Wyoming Reclamation and Restoration Center
Strategic Plans

MISSION AND ASPIRATIONS: To pursue and disseminate impartial, scientifically-based research information related to the reclamation, rehabilitation and restoration of disturbed ecosystems; to educate students so that they will be able to analyze, synthesize and integrate findings, results and related research for use in protecting and improving Wyoming and western U.S. ecosystems; and to serve as a resource of Wyoming citizens and communities, state and federal agencies, and private industries requiring assistance in reclamation science and ecological restoration endeavors (from the WRRC origination proposal approved by the University of Wyoming in October of 2002).

We aspire to be the most objective and influential center for restoration, reclamation, and rehabilitation of disturbed ecosystems in the Northern Rocky Mountains and Northern Great Plains Regions. Our objectivity and influence shall be based on sound ecological, agricultural, and economical practices.

The vision is broad and ambitious, but for Wyoming makes absolute sense. Wyoming is nearly 100,000 square miles of the most important and ecologically noteworthy landscapes on the planet and arguably the highest concentration of mineral and energy resources on the planet as well. Wyoming's citizens are perched atop vast coal, natural gas and petroleum reserves but too are surrounded by cherished landscapes. A relatively low population of human beings share these landscape with wildlife resources of international acclaim. Responsible and ecologically sound development of the energy, the trona, and the bentonite resources of this state is the obvious challenge. Of no less importance are restoration activities and monitoring associated with range and forest fire, erosion exacerbated by over grazing, perturbations induced by climate change and water quality issues connected with energy development, agriculture and municipalities. The charge comes wrapped in a complex ecological and political cloak where contentious circumstances are the norm and unfamiliar terrain familiar.

PREVIOUS PLANNING AND ACCOMPLISHMENTS: Although organization of the WRRC was approved in 2002, the history of mine land reclamation research and education at UW goes back at least 40 years (May, 1967; Lang et al., 1975). Even after its official inception, the WRRC was only loosely functional until late in the Spring of 2007. At that time the new School for Energy Resources had been approved, and S. E. Williams was appointed as WRRC director. Physical space, organizational funds and a first charge for the center were provided by the College of Agriculture Dean, Frank Galey. During the period since Spring of 2007, the first full time director of SER (Mark Northam) was appointed. His vision that reclamation and restoration must be a component of SER's effort has spurred efforts to more fully functionalize the WRRC. To this end (1) an office has been organized and refurbished, (2) the Director has had his job description revised to reflect a 30% administrative appointment and 10% service appointment, all to be devoted to the WRRC administration, (3) a half-time office manager has been employed, (4) an extension effort has been initiated to provide State-of-the-Art reviews germane especially to the Oil and Gas Industry, (5) the undergraduate minor and graduate certificate in restoration ecology have been audited and organized, (6) research partnerships with industrial and governmental entities have been explored, (7) research initiatives have been advanced mostly through the SER competitive matching grants program, (8) efforts have been made to secure more permanent funding for the center (e.g. through endowment efforts of the College of Agriculture as well as a proposed appropriation of State of Wyoming funds), and (9) a structure has been designed and membership postulated for a group of professional to provide guidance to the WRRC.

These efforts were necessary to bring this Center to an active level of physical and organizational existence so that its mission could be realistically addressed. The efforts to date do not represent a necessarily strategic effort. This document establishes a strategic framework for the WRRC.

RELEVANT INSTITUTIONAL ISSUES: The WRRC connects to the University's planning effort in that it addresses (from Motif 2 in *Creation of the Future 3, Office of Academic Affairs -August 2008* [COF3, OAA-2008]) two items*: Environment and Natural Resources*, and *Positions Critical to the State and Region*.

ENVIRONMENT AND NATURAL RESOURCES: Currently there are few topics in the state and region more germane to the citizens than reclamation of disturbances related to energy and mineral development. Many people see these disturbances as having negative impacts on wildlife and indeed it is this impact that most often resonates with many people in the State as well as across the World. However, the impact is more pervasive.

Surface soil and vegetation are disrupted by mineral and energy development. These fundamental resources are at the base of wildlife habitat and thus maintenance of wildlife populations.

