great Basin including increased understanding of the interaction between ground water and

surface water – particularly as related to large scale ground water pumping from mine dewatering, and factors affecting water quantity and quality; and studies involving wildlife including livestock and wildlife interactions, predator – prey relationships, and habitat management for sensitive species. Outreach and extension programs focus on key ecosystem management and conservation issues that will have the greatest impact.

- Applied Economics and Statistics. The Department provides quality undergraduate and graduate training in agricultural economics, natural resource and environmental economics and policy, and statistics. The department is committed to research related to problems in natural resource and environmental economics, with particular focus on resources of importance to the citizens of Nevada. These include questions related to the appropriate multiple uses of range resources, the control of invasive weed species and wildfires through sound economic management, the optimal allocation of water resources among competing users, and the appropriate development of rural communities and large urban centers. The department has developed an international reputation in research related to the non-market valuation of natural resource and environmental amenities that are unpriced but are important in determining the optimal allocation of resources to meet the diversity of societal needs and priorities. A part of the department is the **University Center for Economic Development**, which provides economic development research, technical assistance and educational services to communities, counties and potential business investors in Nevada. Rural economic development, impact analyses, and social and policy implications of public and private decisions are also important center programs. The department is committed to the dissemination of knowledge through outreach to those in the public and private sectors who have an influence on environmental, natural resource and land use policy.
- School of Veterinary Medicine. The Department has undergraduate programs in pre-veterinary medicine and animal science and is developing a curriculum in animal biotechnology, and has graduate programs in animal nutrition and physiology of reproduction. Research emphasis of interest to the CESU includes appropriate livestock production systems for arid rangelands; livestock–wildlife interactions including competition, compatibilities and disease transmission; the role of livestock grazing in vegetation management; and rangeland restoration ecology. Scientists closely collaborate with faculty from other departments on campus and with state and federal land and natural resource management agencies in the implementation of research and outreach programs. The Department has strong outreach and extension programs that work with livestock producers that are generally public land permittees, land managers, wildlife interests, and rural communities. The Department also manages two major ranches, the Gund Ranch as a range and beef cattle research unit north of Austin, NV, and the Rafter 7 Ranch as a range, irrigated pasture and sheep research unit southeast of Yerington, NV.

College of Arts and Sciences:

- Department of Anthropology. The Department has four programs relevant to the CESU: (1) Environmental Archeology, concerned with the delineation of past Great Basin landscapes and environments and human adaptations to long-term changes in those environments over the last 12-14,000 years; (2) Historical Archeology, concerned with the advent of mining and ranching in the Great Basin and the impacts of those and related activities on Great Basin landscapes over the last 150 years; (3) Native American Traditional Cultures, concerned with documenting traditional Native American land use practices and ethno-biological knowledge in the Great Basin; and (4) Medical Anthropology, concerned with social, cultural and environmental factors impacting health of, and health care delivery to, rural populations in the Great Basin. The department has both M. S. and Ph.D. programs with graduate students in all four research programs.
- Biological Resources Research Center (BRRC). The BRRC, a part of the Biology Department, has expertise in ecology and conservation biology, and has developed technical capabilities in geographic information systems, population viability analysis and modeling, and conservation genetics. BRRC faculty provide leadership to the Nevada Biodiversity Research and Conservation Initiative, which has four major goals: (1) to increase UNR’s capabilities in conservation biology research and training; (2) to implement a dialogue on biodiversity issues among state and federal agencies; (3) to develop a comprehensive, coordinated response capacity to meet challenges to biodiversity conservation in Nevada; and (4) to provide the general public with sound, unbiased information on biodiversity issues.

- Great Basin Policy Research Institute (GBPRI). The GBPRI, administered by the Political Science department, has a mission to fill the need for an independent research body to provide analytic studies and technical assistance on policy concerns throughout the Great Basin and the American West. The GBPRI has conducted numerous studies for state and local governments in Nevada and other western states, and organizes its research by assembling teams of experts from the UNR staff and associates in other western state universities. A sampling of relevant projects included analysis of Home Rule provisions for local governments in Nevada; gasoline pricing policies in Nevada and California; emergency management capacity studies for several Nevada counties; and an economic development/education exchange program designed for UNR and the Republic of the Congo.
- Nevada Cooperative Extension
The fundamental role of the College is to help people access science based information to be used in their decision-making. Extension faculty have provided leadership throughout the state in facilitating collaborative problem solving processes for resolving natural resource issues and management planning. This has included curriculum development and training programs in conflict management and facilitator skills and collaborative process participant training. Extension faculty have been field partners in the conduct of applied research studies with campus based faculty and agency personnel. The extension faculty, located in counties throughout the state, can serve as valuable “on site” resources to create links between CESU field research projects and local stakeholders. The UNR College of Cooperative Extension has been in contact with extension leadership in other states in the Great Basin, and is prepared to provide a coordinating role among the CESU states. Idaho, Oregon and other states’ extension leadership have committed to this coordination and cooperation.
- Mackay School of Mines
The college includes departments devoted to earth sciences and geological, materials, mining and chemical engineering. The college has provided the engineering and minerals industries with highly trained graduates conducting state-of-the-art research, and offering continuous public service to Nevada and the nation. Current research programs include numerous individual studies by faculty, and programs through the Mining Life-Cycle Center (MLC), the Hydrologic Sciences program, and the Great Basin Center for Geothermal Energy. Research programs include characterization, modeling and prediction of natural hydrogeological processes. The interplay between natural processes and anthropogenic impacts is a focus of many programs that evaluate natural and man-induced processes impacting the natural environment and potential management and remediation schemes designed to minimize or mitigate impacts to surface and ground waters. Research at the MLC emphasizes improving the environmental management of mine waste facilities. The geothermal energy program emphasizes the environmental, engineering and economic development of Nevada’s geothermal resources.
- Center for Environmental Sciences and Engineering (CESE)
The CESE has an interdisciplinary focus to promote faculty and student interests in the environment. The CESE has three goals. The first is to coordinate the five interdisciplinary graduate programs in environmental sciences and engineering, including Hydrologic Sciences, Ecology Evolution and Conservation Biology, Environmental Science and Health, Atmospheric Science, and Environmental Engineering. The programs have over 200 graduate students and involve nearly 100 faculty from five UNR colleges and the Desert Research Institute. The second goal of the CESE is to promote interdisciplinary research on the environment in cooperation with the various colleges and departments. The third goal is to increase the understanding of the environment through various public outreach activities and projects involving undergraduate and graduate activities.
- Department of Electrical Engineering
The department is working on such research programs as establishment of an entrepreneurial center, creation of a National Wildfire Applied Research Center, a Lake Tahoe Basin research program in environmental monitoring of forested areas involving the development of sensors, data acquisition system, telemetry, and modeling, as well as the establishment of a center of excellence

in Information Technology. Faculty work on projects funded by the Department of Defense and the National Institutes of Health, the latter in collaboration with faculty from the University of Nevada School of Medicine in the area of Biomedical Engineering. For the last few years, the department has focused on the control and suppression of wildfires. This endeavor has recently been expanded to the National Wildfire Applied Research Center (NWARC) which has significance to the Great Basin CESU program in (a) more effectively extinguishing wildfires when such fires are deemed to cause severe ecosystem damage; (b) permitting more effective use of controlled burns, specifically provide guidelines as to when controlled burns can be conducted without getting out of control; and/or (c) more effectively suppressing them if control is temporarily lost. NWARC can be viewed as the link between prevention and restoration with the CESU and the Nevada Arid Range Lands Initiative providing data and direction. The EE undergraduate degree has been continuously accredited since 1937. The department offers both M.S. and PhD degrees, and currently there are 29 graduate students in the program.

Utah State University, College of Natural Resources (Senior Partner)

Contact: Dr. Raymond D. Dueser, Professor and Associate Dean
College of Natural Resources
Utah State University
5200 Old Main Hill
Logan, UT 84322-5200
Tel.: 435-797-2445; **FAX:** 435-797-2443; **Email:** dueser @cnr.usu.edu

The CNR offers degrees through four academic departments and an intercollegiate program: Fisheries and Wildlife (64 graduate students) – Fisheries and Wildlife BS; Fisheries Biology MS, PhD; Wildlife Biology MS, PhD; Ecology MS, PhD; Forest Resources (32) – Environmental Studies BS; Forestry BS, MS, PhD; Recreation Resource Management BS, MS, PhD; Ecology MS, PhD; Geography and Earth Resources (23) – Geography BS, BA, MS, MA; Rangeland Resources (19) –Rangeland Resources BS; Range Science MS, PhD; Ecology MS, PhD; Watershed Science Program (10) – Watershed Science BS, MS, PhD. A graduate certificate in policy is offered through the Natural Resources and Environmental Policy Program. Academic programs in the Colleges of Agriculture, Education, Engineering and Science contribute to and complement those of CNR.

The CNR faculty represent a broad spectrum of expertise in the biological, physical and social sciences. They also have experience and expertise in dealing with the pressing natural resource challenges facing the Great Basin, including invasive species, fire ecology, wildlife and fisheries restoration, multi-species grazing systems, urban-wildlands interface, wildlife damage management, riparian and watershed restoration, water quantity and quality, resource inventory and monitoring, landscape analysis and modeling, population viability and genetic management, natural resource sociology and economics, natural resources partnerships and conflict management, natural resource information systems, public policy, and urban and regional planning.

The CNR conducts broad-based research in natural resources and environmental science. Several centers and institutes facilitate this research, including the USU Biotechnology Center, USU Ecology Center, Utah Agricultural Experiment Station, Utah Center for Water Research, Jack H. Berryman Institute for Wildlife Damage Management, Institute for Land Rehabilitation, Institute for Social Science Research on Natural Resources and the Institute for Outdoor Recreation and Tourism. The USU Space Dynamics Laboratory, Utah Fisheries Experiment Station, Utah Water Resources Research Laboratory, and Intermountain Herbarium provide specialized laboratory facilities and technical assistance. Working in multidisciplinary teams of scientists, project managers and agency representatives, CNR faculty have developed an exceptional capacity for carrying out ecosystem-scale research.

