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

Project Title: *Using National Agricultural Imaging Program (NAIP) Color-Infrared (CIR) Imagery and Image Analysis Protocols to Monitor Land Cover and Habitat Change at Grand Teton National Park*

Project Code: P11AT00196 UWY-146, PR # R1242110012 and R1242110013

Type of Project (Research, Technical Assistance or Education): Research and Technical Assistance

Funding Agency: National Park Service

Partner University: University of Wyoming

NPS Agreement Technical Representative: Kathryn Mellander, GIS specialist, GRTE

Principal Investigator: Eli Rodemaker, Research Scientist, WYGISC

Start Date of Project: May 1, 2011
End Date of Project: March 31, 2012

Funding Amount: $15,000

Project Summary and Status

The following project has been completed. A final report detailing the procedures followed is attached to this completion memo. The remainder of the project's products is a set of digital files of the interim and final classification images of vegetative communities classified from the 2009 NAIP CIR image.

This project's objectives were a set of remote sensing protocols for characterizing sagebrush steppe habitat cover and for assessing habitat change at the alpine/subalpine interface using image processing methodology and 2009 color-infrared (CIR) NAIP aerial imagery. Protocols were produced in the form of computer models and full documentation (including help files and SOPs), for eventual NPS in-house use.

An additional major product of this work was to include transfer of technological knowledge for in-park implementation of protocols for using remotely sensed imagery to monitor changes in habitat over time for Grand Teton National Park. The draft protocol will include a replicable methodology as well as discussion of results and conclusions of method trials (including feasibility and overall utility of the protocol).

The Principal Investigator delivered the results of preliminary model trials and instructed NPS GIS staff in their use and results of various trials in early August, 2011. The products of the initial protocol tests were images classified for vegetation community type and cover class, using a set of combined spatial and spectral metrics. These classified images will serve as the baseline habitat maps for future comparison with CIR NAIP imagery as it is available. The next set of

imagery was flown in 2012, and will be used in early FY 2014 to replicate the methodology used in this project, to produce comparable classified maps. Development of change analysis models will be the subject of future projects, although Dr. Rodemaker has provided guidelines from this and prior projects that will be used by the park staff.

Project trials included the use of different model scales and resolutions (discussions of obstacles in processing capabilities of computers available to NPS staff), and feasibility of the spatial-spectral metrics for this project. UW and NPS staff conducted joint field visits to verify results of the models during Dr. Rodemaker's trip to the park in August, 2011. Meetings with the park vegetation ecologists to look at the draft results were also held. The protocol models and initial process documentation were delivered and approved by NPS in September, 2011.

Number of students participating in this project: undergraduates, graduate students, degrees conferred.

None. The Principal Investigator for the project, Eli Rodemaker (Research Scientist and UW Department of Geography PhD student), did the great majority of the work for this project. His prior work using NAIP imagery and conducting analysis on sagebrush steppe habitat characterization and change, as well as forested area habitat analysis, was very valuable in guiding NPS staff in defining the project objectives. This project builds on the body of related research that WYGISC has conducted, in habitat characterization and change analysis throughout the region.

<u>Lessons Learned from this project:</u>

(not completed by park)

<u>Other RM-CESU agencies or research partners who participated in this project:</u>

None