Due to Wyoming's landscape and climate reclamation of these mineral and energy related disturbances is fraught with problems. Many persons who come to this area seeking work in reclamation are of the opinion, "how hard can this be?" But incidences of reseeding three to five times and still failing are common. Invasion by noxious and toxic invasive plants is the norm, not the exception. Soils too salty to support plant life lurk just below the surface.

It is not that reclamation of these harsh zones is impossible. Much of what is needed for successful reclamation of say sagebrush steppe, is known but is not getting into the reclamation industry or at least not uniformly. There are other technologies that are poorly developed including seed availability for many very important forbs and shrubs. The use and abuse of fertilizers is problematic, some recommend irrigation of disturbed sagebrush sites, but then what happens when the water is turned off, as it must eventually be? There are abundant wildlife issues, invasive species issues, and topsoil problems. Many facets of these problems have been resolved, but others demand concentrated research.

POSITIONS CRITICAL TO THE STATE AND REGION: Through the Undergraduate Restoration Ecology Minor and the Graduate Reclamation Certificate, the WRRC is promoting the education of the next generation of reclamation scientists and practitioners that will regulate, engage in, and see the success of reclamation efforts across the state and region. Already in the state there are dozens of UW graduates at work in the culture and business of reclamation. These people come largely from the Range Ecology and Soils programs, but also from Botany, Zoology, Plant Sciences and others. Any undergraduate student from any discipline can earn the minor or any graduate student similarly can earn the graduate certificate.

OTHER RELEVANT THEMES: The mission of the WRRC echoes phraseology of the University Mission (COF3,OAA,-2008): "education," "scholarship," "technology transfer," "economic development," "stewardship of natural resources." And although Motif 1 of COF3,OAA,-2008 suggests a tension between expanding the breadth of the University and developing its depth, the WRRC can be conceptualized as organizing existing breadth across the University and taking it to new depths. In this regard the WRRC will (see Motif 4) focus "on areas of inquiry relevant to the state and region." Further, also from Motif 4, the role of the WRRC will highlight Wyoming's role as a natural laboratory in which to explore pressing issues confronting the world at large. The faculty foundation and curricular diversity to support the WRRC already exists, and will be enhanced by addition of the Restoration Ecologist position.

The University of Wyoming is positioned to become the regional leader in reclamation and restoration of ecosystems. The issues that are being addressed currently are only a small subset of those that have the potential to be addressed across the spectrum that includes reclamation and restoration. If the WRRC attains appropriate funding, a plethora of issues can be addressed. Addressing these issues through graduate and undergraduate education has the important spin-off of trained students ready to enter the employment ranks of government, industry and academe. Too, there are issues somewhat more basic to the understanding of science and the functioning of ecosystems in the state and region that need to be addressed and should be so addressed at least in part under the auspices of the WRRC. Examples include basic research on the biology of invasive species, monitoring parameters related to changing climate and how energy development related fragmentation of land impacts wildlife species including non-game species such as the Wyoming Pocket Gopher. However, perhaps the most overlooked aspects of especially the reclamation industry are fundamental costs especially in the oil and gas sector. Costs required for reclamation of surface mines are well known because they form the basis of bonds required by regulating entities and are mandated from the Surface Mining Control and Reclamation Act (SMCRA, U.S. Congress, 1977). In the oil and gas industry, these costs are not well established or at least they are not well known largely because the bonding scenario is not well defined. Further, there is no equivalent of SMCRA pertaining to the oil and gas sector.

The salient point here is that a general leadership void exists regarding reclamation and restoration, of applied and basic approaches, and of many economic aspects of direct and indirect effects of energy development in the Ecological Sites that define Wyoming and adjacent states. Comprehensive state and/or regional leadership, however, has been slow to develop. With the strong commitment of the College of Agriculture to Reclamation and Restoration (e.g. through Cooperative Extension's Sustainable Management of Rangeland Resources–SMRR–

initiative), the strong focus on science and policy from both the Ruckelshaus Institute and Haub School sectors of the Environment and Natural Resources program, and the strong commitment of SER to the WRRC, the stage is set for UW to take a leadership role in Reclamation and Restoration.

ACTION ITEMS:

1. Stabilize funding for the management and secretarial staff of the Center. The staff of the Center constitutes a half time office manager and the director, who officially dedicates 40% of his time to administration of the center. One or two graduate assistantships attached to the Center would provide opportunity for a somewhat expanded research role.