CNR research facilities important to the GB-CESU include the 265-acre Natural Resources Research Center (NRRC) seven miles south of the campus, the T. W. Daniel Experimental Forest in Logan Canyon, the Bear Lake Limnology Laboratory, the Tintic Experimental Range near Cedar City, and

the National Aquatic Monitoring Center. The NRRC houses the USDS-APHIS-WS Predator Ecology and Behavior Field Station and a variety of facilities for work with captive wildlife.

Of particular importance to the GB-CESU and CNR's role as the Senior Partner in this proposal are the S. J. and Jessie E. Quinney Natural Resources Research Library and the Remote Sensing/GIS Laboratories. The Quinney Library provides access to world-wide natural resources and environmental information through the identification, location, acquisition, storage, retrieval and dissemination of that information in support of the education, research, extension and service needs of the CNR and USU. The experience and resources of the Quinney Library will provide leadership to the information resource management and networking services of the GB-CESU. The RS/GIS Laboratories provide state-of-the-art research, education and technology transfer to support adaptive management of natural resources and informed environmental planning at the ecosystem and landscape scales. The RS/GIS laboratories will provide leadership to the GB/CESU for coordinating the "big picture" landscape inventory, monitoring and synthesis program needs.

CNR cooperative relationships with a host of federal and state natural resource management agencies and organizations are facilitated by the Interagency Natural Resources and Environmental Analysis and Synthesis Center agreement signed by the heads of the relevant federal agencies, the Utah Department of Natural Resources, and the Colleges of Natural Resources and Humanities, Arts and Social Sciences in 1995. The objective of the Center is to provide "...an interdisciplinary, multi-agency, multi-organizational approach to landscape and ecosystem modeling, monitoring, analysis and management." Housed on the USU campus and conducting research and/or technology transfer are the Utah Cooperative Fish and Wildlife Research Unit (USDI-USGS-BRD, 3 professional personnel), the Predator Ecology and Behavior Project (USDA-APHIS-WS, 5), the National Fish and Wildlife Habitat Relationships Unit (USDA-FS-NFS, 1), the National Aquatic Monitoring Center (USDA-FS-NFS and USDI-BLM, 1), The Landscape Ecology Modeling and Analysis Center (USDI-BLM), the National Guard Bureau Agreement (USDOD-NGB, 1), the Forest Sciences Laboratory (USDA-FS-RMES, 2), the Natural Resources Conservation Service (USDA, 1) and the Agricultural Research Service (USDA, 4). All of these programs contribute to the CNR mission, and 17 federal scientists hold research/adjunct faculty status in CNR departments. Twelve of the cooperating scientists are housed on campus.

Desert Research Institute (Partner)

Contact: Dr. Saxon Sharpe
Division of Earth and Ecosystem Sciences
Desert Research Institute
2215 Raggio Parkway
Reno, NV 89512
Tel.: 775-674-7006; **FAX:** 775-673-7397; **Email:** ssharpe@dri.edu

Nevada's Desert Research Institute (DRI) pursues a full-time program of basic and applied environmental research on a local, national and international scale. DRI's nearly 400 full- and part-time scientists, technicians and support personnel conduct some 400 research projects annually. DRI is organized into three divisions and two interdisciplinary programs, each focusing on complementary segments of the environmental research spectrum.

The Division of Atmospheric Sciences conducts fundamental and applied research into the natural atmosphere and local and regional studies of air quality. The Division specializes in the development of instrumentation and techniques for ground-based, aircraft and satellite observational programs. Inorganic and organic chemistry laboratories allow analysis of human impacts on air quality and detection and quantification of atmospheric pollutants. Modeling capabilities include basic research in atmospheric dynamics and cloudiness, improvement of mesoscale and regional scale predictions, the transportation and dispersion of pollutants in complex terrain, urban air quality, linking meteorology and air quality, and climate. The Division is also home to the Western Regional Climate Center (WRCC), which is part of a nation-wide climate services program. WRCC serves the 11 western

states, Alaska and Hawaii. The Center maintains an online database that is updated daily. It is comprised of the complete historical records from all western stations in the NOAA, BLM/FS, and NRCS networks. WRCC has extensive experience in climate research and database management. It has also participated in the development of a system to provide users with seamless internet access to climatic data and statistical information.

The Division of Earth and Ecosystem Sciences focuses on research into how natural and agricultural ecosystems function and respond to natural and human-caused disturbances. Research is characterized by two important themes: (1) understanding the way biological systems respond to perturbations across multiple temporal scales and multiple spatial scales; and (2) understanding whether different kinds of ecosystems function and respond to disturbance in similar ways and whether they are key fundamental parameters that determine how an ecosystem responds to disturbance. The Nevada Desert FACE facility allows for the study of how an intact desert ecosystem will respond to global environmental change. The division also maintains state-of-the-art dating and soils laboratories, an optical and thermoluminescence laboratory, an archaeology laboratory for the study of cultural materials, and a curation facility for storing cultural materials.

The Division of Hydrologic Sciences has a strong program of research, development and education in the hydrologic sciences. Scientific interests involve the natural and human factors that influence the availability and quality of water resources, and reflect issues and concerns common to arid and developing regions worldwide. Technical specialties represent the fields of chemistry, geochemistry, geophysics, hydraulics, hydrology, isotope hydrology, numerical methods, paleoclimate, physical chemistry, soil water, and water resources engineering.

The Center for Arid Lands Environmental Management assists land managers and others with science-based desert ecosystem management, sustainable development, stewardship, adaptive management, and restoration ecology. The Center integrates capabilities in land, air and water sciences. Field studies, laboratory analysis, numerical modeling, remote sensing, geographic information systems and environmental information management are used to address desert issues spanning spatial and temporal scales.

The Center for Watershed and Environmental Sustainability conducts research on air-land-water processes and environmental sustainability in watersheds to provide a scientific basis for the development and implementation of environmental management strategies in these systems. Scientific information about water quality, air quality and forest health are integrated with information about transportation, recreation and economic development to answer scientific questions about watershed sustainability in an adaptive management context.

University of Utah (partner)

Contact: Dr. Richard Koehn, Vice President for Research
University of Utah
201 Park Building
Salt Lake City, UT
Tel.: 801-581-7236; **Email:** richard.koehn@vpres.adm.utah.edu

The University of Utah has programs that focus on the natural resources of the intermountain west in a number of units on campus:

Department of Biology. The department contains a diversity of faculty and student research interests, covering the spectrum of modern biology from biochemistry through ecosystem ecology. Biology offers B.S., M.S. and Ph.D. degrees and has 1100 undergraduate majors and 83 graduate students. Research relevant to the CESU includes environmental plant physiology, plant and animal ecophysiology, community ecology, conservation biology, ecosystem fluxes, stable isotope ecology, plant phylogenetics and systematics, avian and arthropod biology. Collaborative projects with the

Department of Geology and Geophysics include the use of stable isotopes in paleoecology, and the coupling of hydrology and plant water use.

Utah Museum of Natural History (UMNH). The UMNH is a separate, college-level academic unit of the university. The UMNH holds major collections in the areas of geology, invertebrate and vertebrate paleontology, vertebrate zoology, entomology, malacology, botany, archaeology and ethnography. The Great Basin is a major area of emphasis for these collections. UMNH curators conduct field and collections-oriented research on a wide range of subjects in the natural sciences and anthropology, and hold joint appointments in campus academic departments. The museum promotes undergraduate research training through internships and supports the research of graduate students from the academic departments.

School of Law, Wallace Stegner Center for Land, Resources and the Environment. The Center is committed to the multidisciplinary study of natural resources and environmental law and policy. Faculty research interests cover a wide range of topics in the practice and policy of environmental law. These include water quality and water rights, environmental toxicology, ecosystem management, endangered species, public land issues, oil and gas law, and federal Native American Law. Projects have ranged from wolf recovery, energy development, pollution abatement, environmental dimensions of international trade, to the disposal of toxic waste.

Oregon State University (Partner)

Contact: Dr. John Buckhouse
Department of Rangeland Resources
Oregon State University
202 Strand Agriculture Hall
Corvallis, OR 97331-2218
Tel.: 541-737-3341; **FAX:** 541-737-0504

Oregon State University will be represented in the CESU by the Department of Rangeland Resources in the College of Agricultural Sciences. The Department maintains strong programs in resident instruction and distance education, research in the rangeland and natural resource sciences, outreach through extension services, and an active international program.

The Department maintains two interrelated instructional programs. The Corvallis campus program offers a minor and the B.S., M.Ag., M.S. and Ph.D. degrees in Rangeland Resources and administer the multi-college B.S. degree program in Natural Resources. The combined Natural Resources degree is also offered via distance education. In addition a B.S. and technical minor in Rangeland Resources are offered by the Department on the campus of Eastern Oregon University at LeGrande.

The Department research program is centered on three principal goals: (1) increasing the efficiency and sustainability of rangeland based enterprises; (2) designing multiple use management strategies that ensure and sustain productivity, biodiversity and stability of rangeland ecosystems; and (3) expand humankind's understanding of rangelands and their ecology. Examples of specific research objectives are: (1) Elucidate structure, function and processes of rangeland ecosystems through studies in biological diversity, community ecology, ecophysiology, hydrology, landscape ecology and soil/plant/animal interactions. (2) Develop new management approaches, techniques and procedures to restore, increase and sustain productivity of rangelands. (3) Develop research designed to understand the influences of livestock grazing on ecological processes within rangelands ecosystems. (4) Develop understanding of global climate change and its impact on rangeland ecosystems.

The Department has a strong extension program, with extension faculty and all research and teaching faculty involved in extension programs, and many extension field faculty having academic appointments in the Department. Natural resource issues, particularly riparian ecosystems management and how the public and private rangelands relate to the Clean Water Act, are of critical concern to both private land owners and federal and state land managers as they strive to meet societal

demands for resource-based products and values. Based on needs identified by constituents throughout the state, extension programs emphasize grazing management, watershed function and management, water quality, and vegetation (including weed) ecology and management.

