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| 1. State the proposed Institute/Center’s name and purpose. | | |
| The **Center for Integrated Research on the Environment (CIRE)** is proposed for the University of Montana - Missoula to provide an administrative framework specifically designed to bring institutional organization to research and sustainable management projects in the area of natural and cultural resources that fall under the umbrella of a Cooperative Agreement (CA) between the Department of Defense (DoD) - US Army Corps of Engineers (USACE) and the University of Montana (Award: June 1, 2014 – May 31, 2019; $45,000,000). | |
| 2. A comprehensive statement of the Institute/Center’s mission and its relationship to the University mission. | | |
| 1. **State the Institute/Center’s mission.** | |
| The mission of CIRE is to conduct specific research and management assistance related to the US Army Corps of Engineers’ research projects around the state, nation and world. Primary research functions are organized within two interactive, interdisciplinary divisions: the **Natural Resources Division** and the **Cultural Resources Division**.  CIRE is designed to facilitate research with existing faculty, students and staff, as well as existing infrastructure facilities such as research laboratories, instrumentation, equipment, and other prior investments across the University of Montana (e.g., labs and core facilities specializing in water quality analyses, metals analyses, genomics, soils analyses, wildlife physiology, plant physiology, anthropological and archaeological field-processing and curation, ecological simulation modeling, human environmental health and toxicology, and state-of-the-art GIS).  The **Center** will function within the research and education mission of the UM-Missoula campus. The Program Director of the Cooperative Agreement Award will be the Director of CIRE. The Center will provide the leadership and administration for executing research projects coming to the university through the Cooperative Agreement.. |
| 1. **Identify the Institute/Center’s goals and objectives.** | |
| CIRE objectives include, but are not limited to:   1. Provide the leadership and administration for executing the Cooperative Agreement between the US Army Corps of Engineers and the University of Montana. 2. Create a collaborative administrative framework that will advance interdisciplinary environmental/ecosystem science and cultural resource research and education. 3. A central goal of the Center is to distribute CA-based research broadly across UM faculty, staff and students, thereby advancing research programs across diverse academic units. 4. Increase state and national visibility for the University of Montana and the MUS in environmental and ecosystem science and cultural resources, particularly in research and education. 5. Increase capacity to recruit and retain nationally competitive faculty, graduate students, and undergraduate students in areas critical to the CA. 6. Expand opportunities for students to participate in basic and applied research, develop critical thinking and communications skills, and receive state-of-the-art education to increase their competitiveness in the workforce. 7. Facilitate broad engagement and communication with the DoD to better support informed decision-making on environmental and cultural heritage issues, and to generate research opportunities that are important to the state and nation. 8. Strengthen the primary research connections between UM and MSU, then secondarily with regional, national, and international partners to create new opportunities for interdisciplinary collaboration and innovation in natural and cultural resources research and education. |
| 1. **What specific need is being responded to in developing the proposed Institute/Center?** | |
| The USACE and DoD, similar to any federal agency, must address the regulatory implications of both Natural Resources and Cultural Resources on lands and waters under the jurisdiction of the agency. For example, the following federal acts directly bear on the activities that CIRE will address: Federal Clean Air Act, Clean Water Act, National Environmental Policy Act, Endangered Species Act, the National Historic Preservation Act and the Native American Graves Protection and Repatriation Act.  The Cooperative Agreement requires an administrative entity to run the various projects, protect the interests of the university, and fulfill the requirements of the Award. The Center will provide that administrative structure with the Program Director of the Cooperative Agreement serving as the Director of the Center. |
| 1. **Describe how the Institute/Center benefits the department, college, or institution.** | |
| CIRE is conceived as an Interdisciplinary Center extending across many colleges and departments within the university. It will directly involve a broad array of disciplines and the faculty, post-docs, graduate and undergraduate students from many academic departments, as well as research staff at the UM campus. Currently, five colleges and schools are directly involved in the development of CIRE: College of Humanities and Science, College of Forestry and Conservation, College of Health Professions and Biomedical Sciences, School of Business and School of Law. CIRE-based research will also reach out across the Montana University System whenever appropriate, thus involving faculty, students and other researchers from across the MUS. |
| 1. Describe the Institute/Center’s relationship to the University mission. | |