2. Outreach and extension activities. Develop an outreach program to bring what is known about reclamation into a mode easily digested by the reclamation and restoration minded public. A year's funding for a postdoctoral student to assist with State-of-the-Art was provided by SER. This has helped leverage two years of funding for an extension/outreach function through the UW Cooperative Extension Service to not only continue State of the Art publications addressing reclamation issues, but also planning and implementation of training for persons in the reclamation industry. It is important to continue this effort beyond the next two years

3. Accelerate research agenda. There are documented needs for research in various aspects of reclamation including topsoil handling, topography of spreading topsoil, seed quality and availability, use of livestock to enhance the initial reclamation effort, impacts of energy development on wildlife, off-site mitigation of on-site activities, down-stream effects of energy development, reclamation of abandoned mines on public lands, impacts of overland vehicles of ecosystems, fire, etc. Efforts have been made to address some of these issues through liason with the oil and gas industry (e.g. through the Petroleum Association of Wyoming), through the Wyoming Mining Association, with various governmental agencies (e.g. federal BLM, USFS, NPS and others) as well as State Agencies (e.g. DEQ). Most research where WRRC is a partner is through the matching program sponsored by SER.

4. Successfully complete the search for the Restoration Ecology Position (an SER position). A search effort was made unsuccessfully this past year. A second effort is soon to be underway.

5. Audit and promote the Undergraduate Minor and the Graduate Certificate. A partial audit has been completed, but we continue to find students in these programs that we have not been tracking. Also, a more aggressive promotional campaign needs to be instituted.

6. Stronger coalition with ENR and the Wyoming Conservation Core (WCC). Ties of WRRC with ENR have been good, but there appears to be potential for stronger ties including using the WCC to assist in research, and perhaps outreach activities. Already WCC assisted in a large soil sampling campaign this past spring with EnCana Oil & Gas, USA and the WRRC in the Jonah Field.

7. Stronger ties with entities in the GYE. The geography of Wyoming makes it difficult for UW to easily access the Greater Yellowstone Ecosystem of NW Wyoming. Yet this area is an epicenter of research, education and outreach that has few equals on the planet. We miss opportunities that other universities take advantage of continuously.

8. Focus on utilization of the chain of UW experiment stations in research, and educational efforts.

9. Cultivation of Leadership. Be a leader in providing and certifying existing information but also an epicenter for creating new knowledge to address the concerns of industry, government and private citizens. Further, UW has the programmatic and faculty capacity to cultivate new leadership in this arena through a diversity of departments across several colleges. This strong focus on cultivation of leadership is consistent with Motif 5 of the COF3, OAA, 2008.

IMPLEMENTATION (over the next 5 years)

1. Stabilize funding for the management and secretarial staff of the Center. This is an on-going effort lead in part by the College of Agriculture Leadership, but to date mostly funded through SER. Target: 18 months (March of 2010).
2. Outreach and extension activities. There is good support from UW Cooperative Extension, and prognosis for continued support is good. Target: 24 months (October of 2010).
3. Accelerate research agenda. Continued success of matching proposals through SER is good, but securing industry match is becoming problematic. Needed is an industry committee to consider proposals. Probability of securing endowment funds is unknowns, but there is a strong effort on-going through the College of Agriculture. Probability of securing support from the State of Wyoming is unknown, but there is considerable activity. Ramping up funding requests to outside agencies is a tact needing more effort. Target: Continuing through the entire five years.
4. Successfully complete the search for the Restoration Ecology position. Target: 18 months (March 2010)
5. Audit and promote the Undergraduate Minor and the Graduate Certificate. Target: Continuing through the five year period.
6. Stronger coalition with ENR and WCC. There is considerable opportunity here especially with changed leadership in ENR and stronger ties being developed with WCC. Target: Continuing through the five year period.
7. Stronger ties with entities in the GYE. Progress is being made with especially Teton Park and Bridger Teton National Forest. Target date for a funded contract of 24 months (October 2010).
8. Focus on Experiment Stations. Target: Continuing through the five year period.
9. Cultivation of leadership. Target: Continuing through the five year period.

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