D-Q University (Partner)

Contact: Susan Mahoney
Environmental Sciences
D-Q University
P. O. Box 409
Davis, CA 95616
Tel.: 530-758-0470; **Email:** slmahoney@yahoo.com

D-Q University (D-QU) is an accredited two-year post-secondary institution that serves a diverse population of Native Americans from more than 75 Native American tribes, primarily from California, Nevada, Arizona and Montana. DQ-U offers Associates of Arts (AS) and Associates of Science (AS) degrees in 14 areas. Most graduates pursue 4-year degrees at other institutions. The program most relevant to the GB-CESU is the AS degree program in Environmental Science. This program is designed for entry-level employment and/or for transfer to a 4-year college or university. The Environmental Science program provides students with the theoretical and practical background necessary to work in the environmental science industry, both in the public and private sector. Environmental issues are considered in their proper, social, political and scientific contexts. On-the-job training is encouraged through internship programs. The Environmental Science department also offers a Forestry Technician Certificate and a Waste Management Certificate program.

The main campus of D-QU encompasses 640 acres in rural Yolo County, CA, offering a built-in classroom for environmental science courses. Students are involved in the management of several on-campus restoration projects, including a 3-phase project in partnership with the U. S. Fish and Wildlife Service and the Natural Resource Conservation Service. The project includes a native grass restoration site, a riparian restoration site, and an upland restoration site. As an institution, D-QU strives to incorporate environmental science and natural resource management concepts throughout the curriculum for all students. D-QU is also able to draw on the resources of the University of California, Davis for part-time instructors, guest lecturers, research collaborators and student internship opportunities.

Great Basin College (Partner)

Contact: Dr. Betty Elliot
Vice President for Academic Affairs
Great Basin College
1500 College Parkway
Elko, NV 89801
Tel.: 775-738-8493; **FAX:** 775-738-8771

Great Basin College is a rapidly growing part of the University and Community College System of Nevada, and offers two four-year degrees, a Bachelor of Applied Science and a Bachelor of Applied Arts in Elementary Education, and eleven Associate of Applied Science degrees. Great Basin College is a multi-campus college serving 86,000 residents in a service area of 45,000 square miles. The main campus is in Elko, with branch campuses in Ely and Winnemucca and satellite centers located in 10 neighboring communities. The college serves 4,545 students and an annualized FTE of 1236.

The faculty, although small in number, offer strong teaching and research capability. Eight faculty with interests in anthropology, geology, GIS, biology, history and mathematics will contribute to the CESU programs. The college has been coordinator of a number of environmentally oriented workshops and seminars. Strong collaborative partnerships have been established with federal, state, count and local agencies to address sensitive issues arising from multiple land uses. Northeastern

Nevada has a long tradition of ranching, is the major producer of gold in the United States, has abundant wildlife resources and many recreational opportunities.

The Great Basin College service area includes several reservations of the Western Shoshone and Northern Paiute peoples. Within the service area boundaries are the Great Basin National Park, scenic Lamoille canyon of the Ruby Mountains, the Jarbridge Wilderness Area, the Ruby Marshes and National Wildlife Refuge, diverse streams such as the white-water Owyhee and the sluggish Humboldt rivers, and many other lakes and reservoirs.

Idaho State University (Partner)

Contact: Dr. Richard Inouye, Director
Center for Ecological Research and Education
Campus Box 8007
Idaho State University
Pocatello, ID 83209-8007
Tel.: 208-282-2933; **FAX:** 208-282-4570; **Email:** inourich@isu.edu

Idaho State University will be represented on the Great Basin CESU by the Center for Ecological Research and Education (CERE). The CERE is the core support program for ecological research and education programs at Idaho State University, and facilitates multidisciplinary research and student training programs within the ISU faculty and in collaboration with other universities.

Twenty faculty in the Department of Biological Sciences have research interests that are directly related to various areas of Ecology and are affiliated with CERE. These faculty maintain active research programs that are supported by various state, regional and national funding agencies. On-going research of CERE affiliates includes projects that span a spectrum from basic research on the behavior and physiology of plants, animals and microbes, on biological diversity and ecosystem function, and on the arid lands and aquatic ecosystems of the state and region, to highly applied studies such as the use of native vegetation to isolate buried hazardous wastes, the fate of polyacrylamide applied to soils to prevent erosion, and the use of created wetlands to reduce non-point source pollution from agricultural fields.

University of Nevada Las Vegas (Partner)

Contact: Dr. Dawn Neumann
Department of Biological Sciences
University of Nevada Las Vegas
Las Vegas, NV 89154-4004
Tel.: 702-895-3390; **FAX:** 702-895-3956; **Email:** neuman@cmail.nevada.edu

The College of Science has 5 departments with undergraduate and graduate education programs. The Department of Biological Sciences, which will represent the College on the GB-CESU, shares the College commitment to develop high quality undergraduate and graduate level education experiences for all students who attend UNLV. Faculty represent the diverse disciplines of the life sciences, from Cell and Molecular Biology to Ecology/Evolution and Systematics. The primary research mission is to enhance understanding of processes that define life, the relationship of form to function, the study of diversity and the dynamics of organic evolution. Because the pursuit of knowledge is the hallmark of the university, our mission is accomplished not only by teaching, but also through the research efforts of the faculty who conduct research in collaboration with colleagues and students, and communicate with others through seminars, presentations at professional meetings and through publications.

The University of Nevada Las Vegas will also be represented on the CESU by the Harry Reid Center for Environmental Studies. The faculty of the Center represent a diversity of disciplines, from analytical chemistry to nuclear engineering to zoology and conservation biology. Highlights of the Center's current activities and research programs relevant to the CESU include:

- Chemical and biological analyses of samples of air, water, soil and biota in support of hazardous facility site evaluations, environmental monitoring and regulatory compliance.
- Archeological investigations of development sites for the presence of prehistoric or historic artifacts.
- Ecological investigations of development sites for the presence of endangered species of plants or animals.
- Environmental management and resource assessment of arid aquatic ecosystems.
- Management and production of conferences, seminars, symposia, workshops, training courses and academic courses.

The Rocky Mountain Elk Foundation (Cooperator)

Contact: William H. Geer
 Rocky Mountain Elk Foundation
 2291 West Broadway
 Missoula, MT 59802
Tel.: 406-523-4571; **FAX:** 406-523-4550; **Email:** bill@rmef.org

The Rocky Mountain Elk Foundation and the University of Nevada, Reno have a formal MOU to address issues of common interest within the Great Basin. This MOU provides a framework for cooperative activities that are necessary to maintain and enhance the health and productivity of rangelands in the western United States. Emphasis is on healthy rangelands that provide habitat for wildlife and livestock grazing in harmony, building community partnerships with stakeholders, and providing science-based information and training that will facilitate grass-roots planning processes for the Great Basin Restoration Initiative. The Rocky Mountain Elk Foundation also has a strong cooperative and working relationship with the Senior Partner, the College of Natural Resources, Utah State University. A number of collaborative projects are in progress or being planned in eastern Nevada and Utah.

The Nature Conservancy of Nevada (Cooperator)

Contact: Graham Chisholm, Nevada State Director
 The Nature Conservancy
 443 Marsh Avenue
 Reno, NV 89509
Tel.: 775-322-4990; **FAX:** 775-322-5132; **Email:** gchisholm@tnc.org

The Nature Conservancy is actively involved in a wide range of projects in Nevada and other states in the Great Basin, and has major investments in a number of projects in the region. The Nature Conservancy is in the final stages of preparing an independent strategic plan for restoring ecosystem health in the Great Basin, which will include project priorities for the organization. It is important that a significant and proactive participant in the Great Basin such as The Nature Conservancy be a cooperator in the Great Basin CESU.

Pyramid Lake Paiute Tribe (Cooperator)

Contact: Gerry Emm, Environmental Director
 Pyramid Lake Paiute Tribe
 P. O. Box 256
 Nixon, NV 89424
Tel.: 775-574-0101; **FAX:** 775-574-1008

The Pyramid Lake Indian Reservation, located 30 miles northeast of Reno, includes over 476,000 acres with Pyramid Lake covering 117,000 acres. The Truckee River flows from Lake Tahoe, travels 26 miles through the reservation and terminates in Pyramid Lake. Pyramid Lake Fisheries manages the lake and lower river for the endangered cui ui and the threatened Lahontan Cutthroat trout. The Tribe's contribution to the CESU will include experienced personnel and resources, plus the opportunity for ecosystem and

watershed based research projects. The Tribe has been very progressive in the development of range management plans, riparian habitat restoration, wetlands mapping, monitoring mining activities, water pollution research, Department of Defense mitigation, establishing water quality standards, and establishing cooperative agreements with local/state/federal officials.

Walker River Paiute Tribe (Cooperator)

Contact: Elveda Martinez, Water Resources Coordinator
Walker River Paiute Tribe
P. O. Box 402
Schurz, NV 89427
Tel.: 775-773-2002; FAX: 775-773-2136

The Walker River Indian Reservation, located south of Fallon and at the northern end of Walker Lake, encompasses over 324,000 acres of rangelands, farming and forested lands. Major concerns of the Tribe include water rights from the Walker River which flows through the reservation, Weber Reservoir which is the primary source of water storage for reservation farmers and has been declared unsafe, heavy infestations of Tamarisk and other invasive species on the river riparian areas, and appropriate rangelands management. The tribal government is very concerned about these issues, and looks forward to working with the Great Basin CESU as a cooperator. Specific priorities relevant to the CESU include:

- Development of an integrated resource management plan
- Range and watershed management planning, including control of Tamarisk and other noxious plants.
- Development planning for wetlands to enhance waterfowl, deer, and upland game bird habitat.
- Training for Tribal farmers and ranchers on best management practices to protect our resources.
- Training and education for Tribal staff on technology and programs that will assist in improving resource management (survey, mapping, data base management, etc.).