| The University of Montana mission  *The University of Montana pursues academic excellence as demonstrated by the quality of curriculum and instruction, student performance, and faculty professional accomplishments. The University accomplishes this mission, in part, by providing unique educational experiences through the integration of the liberal arts, graduate study, and professional training with international and interdisciplinary emphases. The University also educates competent and humane professionals and informed, ethical, and engaged citizens of local and global communities; and provides basic and applied research, technology transfer, cultural outreach, and service benefiting the local community, region, State, nation and the world. The University of Montana will lead as a globally focused public research university that serves the state, nation, and world. Intrinsic to this mission are the underlying values of leadership, engagement, diversity, and sustainability.*  The Center will directly support the mission of the university by increasing research opportunities and support for unique educational opportunities across the physical, chemical and biological sciences, the social sciences, natural resources, cultural heritage, and human health in the environment. The center will expand student opportunities to learn highly practical skills in workforce development by providing research/work across the nation. |
| 3. Briefly describe the Institute/Center’s anticipated activities. | | |
| 1. Identify faculty expertise available for participation in the Institute/Center’s activities. | |
| CIRE will function within a single administrative structure with a Director (Professor F. Richard Hauer), who with the UM Administration support and the colleagues listed herein, competitively acquired the Cooperative Agreement. The Center is organized within two interdisciplinary divisions: the **Natural Resources Division** and the **Cultural Resources Division**. Each division is composed of five specific areas of expertise led by an Associate Director, who helped in the development of the award and who now plays an active role in the research activities. The Associate Directors also assist the Director in oversight of the research activities conducted by other faculty and their students and staff. Each Associate Director is a leader in their field of research at national and international levels.  ***Natural Resources Division***  ***Forests, Rangelands, and Terrestrial Invasive Species***  Associate Director and Regents Professor Ragan Callaway (also Director of the NSF MT-EPSCoR Program). The University of Montana has particular strengths in Forests, Rangelands, and Terrestrial Invasive Species research and has extensive experience and expertise that spans a wide range of biology, encompassing the areas of botany, ecophysiology, microbial ecology, field experimentation, restoration, biogeography, ecosystem productivity, and terrestrial plant invasions.  CIRE research and management capacity is particularly well versed in biogeographic comparisons of the ecology of invaders in their native vs. non-native ranges and the control of invasive species.  Natural resource management initiatives will involve the terrestrial ecological management of lands within the scope of the DoD Land and Resource Management Plan.  We will also have the capacity and opportunity to teach short courses, workshops and training in regional ecosystem management, such as habitat preservation and invasive plant species control. A particular area of research strength is in the assessment, prevention, and control of exotic invasive plants that threaten terrestrial and wetland ecosystems. We have capacity to mobilize efforts to reestablish native plant communities and renew ecological functions on landscapes that have been degraded, damaged, and/or invaded by exotic species.  These actions include, but are not limited to, erosion control, reforestation, use of local genotypes, removal of weeds, re-vegetation, and reintroduction of native-targeted species.  Ecological Restoration processes employ planning, implementation, monitoring, and management.  ***Water Resources and Aquatic Invasive Species***  Associate Director and Professor H. Maurice Valett (also Director of the UM Systems Ecology Intercollegiate Graduate Program). The CIRE research and management team in Water Resources and Aquatic Invasive Species has extensive experience in aquatic ecosystem management specializing in freshwater systems: lakes, reservoirs, streams, rivers, groundwater systems, wetlands and floodplains.  Water resource management includes practical understanding of how ecosystems resist and recover from human effects associated with water diversion, dams, flooding, agriculture, mining and mine contamination, urban development, and water pollution.  CIRE will provide particular expertise on freshwater ecological issues involving the Clean Water Act, freshwater invasive species, mitigation/management strategies for meeting federal, state and local environmental stewardship laws and regulations.  CIRE faculty have the capacity and expertise to teach courses/short courses, workshops, and training in freshwater ecology and management.  ***Fish and Wildlife Resources***  Associate Director and Associate Professor Winsor Lowe (also Director of the UM Wildlife Biology Program). Stewardship of terrestrial and aquatic wildlife on lands and waters of the US (such as those under DoD jurisdiction) is central to CIRE research capacity.  We draw on the expertise of faculty at the University of Montana, as well as the network of fish and wildlife scientists within the Institute on Ecosystems, which includes faculty at Montana State University.  Scientists in our network offer expertise with a wide range of taxa, including large mammalian herbivores and carnivores, forest and grassland birds, native fishes and amphibians, and aquatic and terrestrial invertebrates.  We can provide approaches to analyses of wildlife population viability, critical habitat, population connectivity, genetic structure, biodiversity surveys, and impact assessment for a wide range of human activities (e.g., residential and industrial development, environmental pollution, water regulation, non-native species introductions).  ***Ecological Restoration***  Associate Director and Associate Professor Cara Nelson (also Director of the UM Restoration Ecology Program). CIRE will conduct research and provide management support in Ecological Restoration.  