Project Completion Report
Rocky Mountains Cooperative Ecosystem Studies Unit (RM-CESU)

Project Title: Collecting the Intermountain Region's Greenhouse Gas Emissions

Project Code : MSU-211, J1247100003

Type of Project Research & Technical Assistance, interns education

Funding Agency: National Park Service

Partner University: Montana State University

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Start Date of Project: May 1, 2010

End Date of Project: March 1, 2011

Funding Amount: $30,005.00

Project Summary:

Two MSU grad students participated in the project, Adam Hawks with the Engineering Department and Richard Dykstra with the School of Architecture. The interns finished the majority of data entry and analysis for the Climate Leadership in Parks (CLIP) tool, and also completed sustainability summaries for each of the parks they visited. They both attended the training and closing session, and were a delight to work with throughout the summer. They were ambitious, incredibly hard-working, considerate, and willing to listen to park staff comments and the small details.

Dr. Rifki was supportive and interested in the intern's progress throughout the project. In addition, we discussed opportunities for future collaboration throughout the internship, and are currently working on another agreement between MSU's School of Architecture, the Engineering Department, and NPS. Sharon Matney, assistant to the School of Architecture, was a tremendous help to both the students and I throughout the internship. She was patience, concerned, and a joy to speak with. The MSU staff and students commented on how pleased they were to have the opportunity to work across departments, and explained this was the first project in which the School of Architecture and the Engineering Department have had the opportunity to collaborate.

In reference to the tasks set aside in section III of the agreement the interns fulfilled them according to the list below:

1. Enter data into CLIP (Climate Leadership in Parks) tool
    a. Water consumption – Yes, they did a great job of tracking down water consumption at the parks they visited. This wasn't an easy or straight forward job, and I appreciate their efforts.
    b. Scope 1,2, & 3 greenhouse gas (GHG) emissions updates – Yes, majority has been completed

2. For parks with submetering -
    a. Identify which meters go with which buildings – Interns identified whether parks had sub-metering or not, and when possible identified which meters went to which buildings.
    b. Enter information and calculate GHG – N/A

3. For parks **without** submetering – Yes to some extent – interns were able to use FMSS reports to learn more about assets and then record these.
    a. Look at FMSS location & assets reports
    b. Check if existing info regarding HVAC, etc is accurate in FMSS – update in FMSS
    c. Collect information regarding the following: lighting, water heaters, plumbing information, (water consumption where possible), and if interested plug load data

4. Thermography – Richard and Adam received training in thermography while in Denver, and were able to capture some important images to share with park staff and in their reports.
    a. Take pictures and download to disc for park use
    b. Meet with facility manager to describe photos

5. Sustainability suggestions – Yes, they developed summaries for each park discuss 'low hanging fruit', the park's best practices, a review of their meeting with park staff, as well as other important photographs and information. The reports are professional and show their dedication and hard work throughout the summer.
    a. Look at emissions related to one product which is used across all parks – selected depending on park info / 3 options
    b. Written suggestions for the park to improve overall sustainability and identify 'low hanging fruit'

The CLIP tools and summary reports have been posted on the following sharepoint site http://inpniscsmoss:3000/sites/IMR/sustain1/default.aspx, and the link has been sent to all IMR parks which they visited throughout the summer.

The National Park Service 2010 Sustainability Internship Program at Montana State University provided an excellent opportunity for graduate students to gain a diverse array of professional work experience in the rapidly growing field of Building Industry Sustainability. At the forefront of this invaluable work experience was the profound opportunity to participate in a collaborative and integrated work environment where a team of architecture and mechanical engineering students worked together to resolve sustainability issues in the built environment. Gaining experience in this area has often proved extremely difficult to attain. Furthermore, the internship provided the opportunity to expand the partnership between the National Park Service and MSU by offering specific building design opportunities as a part of the students' continuing education curriculum. This coursework is administered under the auspices of the School of Architecture's Community Design Center and provides architecture and mechanical engineering students an enhanced experience in an integrated design environment as well as maintaining an established working relationship with the National Park Service that could potentially open doors for future employment.

The overarching goal of this first cooperative sustainability internship project was to estimate Greenhouse Gas Emissions and water consumption as part of an overall effort to quantify the Carbon

Footprint for all of the Intermountain Regional National Parks over the summer of 2010. The first phase was for the interns to attend an extensive three day orientation and training session in Denver, Colorado in mid May. Instruction and preparation included wide- ranging information on the Climate Leadership in Parks (CLIP) tool software, current sustainability efforts within the National Park Service, sustainability measuring tools and an introduction to systems thinking, an introduction to energy modeling techniques including thermal imaging, how to effectively communicate with National Park Staff as well as cross-cultural communication, the Secretary's Standards for Historic Properties, the embodied energy in historic structures, the concepts of biomimicry, the NPS Climate Response Strategy, NPS Facility Management and Fleet overview as well as National Park Service history and work culture.

After this training was complete, a whirlwind tour of 12 National Parks commenced. For the MSU team this included visiting Parks in Montana, Wyoming, Oklahoma and Texas between late May and mid August 2010. A typical visit lasted anywhere from three days to a week, depending on the size and needs of the particular Park. While at each Park, the typical work scenario included first gathering all of the available data and information that Park personnel provided and then formulating a plan of attack based on the quality and quantity of that information. From there, the CLIP tool software was completed to the highest possible degree and initial numbers were generated for GHG emissions. The next step typically was the review and verification of FMSS and historical energy data while simultaneously touring as many Park facilities as reasonable possible. While touring the interns were extensively engaged in photographing (including thermal imaging) buildings and facilities as well as brainstorming ways the Park could potentially improve in terms of sustainability. Finally, the interns began the formidable process of producing a final report for the Park, which was often not completed until after they had moved to the subsequent Park. Ultimately, the information gathered and included in the final reports was a part of a larger effort to help direct each Park toward a more sustainable future.

In supplement to the standard park work duties; an opportunity to attend, receive additional sustainability education and training as well as give a presentation at the National Park Service Intermountain Region Sustainability Workshop was afforded in late July. The agenda at the Workshop included additional systems thinking training, an NPS Green Parks Plan update, IMR regional sustainability program goals update, prioritizing IMR regional sustainability actions and goals for 2011 and 2012, as well as an internship progress and status report. The presentation was given on how to implement passive design strategies to help the Parks meet sustainability goals.

Once all of the Parks were visited, the interns reconvened in mid August at Rocky Mountain National Park outside of Boulder Colorado to share their experiences, best and worst practices witnessed, and overall lessons learned over the course of the summer. Following this gathering, the group then gave a closing presentation to IMR personnel at the Regional Office in Denver.

In conclusion, it quickly became apparent that some Parks were more sustainable than others and some Parks needed far more help in reaching sustainability goals than others. This was especially true of the Parks in Oklahoma and Texas where the local residents do not have a culture of sustainability as do the local cultures of the Northwest. It would be the hope that the partnership between MSU and the National Park Service continues to provide collaborative internship opportunities in some form into the future. Since the 2010 effort was to establish baseline numbers, there would be little need to repeat that effort initially. However, in three to 5 years a follow-up effort that reproduces the same work effort in order to identify progress toward sustainability goals for each Park will be needed. The same effort should be duplicated again at regular intervals to measure progress. In the meantime, intern's efforts could be focused more specifically on helping those Parks with the most need as a portion of a greater effort to help all of the Parks meet the goals set forth by the recommendations of this internship.