Fallon Paiute-Shoshone Tribe (Cooperator)

Contact: Russell Brigham, Environmental Director
Fallon Paiute-Shoshone Tribe
8955 Mission Road
Fallon, NV 89406-9159
Tel.: 775-423-3725; FAX: 775-423-5202

The Fallon-Shoshone Tribal lands include several thousand acres of critical wetlands habitat, rangelands and irrigated farm lands. The Tribe works with local, state and federal agencies on many environmental, wildlife, water and other management issues. The Environmental Department would provide staff to assist in research and education programs on the reservation and in the state, and would also assist in developing a clearinghouse for research and educational purposes. The Tribe and its members look forward to developing a stronger relationship with the other institutions and agencies within the Great Basin.

State of Nevada, Department of Conservation and Natural Resources (Cooperator)

Contacts:	Terry Crawford Administrator Division of Wildlife 1100 Valley Road Reno, NV 89512 Tel.: 775-688-1500	Glenn H. Clemmer Program Manager Natural Heritage Program 1550 East College Parkway, Suite 145 Carson City, NV 89706-7921 Tel.: 775-687-4245
-----------	--	--

The mission of the Department of Conservation and Natural Resources (DCNR) is to conserve, protect, manage and enhance the state's natural resources in order to provide the highest quality of life for Nevada's citizens and visitors. The mission of the department is to establish and administer goals, objectives and priorities for the preservation of the state's natural resources. The DCNR provides administrative,

technical, budgetary and supervisory support to all of the divisions and programs, and several boards and commissions within the department. These include:

- Division of Conservation Districts.
- Division of Environmental Protection.
- Division of Forestry
- Division of State Parks
- Division of State Lands
- Division of Water Resources
- Division of Wildlife
- Natural Heritage Program
- Wild Horse Preservation Program
- Nevada Tahoe Regional Planning Agency

Community College of Southern Nevada (Cooperator)

Contact: Dr. David Charlet
Department of Biological Sciences S2B
Community College of Southern Nevada
3200 East Cheyenne Avenue
North Las Vegas, NV 89030
Tel: 702-651-4734; **FAX:** 702-651-4056; **Email:** charlet@ccsn.edu

The Community College of Southern Nevada (CCSN) is willing to provide assistance to the CESU through its Science Department. Five Ph.D. trained faculty have recognized expertise in areas of importance to the CESU. Areas of expertise include vegetation mapping of both statewide and in-depth maps of more critical areas, meteorological components and weather patterns of the Great Basin through GIS mapping, and wildlife ecology from large mammals to herpetology.

University of California, Berkeley Museum of Vertebrate Zoology (Cooperator)

Contact: Dr. James Patton, Acting Director and Curator
Museum of Vertebrate Zoology
University of California
3101 Valley Life Sciences Building
Berkeley, CA 94720
Tel.: 510-642-3567; **FAX:** 510-643-8238; **Email:** patton@uclink4.Stanford.edu

Staff and students of the museum have been engaged in studies of the terrestrial vertebrate fauna of the Great Basin, with emphasis in the states of California, Nevada and Utah, since the 1920's, resulting in one of the largest repositories of specimens available. More recent and current studies have emphasized the distribution and systematics of the bird species of the Great Basin, systematic and evolutionary studies of several species of small mammals with emphasis on pocket gophers of the genus Thomomys, and other vertebrate groups as well as identification and distribution of the major plants and plant communities.

Stanford University, The Center for Conservation Biology (Cooperator)

Contact: Dr. Carol Boggs
Center for Conservation Biology
Department of Biological Sciences
Stanford University
Stanford, CA 94305
Tel.: 650-723-5923; **FAX:** 650-723-5920; **Email:** cboggs@leland.Stanford.edu

The Center for Conservation Biology (CCB) conducts scientific and policy research to build a sound basis for the conservation, management and restoration of biotic diversity. The CCB has been a cooperator in the

Nevada Biodiversity Initiative since its inception. The CCB's primary foci include: (1) to investigate the effects of human population growth and patterns of resource use on the well-being of humans and other organisms; (2) to develop practical applications of ecology and other disciplines to the preservation of earth's biotic resources; and (3) to communicate the results of scientific and policy research to biologists, reserve managers, planners, decision-makers and the public.

University of California, White Mountain Research Station (Cooperator)

Contact: Dr. Frank Powell, Director
White Mountain Research Station
3000 East Line Street
Bishop, CA 93513
Tel: 858-534-1523; **FAX:** 858-822-0164; **Email:** fpowell@wmrs.edu

White Mountain Research Station (WMRS) located in the Owens Valley region of Eastern California has a 50 year history of research within the basin and range. WMRS can bring into the consortium a long history of cooperative studies with federal and state agencies as well as universities world wide. Since WMRS is a multi-discipline unit it can provide expertise in areas ranging from water management through natural resource management. There is housing, lab space and data management capabilities available in the Owens Valley as well as at 12,250' and 10,000' elevations in the mountains.

Services To Be Provided by the GB-CESU Partner Institutions

If GB-CESU leaders or scientists are located on the host or a partner institution campus, services provided by the institutions will include office space, furniture, telecommunications access, networked computer services, and business and administrative services normally provided faculty at the College/University. Access to laboratories and scientific equipment will be provided as needed. Access to faculty and undergraduate and graduate students will be facilitated to serve the needs of the GB-CESU. Technology linkages to faculty and laboratories in all of the partner institutions will be available. GB-CESU leaders and federal scientists at partner institutions will be accorded the same prerogatives and privileges that are available to other federal program leaders and scientists holding faculty rank.

The UNR College of Agriculture, Biotechnology and Natural Resources as the Host Institution will facilitate the development of Memoranda of Understanding among the GB-CESU partners to ensure administrative collaboration and ease of contracting/subcontracting among agencies and institutions. The primary communications network for CESU faculty and programs will be managed by the Utah State University College of Natural Resources as Senior Partner.

The partner institutions will be contributing significantly to the GB-CESU through forgoing indirect costs above the maximum 15% allowed in the CESU RFP. These contributions vary by institution since approved established rates vary from 23% to in excess of 50% among the partner institutions. These significant administrative subsidies are provided by the institutions in recognition of the collaborative potential of the GB-CESU.

Indirect Cost Rate

The partner Universities and Colleges in this GB-CESU proposal agree to charge the maximum allowed 15% indirect cost rate (all cost items) for all activities and projects conducted within the CESU. The Universities and Colleges further understand that only projects and activities clearly associated and identified with the CESU will be brought under the umbrella of the GB-CESU.

Selection of Federal Leaders and Scientists

Selection of federal leaders and scientists to be located on partner institution campuses must be a collaborative process involving the federal agency and host campus if they are to hold faculty rank, serve as teachers, and supervise undergraduate and graduate students. Searches and selections of GB-CESU leaders and scientists must be done collaboratively with the host faculty. Relevant faculties and administrators on the campus must approve the federal employee as a member of the faculty.

SPECIFIC BENEFITS OF THE PROPOSED GREAT BASIN CESU

The proposed GB-CESU will provide substantial benefits to the participating federal agencies, the university partners and cooperators participating in the proposal, state and local governments, and public and private stakeholders within the Great Basin. It is our strong desire that the primary beneficiary is the health of the Great Basin ecosystems and the well-being of its residents. Some of the more obvious expected benefits are:

Service

- A coordinated network of over 500 natural resource biological, environmental and social scientists from the partner and cooperator institutions to provide research and technical assistance to the GB-CESU.
- A system for contracting and handling of funds on a pre-arranged basis and at reduced overhead cost. The host university has had an excellent history of working with other universities and institutions through subagreements involving transfer of funds in a timely manner at low cost. At this time, the grants and contracts office of the host institution charges a maximum of \$3750 for each subagreement exceeding \$25,000. For subagreements less than \$25,000, 15% of the subagreement amount is charged.
- Development of an effective multi-disciplinary/multi-agency research program based on a minimum of administrative bureaucracy and on procedures that are structured around a system of partner memoranda.
- Coordinated networking of scientists, educators and technology transfer services with federal agency counterparts for information sharing on research, education and new technologies for the benefit of the Great Basin ecosystem.
- Integration of undergraduate and graduate education programs into the GB-CESE network for research and management training to increase student educational opportunities and to meet the future personnel needs of the federal agencies and others in the Great Basin.
- Cooperative use of a vast array of research libraries, laboratories, experiment stations, teaching and demonstration sites, and equipment that would not be readily available to any one partner in the CESU.

Involvement

- All partners, cooperators and federal agencies will benefit from participation in on-going ecosystem science and social science research and education programs at participating institutions and agencies that annually total in the hundreds of millions of dollars. The host university alone currently has 112 award agreements with various federal and other research agencies in environment, ecology and related fields for a total in excess of \$20 million in grants. CABNR at UNR, under the leadership of Dean Thawley, recently initiated a multi-university, multi-agency consortium entitled "Born of Fire". The objective of this consortium is to help coordinate research activities in the Great Basin and to avoid unnecessary duplication. Federal partners with the consortium include the BLM, NRCS, USGS, Forest Service, ARS and USFWS. Universities represented include UNR, Utah State, Idaho State and OSU.
- Federal agencies will capitalize on investments in research and education programs already made with participating partners and cooperators.
- Direct involvement in current collaborative efforts among partners and cooperators.

Potential Multi-Disciplinary and Multi-Agency Contributions

- Coordinated prioritization of Great Basin research and education needs, and implementation strategies that increase the likelihood of success, minimize duplication, and most efficiently utilize available resources.

- Potential for collaborative, creative ecosystem problem-solving through the diversity of individuals, institutions and interests involved in the GB-CESU.
- Efficient integration, sharing and transfer of data, knowledge and information among partners and cooperators in the GB-CESU.
- Development of multi-disciplinary and multi-institutional teams to address the complex cross-scale and cross-jurisdictional issues that would not be possible without the GB-CESU.
- Create networks of coordinated research and education programs to address the structure and function of ecosystems within human, aquatic and terrestrial perspectives.
- Integration of federal partner scientists into the research and education programs of the host institutions. (There are federal employees located on the host institution's campus. Federal offices housed on campus include the Nevada Agricultural Statistical Services (USDA/NASS), Agricultural Research Service (USDA/ARS) and the U.S. Forest Service Experiment Station. The university faculty work closely with these offices and include federal employees in university academic activities.)