CIRE capacity in this area is wide-ranging in managing research and training related to the repair of degraded ecosystems, encompassing forests, grasslands, rivers, and wetlands.  The field of ecological restoration has matured considerably over the last three decades, growing from a relatively minor component of natural resource management to a dominant activity in terrestrial and aquatic ecosystems.  In the United States alone, it is now an over-81-billion-dollar-per-year industry.  As the scope and scale of restoration increases worldwide, there is a corresponding need for increased understanding of the effects of abiotic and biotic disturbance on ecosystem composition and function, the ecological goals of restoration, the efficacy and effects of restoration practices, and best practices for solving the complex challenges of restoring ecosystems in an era of rapid environmental change.  Accordingly, the CIRE program in ecological restoration is focused on research and training to improve the quality of restoration practice in the United States and across the globe.  ***Climate Impacts, Remote Sensing, and GeoSpatial Modeling***  Associate Director and Professor John Kimball (also Deputy Director of the Numerical Terradynamic Simulations Group). There is an Executive Directive to all federal agencies to evaluate the potential impacts associated with climate change. CIRE conducts research and support activities addressing Climate Impacts, Remote Sensing and Geospatial Modeling.  CIRE capacity in this area includes modeling of the interface of hydrology and terrestrial ecology, including the study of climate impacts to water resources and ecosystems.  Our work involves all aspects of natural resource data collection and analysis, together with the design and application of airborne and satellite remote sensing for environmental data collection and monitoring.  These activities comprise forest and rangeland productivity, environmental trend analysis, vegetation health and biodiversity, and water quality.  We are particularly strong in geospatial modeling and GIS for environmental prediction, risk, impact and mitigation assessment, and decision support.  ***Cultural Resources Division***  ***Anthropological and Archaeological Resources***  Associate Director and Professor Kelly J. Dixon (also Director of the Montana Anthropological Research Cooperative). CIRE provides the top practices in sustainable Cultural Resource Management (CRM) and planning, including guidance and compliance with federal [e.g., Section 106 of the National Historic Preservation Act (NHPA)], state and tribal cultural resource and preservation legislation, for integration with environmental and human health policy statements of federal, state, and tribal authorities.  Following guidelines in the Federal Cultural Resources Program Area, CIRE will work with DOD installation resource managers, drawing from an existing interdisciplinary support network grounded in collaborative projects within the UM Department of Anthropology, the Montana State University-Billings Drafting and Design Program, as well as partnerships with tribal organizations, numerous academic consultants on and off the UM campus, and private CRM and environmental consulting firms to ensure that regional expertise and stakeholder needs are included in planning and decision-making.  ***Environmental Toxicology and Human Health***  Associate Director and Professor Andrij Holian (also Director of the Center for Environmental health Sciences). CIRE conducts investigations and analyses in Environmental Human Health within the Department of Biomedical and Pharmaceutical Sciences, including toxicology and human health effects.  These include validated *in vitro* models using primary cells and cell lines from most tissues; *in vivo* exposure studies in various rodent models including sensitive and resistant strains, as well as obese and compromised rodent models; zebra fish for developmental studies; exposure assessment capabilities and epidemiology.  We also have the ability to work with clients on specific environmental health problems initiated by various environmental exposures and their contribution to diseases ranging from type II diabetes, lung fibrosis and asthma, atherosclerosis, autoimmune diseases and central nervous system disorders and cancers.  In addition, we have expertise in evaluating toxicity of nanomaterials and other emerging new materials. Air Quality studies can be conducted to determine the amount of contaminants in the air.  Equipment is available to do field studies to measure the amount of particulates and conduct source apportionment of the particulates.   Epidemiology studies can determine if there is an increase in the prevalence of any environmental diseases in populations of interest.  These studies would involve accessing health records in hospitals and clinics in areas of interest.  Studies can also be conducted on humans using validated questionnaires and/or collection of physiological data, as well as biological samples including exhaled breath condensate, blood or urine.  ***Environmental Law and Policy***  Associate Director and Professor TBD (Professor Irma Russell has been serving in this capacity from the School of Law - TBD summer 2015 as Professor Russell departs UM). CIRE can work with the USACE and DoD on Environmental Policy and Legal Compliance in Resource Management in the legal policy areas of natural and cultural resources.  We have capacity and approaches for best practices and adherence to legal requirements related to hazardous substances in natural environments, restoration ecology and related inquiries.  We support assessment and implementation of policy and legal guidelines with attention to the environmental policy statements of the Corps and other federal and state authorities.  CIRE does not provide legal advice or practice law.  Rather, members of the CIRE team help by identifying legal issues and applicable standards to assist the Corps of Engineers and DoD in achieving goals in line with legal policy and identified best practices.  