WyomingView FY 2003 Grant Final Report

Member Institution: Wyoming Geographic Information Science Center, University of Wyoming – WyomingView (WYView)

Grant Period: September 25, 2003 – September 24, 2004

Grant Number: 03HQGR0146

Grant Title: WyomingView: Promoting the use of remotely sensed data in Wyoming through education, outreach and data access.

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Overall Grant Deliverables:

Program Development

Objective 1. Continue the development of WYView consortium

Goals/Activities:

- Visit federal, state and local government agencies in Casper, Wheatland & Torrington , Cody, Thermopolis, Pinedale, Jackson, and Farson

Objective 2. Continue the outreach efforts using the data resources provided by the Upper Mid-west Aerospace Consortium (UMAC).

Goals/Activities:

- Meetings with Farmers in Wheatland area
- UMAC meeting in North Dakota
- Meetings with Farmers in Farson area

Objective 3. Identify opportunities through campus interactions

Goals/Activities:

- Seminars in academic departments on campus
- Graduate student research activities

Objective 4. Present WyomingView activities in conferences

Goals/Activities:

- Southwest GIS Users Conference
- ASPRS 2004

Objective 5. Administration

Goals/Activities:

- Summarize the responses from the Needs Assessment Survey
- Identify specific goals for FY05

Technical Development

Objective 1. Modify GloVis code and deploy WyoVis

Goals/Activities:

- Prototype development
- Deploy and refinement (if necessary)

Objective 2. Continue to obtain data through UMAC to support WY farmers and ranchers
Goals/Activities:

- Summarize activities from past year and submit proposal for 2004 crop growing season
- Obtain and distribute Landsat imagery

***Objective 3*.** Continue to modify and add content to the WYView webpage
Goals/Activities:

- Update contents as needed
- Release new webpage by the end of funding year (v.3)

***Objective 4*.** Continue to obtain and or download Landsat and MODIS data
Goals/Activities:

- Obtain new and existing Landsat data from the USGS or consortium partners
- Download new MODIS data for Wyoming from EDC

***Objective 5*.** Develop interfaces for distributing ASTER data
Goals/Activities:

- Obtain ASTER data downloaded by Dr. Ron Marrs' graduate students
- Update necessary scripts to distribute ASTER data through WYView webpage

Education and Training Activities
***Objective 1*.** Continue remote sensing training activities

- Conduct introductory remote sensing workshops on project management
- Develop and conduct digital photogrammetry workshops

Research and Technology Transfer
***Objective 1*.** Initiate pilot research projects
Goals/Activities:

- Test the utility of Landsat data for monitoring rangeland vegetation. Partner: USDA-ARS Cheyenne
- Test the utility of Landsat data for identifying conifer encroachment within pine stands. Partner: WY Game & Fish
- Continue to support UW faculty members on their international projects aimed at mapping locust habitats in Kazakhstan.

Objective 2. Continue to provide technical support for BLM, NRCS and USDA-FS personnel.
Goals/Activities:

- Provide technical support (through emails and phone calls) to resolve image processing issues and answer other technical questions.

Status of Budget:

Category	Budgeted	Spent	Remaining
Salaries	43806	43806	0
Fringes	15332	15332	0
Subtotal, Payroll Expense	59138	59138	0
Travel	7662	7662	0
Supplies	4800	4800	0
Equipment	-	-	
Contracts	-	-	
Scholarships/Assistantships	-	-	
Other	-	-	
Subtotal, Other Expenses	-	-	
Cost Indirect (NTE 25%)	17900	17900	0
Total	89500	89500	0

Textual Description of Activities for the Project Year:

Part A. Program Development

Objective 1. Continue the development of the WYView consortium

In January 2004, the USDOI – Bureau of Land Management, Wyoming State Office and all its district offices in Wyoming became a WyomingView consortium member. The MOU was signed on January 28, 2004 between the BLM Wyoming State Office and UW.

In February 2004, the USDA – Natural Resources Conservation Service, Wyoming State Offices and all its district offices in Wyoming became a WyomingView consortium member. The MOU was signed on February 19, 2004 between the NRCS and UW.

In April 2004, the State Engineer's Office (SEO) in Cheyenne and all of its district offices throughout Wyoming became a WyomingView consortium member. The MOU between the SEO and UW was signed on April 28, 2004.

In May 2004, the USDA – Forest Service Region 2 (Rocky Mountain Region, Lakewood Colorado, became a WyomingView consortium member. The MOU was signed on May 3, 2004.

Objective 2. Continue the outreach efforts using the data resources provided by the Upper Mid-west Aerospace Consortium (UMAC)

We obtained several Landsat scenes through our participation in the UMAC. In addition to Landsat data, UMAC also provided outreach materials (handouts and brochures) that highlighted the use of satellite data for agricultural applications.