Diversity

- Integration of Native American faculty and students into the research and education programs of the GB-CESU.
- Cooperating with faculty and scientists from Native American Universities and Tribes to increase our understanding of the problems and issues within the Great Basin from a historical and cultural perspective.
- Providing minority students opportunities for employment as natural resource scientists and managers.
- The host institution has an Ethnic Student Resource Center that assists in the recruitment and the relations of minority students, provides educational and academic assistance, makes available scholarship and financial aid information and serves as a general resource center.

LETTERS OF INTEREST AND COMMITMENT

Letters of Interest and Commitment from the following partner institutions are attached as appendix II:

- **Utah State University College of Natural Resources (Senior Partner)**
- **Desert Research Institute**
- **University of Utah**
- **Oregon State University**
- **D-Q University**
- **Great Basin College**
- **Idaho State University**
- **University of Nevada Las Vegas**

SELECTED FACULTY FROM PARTNER INSTITUTIONS

UNIVERSITY OF NEVADA RENO

College of Agriculture, Biotechnology and Natural Resources

Department of Environmental and Resource Sciences

- Joel Berger – Wildlife, conservation biology, resource management.
- Dale Devitt – Plant response to multiple stresses; evapotranspiration, bioclimatic zone evaluation.
- Mae Gustin – Study of the fate and transport of inorganic contaminants in the environment.
- Dale W. Johnson – Biogeochemical cycling, soil chemistry, simulation modeling.
- Nancy Markee – Interactions between humans and the environment; policy analysis.
- Glenn C. Miller – Director, Center for Environmental Sciences and Engineering. Agricultural uses of pesticides, mining wastes, watercraft emissions in fresh water lakes.
- W. W. Miller – Acting Department Chair; effects of resource management activities on soil infiltration, water quality, nutrient transport.
- Robert Nowak – Plant physiological ecology; global climate change; paleoecology.
- Lewis Oring – Shorebird breeding biology and conservation; wetlands management strategies.
- Robert Qualls – Physiology and competitive relationships of invasive plant species.
- S. R. Swanson – Riparian proper functioning condition, states and transition models.
- Paul Tueller – Range ecology; fire ecology; remote sensing.
- Scott Tyler – Transport of water and solutes through the soil and vadose zones.
- Mark Walker – Nonpoint source management of water contaminants; risk assessment.
- Roger Walker – Forest ecology and management; ecosystem restoration; tree physiology.

Department of Applied Economics and Statistics

- Kees van Kooten – Department Chair; natural resource modeling and policy; forest and range economics.
- Jeffrey Englin – Natural resource economics; non-market valuation; applied microeconomics.
- Mark Eiswerth – Environmental and natural resource economics; economics of invasive species.
- George Fernandez – Modeling in biological and physical sciences; applied statistics.
- Thomas Harris – Director, University Center for Economic Development; regional economics, impact modeling, rural economic development.
- Wayne Johnson – Woody plant physiology; water use efficiency; water quality.
- Gordon Myer – Farm and ranch management economics, finance.
- Rangesan Narayanan – Water and land resource economics.
- W. Douglass Shaw – Natural resource and environmental economics; recreation demand analysis.
- J. Scott Shonkwiler – Applied econometrics; resource valuation; regional economic models.
- Steven Yen – Applied econometrics and statistics; demand analysis; health economics.
- Tim Darden – Research Analyst, regional economics.
- Thomas MacDiarmid – Research Analyst, water and land resource economics.
- Patricia Rowley – Urban forestry; statistics.
- Shawn Stoddard – Research Analyst; instructor.

School of Veterinary Medicine

- Craig Beattie – Department Chair; animal biotechnology; animal and range production efficiency.
- L. Ben Bruce – Range animal management; production systems modeling.
- Hudson Glimp – Animal production systems; livestock – wildlife interactions; role of grazing in vegetation management.

- Hussein Hussein – Range animal nutrition; nutritive value of range plants.
- W. G. Kvasnicka – Livestock and wildlife diseases and their etiology, transmission and species interactions.
- Barry Perryman – Rangeland restoration ecology; rangeland monitoring and evaluation.

College of Arts and Sciences

Department of Anthropology

- Marie Boutte – Social, cultural and environmental factors impacting health care and delivery.
- Catherine S. Fowler – Native American traditional cultures; land use and ethnobiological knowledge.
- Don Fowler – Environmental Archaeology; delineation of past landscapes and environments and human adaptations to long-term changes.
- Donald Hardesty – Historic Archaeology, concerned with the advent of mining and ranching 150 years ago and their impacts on landscapes and environments.

Biological Resources Research Center

- P. Brussard – conservation biology; habitat conservation; ecosystem management; biogeography.
- G. Hoelzer – evolution; population genetics; phylogenetics; historical biogeography; behavior.
- D. Murphy – Conservation biology; insect ecology; habitat conservation, adaptive management.
- M. Peacock – Population viability modeling; conservation genetics of species.
- C. R. Tracy – Ecology; desert biology, conservation biology; herpetology.
- D. W. Zeh – Behavioral ecology, molecular conservation.

Great Basin Policy Research Institute

- Erik Herzik – Director; political science and policy
- Chris Simon – Political science
- Leah Magennis – Political science
- Karl McArthur – Economics
- Sue Wagner – Political science; state government.

Nevada Cooperative Extension

- Karen Hinton – Dean and Director
- John Buxton – Associate Dean and Director; social sciences
- Jerry Buk – Area Director, Northern and Central Areas
- Jason Davison – Area Natural Resources Specialist; rangelands management, agronomy
- Edwin Smith – Area Natural Resources Specialist; wildfire ecology, rangelands management
- J. Kent McAdoo – Area Natural Resources Specialist; wildlife and range restoration ecology
- W. Riggs – Extension Educator; range economics, rural economic development.
- Robert Wilson – Extension Educator; agronomy, range restoration, invasive weeds
- Loretta Singletary – Extension Educator; economics, natural resources public issues education
- Steve Lewis – Extension Educator; natural resources conservation and management.

MacKay School of Mines

- Jane C. S. Long - Dean
- Dirk van Zyl – Director, Mining Life Cycle Center
- James Taranik – Director, Great Basin Center for Geothermal Energy
- Greg Arehart – Geothermal systems, rare earth elements, stable isotopes.
- Renato Bautista – Rate of mass transfer, chemical kinetics, chemical reaction modeling.
- John Bell – Geomorphology and engineering geology.
- Geoffrey Blewitt – Geodesy, geodynamics, crustal deformation
- Jim Brune – Geophysics, earth structure.
- James R. Carr – Geological engineering, geomathematics, remote sensing.

- Pat Cashman – Structural Geology
- Chuck Coronella – Chemical Engineering
- Craig DePolo – Earthquake geology, neotectonics.
- James Faulds – Structural geology, Nevada geology, neotectonics
- Alan Fuchs – Chemical Engineering
- Maurice Fuerstenau – Interfacial phenomena, kinetics, environmental remediation.
- Larry Garside – Nevada geology, volcanic stratigraphy, energy resources.
- Christopher Henry – Volcanology, Nevada geology
- Ron Hess – Geography, GIS, remote sensing.
- Bob Karlin – Deformational history of the Great Basin.
- Mary Lahren – Structural geology, tectonics.
- Paul Lechler – Environmental and exploration geochemistry.
- Jane Long – Fluid flow in fractures.
- John Louie – Imaging and characterization of subsurface structures.
- Gary Oppliger – Applied geophysics.
- Simon Poulson – Stable isotope and environmental geochemistry.
- Jonathan Price – Aqueous and environmental geochemistry.
- Alan Ramelli – Neotectonics, quaternary stratigraphy, geomorphology.
- Richard Schultz – Fracture, fault and rock-mass mechanics.
- Richard Schweickert – Structure, stratigraphy, tectonics.
- Lisa Shevenell – Hydrogeology, isotope hydrology, aqueous geochemistry.
- Ross Smith – Bioremediation of toxic effluents, remediation of heavy metals.
- Gina Tempel - Aqueous geochemistry, geochemical modeling.
- Jim Trexler – Sedimentology, stratigraphy, tectonics.
- Scott Tyler – Rate and magnitude of ground water recharge.
- Victor Vasquez – Uncertainty analysis of thermodynamic models.
- Bob Watters – Applied rock mechanics, geological engineering.
- Steve Wesnousky – Neotectonics, fault mechanics.
- Steve Wheatcraft – Groundwater contaminant transport, numerical modeling.
- Wallace Whiting – Chemical engineering, thermodynamic models, chemical process design.

Department of Electrical Engineering

- John A. Kleppe – Digital systems, telemetry, acoustic sensor technology and weather modification instrumentation
- John P. Chisholm – Precision aircraft navigational and landing systems, emergency locating and collision avoidance systems
- M. Sami Fadali – Robust control; fault detection; physiological modeling
- James M. Henson – Linear synthetic aperture radar imagery; inverse synthetic aperture imagery of rotating objects; air-to-ground radar systems
- Bruce P. Johnson – High frequency electronics for industrial and biomedical instrumentation
- Barmali S. Rawat – Analysis, design and fabrication of microstrip components; optical fiber sensors for variable pressure, temperature, corrosion and electromagnetic field measurement

UTAH STATE UNIVERSITY COLLEGE OF NATURAL RESOURCES

Social Sciences

- Janet E. A. Anderson – Natural Resource (NR) sociology, recreation resources.
- Dale J. Blahna – NR sociology, outdoor recreation
- Mark W. Brunson – NR sociology and policy.
- Steven W. Burr - Recreation resources, tourism.
- Joanna L. Endter-Wada – Cultural anthropology, NR policy.
- Nicole L. Haynes – NR economics and management.