CIRE provides legal research and assessment of applicable requirements for preservation of environmental amenities and values of areas subject to agency projects.  Restoration of degraded natural or cultural resources, such as historic sites, forests, grasslands, rivers, and wetlands requires assessment in light of legal requirements.  Data collection guidelines and other requirements set by regulation, memoranda of understanding, or other contractual undertaking all require monitoring and management in compliance with the mandated or chosen standards.  ***Social Dimensions of Natural Resources***  Associate Director and Assistant Professor Elizabeth Metcalf (also Professor of Recreation Management and Human Dimensions of Natural Resources). The Social Dimensions of Natural Resources is a critical area for understanding stakeholders involved in natural resource management, including recreationists, community members, NGOs, and interfaces with other agencies.  Through state-of-the-art research methods and engagement strategies, the public has improved representation in natural resource management.  Using both qualitative and quantitative methods CIRE will help the DoD to better understand population parameters while embracing the complexity of natural resource issues.  Our approaches often include on-site surveys, mail/web based surveys, focus groups, facilitated discussions, in-depth interviews, and other methods.  CIRE also works with mangers to solve on-the-ground issues associated with recreation management like crowding and recreation conflict.  ***Environmental Innovation and Natural Resource Management***  Associate Director and Regents Professor Jakki Mohr (also Professor of Marketing and Rosemary and William Gallagher Distinguished Faculty Fellow). As the nation looks for better Environmental and Innovation Initiatives focused on the human dimension of ecological management that includes preservation and restoration, CIRE will work with the DoD to restore degraded environments. New innovations in ecological management of federal lands and waters, especially in the area of restoration ecology, must be implemented to ensure that best practices are utilized.  However, existing practices, routines, conflicting goals, incompatible performance metrics, and entrenched communication patterns can inhibit an agencies’ ability to change and achieve mandated management goals.  Furthermore, managing public perceptions, crafting communication messages to build goodwill with local stakeholders, and utilizing media effectively are essential.  CIRE can also provide courses/short courses, workshops, and training in business innovation of natural resource and cultural resource management. |
| B. Which departments on campus will be involved and how will the Institute/Center contribute to the academic programs of the institution? | |
| The Cooperative Agreement is a large and complex award designed to support a diverse research scope. The Associate Directors, who oversee specific research projects along with other faculty as PIs come from the College of Humanities and Science, College of Forestry and Conservation, College of Health Professions and Biomedical Sciences, School of Business and School of Law. Faculty, graduate and undergraduate students, and staff will be directly involved in CIRE-based research and accompanying building of academics across programs within each unit. |
| 4. Identify the organizational structure of the Institute/Center within the institution. | | |
| A. Identify all agencies, organizations and/or institutions that will be involved. | |
| The **Center for Integrated Research on the Environment** is organized to maximize project coordination and response efficiencies through an Executive Team and a Management Team. The Executive Team is composed of the CIRE Director and CA Program Director/Principal Investigator, the UM Vice President for Research, the Director of the Office for Research and Sponsored Programs, and the Associate Vice President for Human Resources (see Figure 1). The Executive Team’s responsibilities include program management within the larger University (CIRE Director Hauer), maintaining consistency with university research policy (VPR Whittenburg), contracting and fiduciary responsibilities including pre- and post-CA adherence to all federal, state and university accounting and fiduciary reporting laws and regulations (ORSP Director Fredenberg), and meeting all federal, state and university employment regulations (Assoc. VP-HR Phillips).    Figure 1. Organization Chart of the Project: the Executive Team (surrounded by dotted Orange Line) assures maximum efficiencies and coherence with federal fiduciary and hiring practices, the Management Team (surrounded by the dotted Red Line) is responsible for implementation of research projects.  The Management Team is at the core of this Cooperative Agreement (see Figure 1, above). The Management Team’s responsibilities are to implement the common research, data collection, support, and management goals of the CA. The Management Team is organized within two overarching topical divisions: a Natural Resources Division and a Cultural Resources Division. The Director of CIRE is responsible for overall program management and is the Program Director/ Principal Investigation of the CA, serving as the primary contact between the university and the Corps. Daily information flow within the CIRE Office is managed by a Program Office Manager who works immediately with the Director to maintain office organization and administrative workflow. The CIRE Fiscal Officer manages fiscal matters including forecasting, fiscal strategies, accounting and purchasing. The CIRRE FO reports directly to the Director to maintain accounts and coordinates these accounts with the Office of Research and Sponsored Programs (ORSP, see above). This assures immediate financial tracking of all accounts and strong accounting coordination between CIRE operations and financial tracking. | |
| B. Identify advisory council information. | |