- James J. Kennedy – NR economics, policy and administration
- Richard S. Krannich – NR sociology, policy
- Robert J. Lillieholm – NR economics, land use planning
- Derrick J. Thom - Rural development, cultural geography

Plants, Forest, Rangeland and Insect/Disease Ecology

- Barbara J. Bentz – Disturbance ecology, forest insects
- Martyn M. Caldwell – Plant ecophysiology, global change
- Christopher A. Call – Vegetation manipulation, restoration ecology
- Michael J. Jenkins – disturbance ecology, fire ecology
- Douglas A. Johnson – Plant ecophysiology, range grasses
- Thomas A. Jones – Native grass breeding
- Michael R. Kuhns – Forestry extension, urban forestry
- Jesse A. Logan – Disturbance ecology, forest insects
- James N. Long – Forest ecology, silviculture
- James A. Pfister – poisonous range plants
- Michael H. Ralphs – Poisonous plants, grazing management
- David W. Roberts – Forest ecology, NR modeling
- Eugene W. Schupp – Plant population ecology
- Terry L. Sharik – Forest regeneration, ecology
- Leila M. Shultz – Plant taxonomy and geography

Wildlife Ecology and Management

- Gary E. Belovsky – Population ecology, conservation biology
- John A. Bissonette – Landscape ecology, wildlife management
- Michael R. Conover – Wildlife damage management. Animal behavior
- Thomas J. DeLiberto – Wildlife health, veterinary medicine
- Raymond D. Dueser – Terrestrial ecology, mammalian biology
- Richard C. Etchberger – Wildlife-habitat relationships
- Eric M. Gese – Predator behavior and ecology
- Barrie K. Gilbert – Wildlife ethology
- Frederick F. Knowlton – Predator behavior and ecology
- J. Russell Mason – Chemical ecology, animal behavior
- Terry A. Messmer – Wildlife extension, wetlands
- Mark E. Ritchie – Community ecology, plant-herbivore interactions
- Robert H. Schmidt – Wildlife damage management, wildlife policy
- Michael L. Wolfe – Wildlife ecology and management

Aquatic Ecology, Fisheries Biology

- Phaedra E. Budy – Aquatic food webs, fisheries management
- Todd A. Crowl – River ecology, conservation biology
- Ronald W. Goede – diseases of fish
- Charles P. Hawkins – Stream ecology, watershed resonation
- Jeffrey L. Kershner – Stream restoration, fisheries
- Chris Luecke – Aquatic ecology, fisheries management
- J. Christopher Wilson - Aquatic animal health
- Wayne A. Wurstbaugh – Limnology, fish ecology

Forest and Range Management

- Roger E. Banner – Range extension, grazing management
- Dale L. Bartos – Range ecology and management
- James E. Bowns – Rangeland ecology
- F. E. “Fee” Busby – Range management, NR policy

- L. Wayne Coppock – Rangeland production systems
- Charles W. Gay, Jr. – Range extension, international range management
- John C. Malechek – Rangeland management, range animal nutrition
- Brien E. Norton – Grazing ecology, international range management
- Kenneth C. Olson – Grazing, livestock nutrition
- Frederick D. Provenza – Range animal behavior, vegetation management
- G. Allen Rasmussen – Fire ecology, range succession
- Neil E. West – Range condition/trend, desertification

Hydrology/Watershed Management

- James P. Dobrowolski – Rangeland hydrology, watershed management
- Nancy O. Mesner – Watershed/water quality interactions

Other

- Ted J. Alsop – Climatology, photogrammetry
- Frederick A. Baker – Forest pathology, computer applications
- Paul W. Box – Spatial statistics/GIS, human ecology
- Cliff B. Craig – Community development, rural planning
- John L. Crane, Jr. – Environmental management
- Thomas C. Edwards, Jr. – Spatial ecology, bioregional planning
- Robert R. Gillies – Climatology, remote sensing
- Carla G. Heister – NR information systems
- Karen Mock – Conservation genetics
- H. Charles Romesburg – NR philosophy, statistics
- John C. Schmidt – Fluvial geomorphology, water policy
- Richard E. Toth – Bioregional planning
- Helga Van Miegroet – Forest soils, biogeochemistry

DESERT RESEARCH INSTITUTE

Division of Atmospheric Sciences

- Peter Barber – Division Executive Director
(The Division has 39 full-time and 5 part-time scientists)

Division of Earth and Ecosystem Sciences

- David Rhode – Interim Executive Director
(The Division has 29 full-time and 2 part-time scientists)

Division of Hydrologic Sciences

- Alan McKay – Interim Executive Director
(The Division has 32 full-time and 7 part-time scientists)

UNIVERSITY OF UTAH

Utah Museum of Natural History

- Laurel Casjens – Archaeology, documentation and conservation of rock art
- Duncan Metcalfe – Human ecology and foraging theory
- William Newmark – Conservation biology
- Erik Rickart – Biogeography, ecology, and systematics of mammals
- Scott Sampson - Paleontology (systematics and paleobiology of Archosaurs)
- Paula Wilson – Mineralogy
- Michael Windham – Systematics of vascular plants

Biology, Geology and Geophysics

- Lynn Bohs – Phylogenetics and systematics of vascular plants
- Thure Cerling – Geochemistry, soil chemistry, paleoecology, stable isotopes
- Dale Clayton – Avian biology, host-parasite co-evolution
- Dinah Davidson – Plant-animal interactions, conservation biology
- Denise Dearing - Physiological ecology of animals
- Jim Ehleringer – Physiological ecology of plants, ecosystem biology, desert ecology
- Tony Ekdale – Trace fossils, paleoecology, invertebrate paleontology
- Donald Feener – Entomology, host-parasite evolution, fire ant ecology
- Sarah George – Evolutionary systematics of mammals
- Kip Solomon – Groundwater hydrology, environmental geology, geological engineering
- John Sperry – Plant structure, function and adaptation; plant-water relations

Wallace Stegner Center, School of Law

- Robert Adler – Water systems, environmental law
- Robert Keiter – Natural resources, public land, constitutional law
- William Lockhart – Public land, natural resources, administrative law
- Susan Poulter – Science and law, environmental law, toxic torts
- Robert Schmidt – Land development, mining, oil and gas, natural resources law
- Alexander Tallchief Skibine – Administrative law, legislation, federal Indian law
- Robert Swenson – Water law, property law, mining and natural resources

OREGON STATE UNIVERSITY DEPARTMENT OF RANGELAND RESOURCES

Faculty

- Michael M. Borman – State Extension Specialist
- John C. Buckhouse – Watershed function and management
- Paul S. Doeshner – Plant physiology
- Lee E. Eddleman – Plant community ecology
- Robert C. Ehrhart – Natural resources management
- Douglas E. Johnson – Landscape ecology
- William C. Krueger – Riparian ecology
- Larry Larson – Weed ecology
- Mike L. McInnis – Grazing ecology
- Richard F. Miller – Community ecology
- Steven H. Sharrow – Agroforestry
- Tamzen K. Stringham – Riparian ecology
- Martin Vavra – Range animal nutrition

Courtesy and Adjunct Faculty

- Raymond Angell – ARS, Grazing management
- Jerry Barker – EPA, Water quality
- David Ganskopp – ARS, Grazing management
- Fred Obermiller – ES, Economics
- David Pyke – USGS, Range ecology
- Gregg Riegel – USFS, Range ecology
- Pat Shaver – NRCS, Range management
- Dennis Sheehy – EOARC, Range/Animal nutrition
- Tony Vecar – Plant ecophysiology

D-Q UNIVERSITY

- Susan Mahoney – Environmental sciences

- Suresh Tiwari – Dean of Faculty, Biology
- Jim Liment – Social sciences/indigenous studies
- Susan Little – Forestry
- Angela Moore – Hydrology
- Kathy Wallace – Basketry/native crafts

GREAT BASIN COLLEGE

- Erik Henderson – Anthropology
- Mike McFarlane – Geology
- Patricia Josey – Geographic Information Systems
- Pete Bagley – Biology
- Mark Ports – Biology
- Jack Smith – History
- Joel Shrock – History
- Frank Daniels – Mathematics

IDAHO STATE UNIVERSITY

Center for Ecological Research and Education

- Jay Anderson – Physiological plant ecology, vegetation dynamics
- Michael Childress – Behavioral ecology
- Joe Cook – Phylogeography, mammalogy
- David Delahanty – Avian biology, behavior
- Lucina Hernandez – Conservation, wildlife ecology
- Nancy Huntly – Community ecology, biodiversity, plant-animal interactions
- Richard Inouye – Plant and community ecology, plant-animal interactions
- Ernest Keeley – Behavior, ecology and conservation of fishes
- Barry Keller – Mammalogy, population ecology, museology
- John Laundre – Wildlife ecology, behavior
- Terence McGonigle – Soils, mycorrhizae
- Wayne Minshall – Stream ecosystem dynamics, pollution ecology, habitat management
- James Moodie – Animal behavior
- Margaret Ptacek – Evolutionary biology, population genetics
- Charles Peterson – Physiological and behavioral ecology, herpetology, conservation biology
- Rosemary Smith – Ecology of burying beetles, population interactions
- Stefan Sommer – Species interactions, community ecology, mutualism
- Charles Trost – Ornithology, physiological ecology, animal behavior
- Maribeth Watwood – Microbial ecology, bioremediation, biodegradation
- Keith Webber – Director, ISU GIS Center
- Rick Williams – Molecular population genetics, plant-animal interactions

Botany

- Ray Donahue – Ecophysiology
- Jeff Hill – Plant development, evolution, reproduction
- Mary Poulson – Plant physiology
- Jenny Xiang – Plant systematics

UNIVERSITY OF NEVADA LAS VEGAS

Harry Reid Center for Environmental Studies

- Donald Baepler – Environmental assessments of threatened and endangered species
- Lynda Blair – Archaeology; cultural resource management

- Mark Buttner – Environmental science and health/microbiology
- Gary S. Cerefice – Radioactive and hazardous waste management
- James Cizdziel – Behavior of radioactive and stable elements in the environment
- Anthony E. Hechanova – Radioactive waste management; dose risk assessment
- John Klicka – Avian biogeography, evolutionary biology
- Craig Palmer – Soil chemistry, sampling techniques research for forest health
- William L. Pratt – Taxonomy and zoogeography of terrestrial arthropods
- Amy Smiecinski – Environmental quality assurance
- Klaus Stetzenbach – Analytical chemistry, ground water movement, rare earth elements
- Linda D. Stetzenbach – Microbiology, airborne and surface-associated organisms
- Gary Voelker – Historical biogeography of avian populations, genetic relationships
- Dennis Weber – Environmental and spatial statistics, computer modeling biological systems
- Ingrid Wengatz – Detection and analysis of hazardous organic and inorganic compounds

Department of Biological Sciences

- Raymond W. Alden III – Aquatic, marine and pollution ecology; sediment toxicology
- Penny S. Amy – Survival of environmental microorganisms
- Davis F. Bradford – Desert amphibian ecology and conservation
- James E. Deacon – Ecology and conservation biology
- Charles L. Douglas – Ecology and management of desert mammals
- Stanley D. Hillyard – Membrane ion transport and water balance in desert amphibians
- Karin S. Hoff – Behavioral physiology, water balance in desert amphibians, conservation
- Ian McGaw – Comparative physiology of invertebrates
- Dawn S. Neuman – Physiological adaptations of plants to environmental stress
- Wesley E. Niles – Angiosperm taxonomy and floristics of southwestern deserts
- Carl L. Reiber – Comparative animal physiology, cardio-respiratory systems
- Brett R. Riddle – Macroevolutionary structure of western North America biotas
- Stephen Roberts – Insect physiology, thermoregulation and physiology of flight
- Paul J. Schulte – Plant-water relations; modeling of plant-environment interactions
- Stanley D. Smith – Physiological ecology of desert plants
- Rhonda Snook – Evolution of reproductive traits
- Lloyd Stark – Reproductive biology of desert mosses
- Peter L. Starkweather - Aquatic ecology
- Daniel B. Thompson – Population biology; avian feeding ecology, desert granivory
- Lawrence R. Walker – Succession in plant communities, responses to disturbance
- Robert M. Winokur – Vertebrate morphology and evolution

ADDENDUM

A Proposal to Establish a
Cooperative Ecosystems Studies Unit
for the
Great Basin Area

Submitted by

University of Nevada, Reno
As Host University

And

Utah State University
Desert Research Institute
University of Utah
Oregon State University
D-Q University
Great Basin College
Idaho State University
University of Nevada, Las Vegas
As Partner Institutions

Date of Submission
January 22, 2001

Contact Person:
David G. Thawley
Dean and Director
College of Agriculture, Biotechnology and Natural
Resources
University of Nevada, Reno
Reno, NV 89557

Submitted To:
Dr. Gary E. Machlis, CESU Coordinating Council Chair
Department of Interior, Main Interior Building (3127)
1849 C Street, NW, Washington, D.C. 20240

Needed Clarifications/Improvements to the Initial Proposal

1. CESUs operate under cooperative agreements between agencies and universities, and hence university partners must reflect institutional involvement at the

university, not center or departmental level. While a department or center can serve as an administrative lead for the university, the agencies must have access to the full operations of the host and partner institutions. The involvement and roles of host, senior partner, partners and cooperators must be clarified, including access by potential federal agency partners, overhead and "pass through" costs. The organizational structure of the CESU and how it will work must be clarified.

Response/Clarification

a. The revised letters indicating institutional involvement at the university level are attached in Appendix A.

b. Organizations Involved

Proposed Host Institution

University of Nevada, Reno
College of Agriculture, Biotechnology and Natural Resources (Lead Unit)

Senior Partner Institution

Utah State University
College of Natural Resources (Lead Unit)

Proposed Partner Universities

Desert Research Institute
University of Utah
Oregon State University
D - Q University
Great Basin College
Idaho State University
University of Nevada, Las Vegas

Other Program Organizations (Cooperators)

The Rocky Mountain Elk Foundation
The Nature Conservancy
Pyramid Lake Paiute Tribe
Walker Lake Paiute Tribe
Fallon Paiute-Shoshone Tribe
Nevada Department of Conservation and Natural Resources
Community College of Southern Nevada
University of California, Berkeley Museum of Vertebrate Zoology

Center for Conservation Biology, Stanford University

University of California White Mountain Research
Station

Current Federal Participants

Bureau of Land Management
U.S. Bureau of Reclamation
U.S. Geological Survey
Department of Energy
National Park Service
U.S. Forest Service, USDA
Department of Defense

c. Description of Roles

Host Institution: University of Nevada, Reno is the host institution for the Great Basin Cooperative Ecosystem Studies Unit. The College of Agriculture, Biotechnology and Natural Resources is the lead unit. It serves as the coordinator of Partner and Cooperator joint program and project planning and implementation in cooperation with the Federal participating agencies. It also serves an administrative role for the CESU through program and project funds management. It will coordinate and host all meetings of the CESU Administrative Board consisting of Federal participants and representatives designated by Partner institutions. It will implement the administrative decisions of the Board. It will provide leadership to strategic planning and establishment of goals and priorities by the Administrative Board. It will provide leadership to Partner efforts in informing the public of the CESU mission, goals and programs, and to Partner efforts in seeking additional matching financial support for CESU programs and projects. The Host Institution may have direct cooperative projects with the federal agency partners, may serve as the coordinator of multi-institutional projects, or may serve as a conduit for other research and education projects to be conducted by another partner within the GB-CESU.

Senior Partner: The Utah State University (USU) will be the senior partner institution. The College of Natural Resources will be the lead unit within USU, due to its recognized existing expertise and current active programs within the Great Basin. It will provide leadership to and coordination of the critical areas of Remote Sensing/ Geographical Information Systems (RS/GIS)

and, through the S. J. and Jessie E. Quinney Natural Resources Research Library, information resource management and networking systems within the GB-CESU. The Senior Partner has the same rights and responsibilities assigned to the remaining partners.

Partners: The listed partners were invited to participate due to established areas of expertise, existing working relationships with the Federal participants, demonstrated cooperation with other Partners, and/or available resources that could contribute significantly to CESU program and project needs. Each Partner will have a designated representative on the GB-CESU Administrative Board. Partners may have direct cooperative projects with the federal agency partners that are a part of, or independent of, the CESU. Additional Partners may be invited to participate by the Administrative Board.

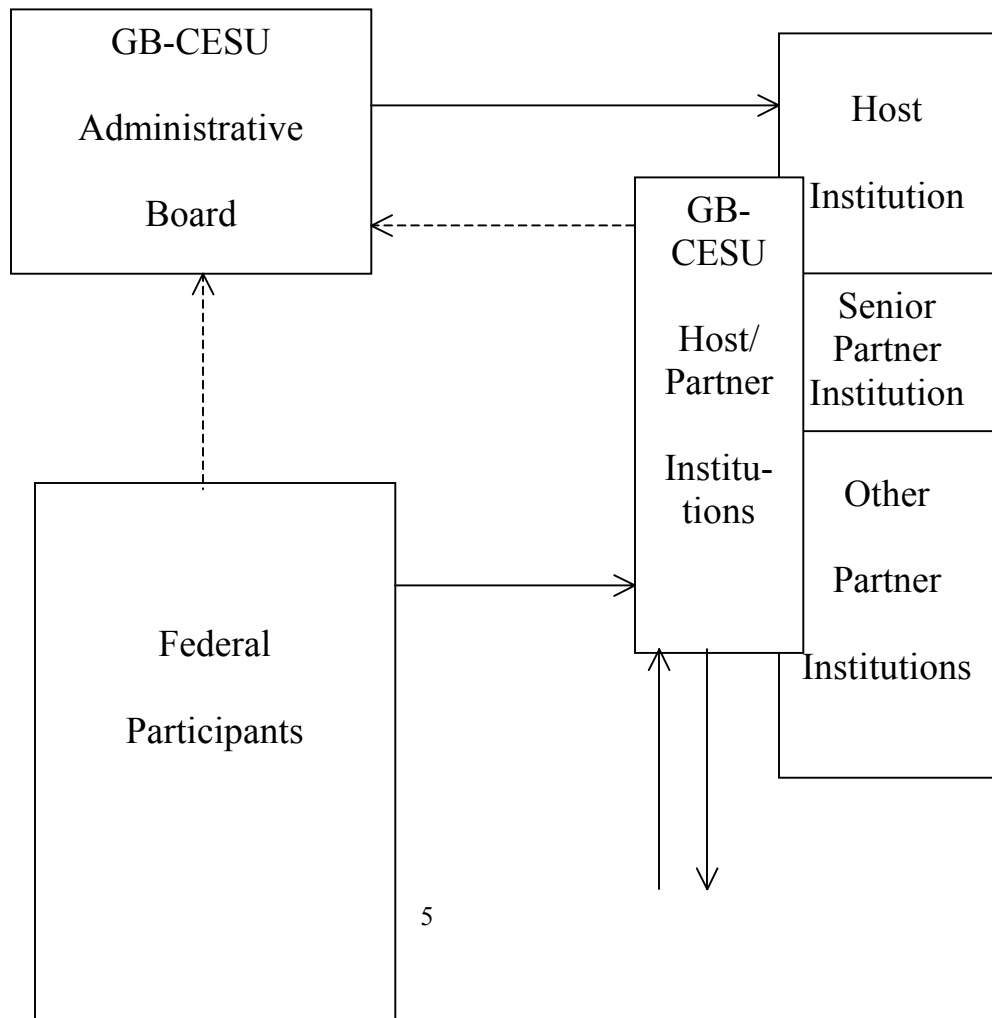
Cooperators: Cooperators are other proposed organizations which are either non-university cooperators or selected units within a university. The listed Cooperators all have active programs within the Great Basin, and in most cases active cooperation with Partners and Federal participants. For example:

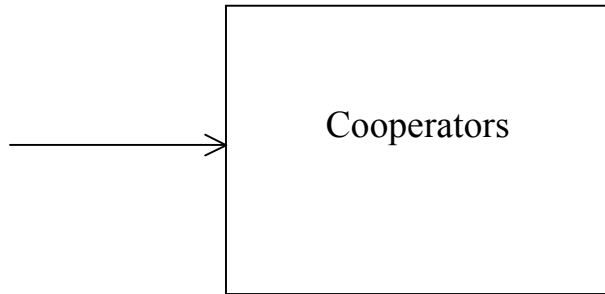
- The Rocky Mountain Elk Foundation has a long history of cooperative projects with Federal land management agencies, state and Federal wildlife agencies, and has current active formal cooperative agreements with the Host Institution and Senior Partner.
- The Nature Conservancy has a long history of cooperative projects within the Great Basin, and is currently approaching completion of a strategic plan for the Great Basin that may be relevant to the CESU.
- The Native American Tribes control large tracts of land in need of planning, restoration and management assistance, and have a strong desire to become active participants in research and education programs within the Great Basin CESU. Tribal participants will provide valuable historical and cultural perspectives to the CESU, and will work with the Host Institution, partners and Federal participants to encourage Native American students to continue their education and

pursue careers in natural resource conservation and management.