| The Center for Integrated Research on the Environment has established a Advisory Council composed of the following:  Chair – UM President  Provost and Vice President for Academic Affairs  Vice President for Research and Creative Scholarship  Vice President for Administration and Finance  Dean, College of Humanities and Science  Dean, College of Forestry and Conservation  Dean, College of Health Professions and Biomedical Sciences  Dean, Business School  Dean, School of Law  The Advisory Council will meet at the end of the fall semester and at the end of the spring semester to review CIRE and provide oversight of activities and fit with the mission of the University of Montana. |
| 5. Identify first year and continuing finances necessary to support the Center/Institute, including the sources of funding. | | |
| A. Will additional faculty and other resources be required to implement this Center/Institute? If yes, please describe the need and indicate the plan for meeting this need. | |
| The Center for Integrated Research on the Environment is a UM initiative stemming from the Cooperative Agreement between UM and the US Army Corps of Engineers. This $45M/5-year award will support the research and support activities of the participating faculty, students and staff, thus no additional funds are needed or requested. The CA funds will provide administrative support; enhance and improve faculty research opportunities; provide opportunities for interdisciplinary research; enhance UM infrastructure and development; facilitate new research funding; support graduate and undergraduate student research and workforce development; and encourage outreach and public engagement in the area of environmental science and sustainability. We do not anticipate new tenure line faculty hires. Although, existing faculty engaged in CIRE-based research may add research faculty or post-docs to their labs and thus to the academic unit. |
| B. Are other, additional resources required to ensure the success of the proposed Center/Institute? If yes, please describe the need and indicate the plan for meeting this need. | |
| Additional resources are not needed for the support of the Center. Sustainability of CIRE beyond the 5-yrs of the current award is highly likely. This projection is based on two things: 1) the level of interest expressed by the US Army Corps of Engineers, and 2) the track record of a similar center at Colorado State University (Center for Environmental Management on Military Lands-CEMML), which has been sustained for over 10 years by individual contracts and a similar cooperative agreement. While CIRE is being developed in specific response to the Cooperative Agreement between UM and the USACE, we expect the Center to work with and have working contracts with other federal, state, tribal or foundation agencies that fund environmental research. No general fund dollars are requested to fund the Center. |
| 6. Describe other similar Centers/Institutes or research capacities in the state and surrounding region. | | |
| A. Describe the relationship between the proposed Center/Institute and any similar Centers/Institutes, programs, or research capacities within the Montana University System. | |
| The Center for Integrated Research on the Environment is unique in Montana. One other university received a similar award stemming from the “Request for Qualifications” proposal that appeared in the Federal Register in February 2014: Colorado State University. The scope of CIRE will allow the UM to form intra-university, inter-MUS, and external collaborations that would otherwise be difficult to develop and administer. UM will successfully fulfill its obligations specified in the Cooperative Agreement by drawing on the enhanced research and education capacity extending across the faculty, thus serving as a model for achieving institutional capacity through pooled resources, common purpose, and collaboration. |
| B. In cases of substantial duplication, explain the differences between these and the need for the proposed Center/Institute at an additional institution. Describe any efforts that were made to collaborate with these Centers/Institutes, programs or research capacities. If no efforts were made explain why. | |
| There is no substantial duplication either within the UM or across the MUS. |
| 7. Assessment: How will the success of the program be measured? | | |
| Success in the program and in the Center will be evaluated by the Advisory Council and by the participating faculty, students and staff. Participation in the CIRE research and support activities will extend to tenure-track and research faculty of all ranks and their graduate and undergraduate students at UM and across the MUS. We expect >100 faculty and students at UM-Missoula to be involved in CIRE-based research. These faculty and students will represent a broad array of disciplines including, but not limited to, geosciences, atmospheric sciences, forestry, chemistry, biological sciences, environmental health, sustainable business practices, environmental economics, and environmental policy and law. Success will be measured by the successful research conducted and by the involvement of faculty, graduate students, and undergraduates that receive research opportunities embedded within the academic programs distributed across the university and the MUS. | |
| 8. State the internal campus review and approval process which has occurred prior to submission to the Commissioner's Office. Indicate, where appropriate, involvement by faculty, students, community members, professional constituencies, etc. | | |
| The organizational development and sustaining approach of the Center were conceived during the proposal development and submission process to the US Army Corps of Engineers RFQ. This was done in cooperation with the UM President and Vice President for Research and Creative Scholarship, the Provost, the Deans of the five Colleges numerated in the Advisory Council (above), and with the collaboration of the ten Associate Directors of CIRE listed on the Organizational Chart and above in Section 3.A. | |