Cooperators will not be members of the Administrative Board; however the Board may invite Cooperators to participate in Board activities or on selected committees. It is expected that Cooperators will be active participants in many of the CESU programs and projects. The overhead and the "pass through" costs will be the same as those applicable to the partners.

Administrative Flow Chart for GB-CESU





2. **The integration of scientific activities related to research, technical assistance, and education should be clarified, including information database capabilities.**

Response/Clarification

Research and Technical Assistance. An example of how the GB-CESU should coordinate and integrate activities is the web site of the Consortium For Great Basin Studies at the University of Nevada, Reno that is jointly coordinated by the College of Agriculture, Biotechnology and Natural Resources (Host Institution) and the Desert Research Institute (Partner). All colleges, departments, institutes and centers within the university system with interests in Great Basin natural resources are participating in this activity. The mission of the Consortium is to facilitate communication and information exchange among people interested in the Great Basin. We believe that the integration of different disciplines and the collaboration of multiple investigators is essential to truly understanding processes operating within the Great Basin. The process of bringing this group together, establishing priorities, and identifying existing programs and scientists was very instructive to all participants. Further, all federal and state agencies, interest groups, and interested individuals may access our web site URL at <http://www.ag.unr.edu/cgbs>. Once the priorities are established and needs identified by the GB-CESU Administrative Board, all Partners should provide the information required to develop a similar knowledge resource base for the CESU. Our Senior Partner, the Utah State University College of Natural Resources, will provide leadership to the GB-CESU in coordinating

information resource management and networking services.

Education. The education component of the GB-CESU will have two major functions among the university partners: (1) outreach or extension education that works with the stakeholders within the Great Basin - state, county and local governments, public interest groups, rancher permittees, mining companies, etc.; and (2) education and in-service training programs within the university systems.

Nevada Cooperative Extension, as a part of the CESU proposal development process, contacted all state Cooperative Extension Deans/Directors within the Great Basin and received commitments from all states to be a part of the educational program requirements of the CESU. Cooperative Extension in all Great Basin states has State and Area Specialists and county Extension Educators that are trained in the natural resource sciences and work closely with both the land and resource management agencies and stakeholder groups.

One of the most serious challenges within the western U. S. is the gradual decline in undergraduate and graduate student enrollment in the natural resource sciences at our land grant universities, due primarily to the historical lack of job opportunities upon graduation. Recent discussions with federal and state natural resource management agencies clearly identify a serious pending personnel shortage due to the need for additional new employees and the replacement of retirees in the near future. One of the first priorities of the GB-CESU should be to develop an education needs and recruitment strategy to address these issues. As stated in the proposal, one of our highest priorities will be to identify and recruit students for agency internships, which has been shown to be a valuable student-training program, and agency evaluation and recruitment opportunity. Agency and university teams need to develop joint recruitment strategies that start perhaps even at the high school freshman and sophomore level, since university studies have shown that career education decisions are often made by the best students at this age level. A special effort needs to emphasize the recruitment of minority students into the natural resource sciences, and this also will require a unified effort among universities, agencies and Native American and other minority communities.

Another important education component that is perhaps not being met by the universities is the need for agency personnel in-service training. A part of the strategic planning for education will be to identify agency in-service training needs and those universities best qualified to meet those needs within the Great Basin.

3. **For the Department of Defense's (DOD) potential participation in the Great Basin CESU, the benefits of the CESU to DOD must be included and past experience with DOD identified.**

Response/Clarification

The DOD is the third largest land manager in the Great Basin. The DOD presence in Nevada includes Fallon Naval Air Station and related training ranges, Hawthorne Army Ammunition Depot, Nellis Air Force Base and its reserved lands, Indian Springs Air Force Base, and its shared management of the Nevada Test Site with the DOE. The DOD presence in Utah includes Dugway Proving Grounds, Deseret Test Center, Wendover Range, and Hill Air Force Base, all of which represent major land holdings reserved for training and/or testing. Mountain Home Air Force Base in Idaho is also located in the Great Basin, as is the Army Ammunition Storage Depot and Disposal Site at Herlong, California.

The DOD lands in the Great Basin have in many situations problems similar to other public lands managed by the BLM and USFS - rangeland restoration needs, overstocked wild horse populations, invasive non-native plant species, wildlife management, threatened or endangered species management, water distribution, etc. In addition, the DOD has both historical and current waste management challenges at many of its locations. The public largely supports the military bases located in the Great Basin, but expects the DOD to manage their lands in a responsible manner. The need for security and other factors has often created a lack of understanding among the public regarding the responsible management of these lands by the DOD. Studies based in an arid environment such as the Great Basin can help military facilities worldwide better understand and prepare for activities in dry areas. For example, research involving sand transport could aid in visibility procedures and military vehicle traction. Environmental restoration and stewardship issue research could help to maintain biodiversity, protect cultural resources, and help sustain watersheds and critical water resources on military and other

government installations. The resources of the Partners of the GB-CESU will be available to the DOD for research, technical assistance and education programs.

A list of recent historical and current experiences of the partners with the DOD is attached (Appendix B).

4. **The benefits of the CESU to the Department of Energy (DOE) should be included and past experience with DOE identified.**

Response/Clarification

The DOE has two major locations within the Great Basin - the Idaho National Energy Laboratory (INEL) includes major research facilities at Idaho Falls and extensive land holdings on the Snake River plains, and the proposed Yucca Mountain Nuclear Waste Depository at the Nevada Test Site. A number of the Partners have participated in research projects with or provided technical expertise to scientists at the INEL, and would anticipate expanded collaboration through the GB-CESU. Collaboration between DOE laboratories and CESU partners would be enhanced, and studies such as carbon sequestration could aid in identifying processes of worldwide concern such as global warming. The Yucca Mountain Nuclear Waste Depository continues to be the most controversial and emotional issue in Nevada. Scientists at the University of Nevada, Reno, the University of Nevada, Las Vegas and the Desert Research Institute have participated in numerous research studies related to Yucca Mountain. The DOE must convince the public that the storage of high grade nuclear wastes at Yucca Mountain will be conducted in a manner that guarantees long-term security and protection for its neighbors, and must provide the assurances through credible sources. The GB-CESU could potentially have a major role to play through continued research, technical assistance and education programs.

A list of recent historical and current experiences of the partners with the DOE is attached (Appendix B).

5. **Additional minority partners are encouraged. Minority institutions that are partners with existing CESUs are not prohibited from joining more than one CESU.**

Response/Clarification

Haskell Indian Nations University at Lawrence, Kansas has been contacted to be a full partner in the Great Basin CESU. A letter received from Haskell Environmental Research Studies (HERS) indicating an interest in joining the GB-CESU is attached in Appendix C. At this time, specific details of the responsibilities and the nature of the participation by Haskell are being worked out. It is expected that the details of the agreement with Haskell could be completed within 30 days. If this partnership arrangement does not materialize, the CESU will work diligently to include another minority partner.

6. **The involvement of minority students - how minority students will be engaged in CESU activities - should be identified.**

Response/Clarification

The host institution as well as the partner institutions have excellent track records in working with minority students. The Great Basin has a large population of Hispanics and a number of Native American tribes. The GB-CESU universities have established programs for recruitment, financial assistance and retention of minority students. Minority students will be recruited to work on various GB-CESU research projects, technical assistance programs and other outreach educational programs. The cooperating Native American tribes will potentially assist in identifying and involving Native American students in the CESU program. Three types of programs are envisioned for these students: (a) the students will be recruited into the programs of the CESU institution and hired on CESU projects part-time throughout the year, (b) the students will be hired during the summer on CESU field projects and (c) scholarships and internships will be established to target minority students to link them with CESU projects.

7. **Letters of support from interested tribes should be provided or, in the absence of letters, additional information is needed that specifically describes how the tribes will become involved in the CESU.**

Response/Clarification

Letters of support from interested tribes and other cooperators are attached in Appendix D.

Corrections to Contact Information

1. **Utah State University, College of Natural Resources (Senior Partner)**
Contact: Dr. Fee Busby, Dean
College of Natural Resources
Utah State University
5200 Old Main Hill
Logan, UT 84322-5200
Tel.: 435-797-2445; **FAX:** 435-797-2443;
Email: feebusby@cnr.usu.edu

2. **University of Utah (Partner)**
Contact: Dr. James R. Ehleringer, Professor, Biology
University of Utah
257 S 1400 E
Salt Lake City, UT 84112-0840
Tel.: 801-581-6414; **FAX:** 801-581-4668;
Email: ehleringer@biology.utah.edu

Contact: Dr. John S. Sperry, Associate Professor,
Biology
(Same address as above)
Tel.: 801-581-6517; **FAX:** 801-581-4668;
Email: sperry@biology.utah.edu

3. **The Nature Conservancy of Nevada (Cooperator)**
Contact: Dr. Teri A. Knight, Director of Conservation
Biology
The Nature Conservancy of Nevada
1771 E. Flamingo, #111B
Las Vegas, NV 89119
Tel.: 702-737-8744; **FAX:** 702-737-5787;
Email: tknight@tnc.org

4. **University of California, White Mountain Research Station (Cooperator)**
Contact: Dr. Frank Powell, Director
White Mountain Research Station
University of California, San Diego
9500 Gilman Dr. #0689
La Jolla, CA 92093-0689
Tel.: 858-822-0165; **FAX:** 858-822-0164;
Email: fpowell@ucsd.edu

5. **Selected Faculty**
Delete: Marie Boutte
University of Nevada, Reno
Department of Anthropology