Dr. Sivanpillai attended the UMAC annual meeting in Grand Forks, ND to identify additional opportunities for collaboration between WyomingView and UMAC. UMAC is interested in assisting farmers and ranchers with the use of Landsat (or other satellite) data.

Objective 3. Identify opportunities through campus interactions

Dr. Sivanpillai presented a seminar in the Renewable Resources Department on Sept 19, 2004 on resources available through WyomingView for research and teaching.

Dr. Sivanpillai continues to work with faculty members and researchers to identify opportunities for remote sensing research and education. Currently, Drs. Latchininsky, Miller, Larson and Buss have initiated collaborative work through WyomingView. Our goal is to identify other faculty members conducting geospatial research who might be interested in using remotely sensed data. Dr. Sivanpillai presented opportunities through WyomingView to faculty and students through various departmental seminars on campus.

We are collaborating with Dr. Latchininsky to map grasshopper habitat in Central Asia (Kazakhstan, Uzbekistan, and Russia) with shared support between UMAC (*travel*) and WyomingView (*partial salary support*). Sivanpillai traveled to Kazakhstan last summer for this work and will visit Uzbekistan this summer.

We are also supporting a UW graduate student (Ms. Tracy Baldgya) by providing technical assistance for land cover mapping in a Kenyan watershed. Dr. Miller is the student advisor and his work involves modeling watershed hydrology. International projects offer exciting opportunities for students and are high profile in that they draw attention both to the WyomingView program and to remote sensing applications.

We are collaborating with Dr. Larson to use remote sensing for mapping dune complexes in western Wyoming that are associated with archaeological sites. This work is just getting underway but represents a new area of collaboration for us (anthropology).

Objective 4. Present WyomingView activities in conferences

Sivanpillai presented about WyomingView consortium at the Southwest GIS Users Conference (SWUG) in Jackson Hole, WY. This presentation was well attended by participants from WY and several adjacent states (UT, CO, ID and MT).

Driese presented WyomingView activities in the ASPRS 2004 annual conference in Denver, CO (please see attached pdf file for the paper that appeared in the ASPRS 2004 conference proceedings).

Objective 5. Administration

We received only 25% of the needs assessment surveys that were distributed during the outreach activities. Therefore we could not generate a comprehensive report of the requirements of various federal, state and local government agencies. We continue to receive

feedback about the length and purpose of the NAS and we may conduct another survey in 2-3 years.

Lesson learned and changes for subsequent years: We are continuing our outreach activities through face-to-face meetings. We have adopted an outreach strategy designed to reach targeted audiences at meetings and conferences. Earlier we were meeting personnel from one agency at a time, but this new approach allows us to reach more people efficiently, and to provide information by specific themes.

Part B. Technical Development

Objective 1. Modify GloVis code and deploy WyoVis

We have successfully implemented the Wyoming version of GloVis, ie.,WyoVis, during this fiscal year. Wyoming is the 4th state to successfully implement this browser tool. Users can browse and order LANDSAT data through this tool at http://www.wygisc.uwyo.edu/wyovis. We have provided the information about our data holdings to the AVVis (national browser for all AV membership holding) so users can browse our archive through multiple sites.

In order to fulfill our need, we developed a simple, web-based interface (http://www.wygisc.uwyo.edu/wyview/data.html) allowing users to browse and order imagery from our archive. Currently, data are ordered via e-mail or web-form, providing us with a mechanism for tracking data users and applications. We supply imagery either by ftp or on CD/DVD if requested. Our ftp server has been operational since August 2003. Requests for data during the last year came from several states in the U.S. (CO, ME, MT, PA, TX, UT and VA) and Canada. To date, we have delivered 235 LANDSAT scenes or 131GB of digital data to various users (Table 1) and ftp data download option accounted for about 76% of the requests.

Table 1. Landsat data (scenes) distribution through WyomingView

File transfer protocol	178
CD-ROM	31
UW-Students (CD loan)	26
Total	**235**

Objective 2. Continue to obtain data through UMAC to support WY farmers and ranchers

Through our participation in the Upper Midwest Aerospace Consortium (UMAC) we have received ***15*** LANDSAT 5 scenes for 2004 which have been added to our archive. We provided these images to farmers (in Farson, WY) through the local NRCS office and also to a various land management agencies (BLM, NRCS and ARS).

Objective 3. Continue to modify and add content to the WYView webpage

We redesigned the data distribution page (as described in objective 1, under Technical Development section above) and also information about consortium members, and upcoming events. We solicited input from our members for additional needs and modifications to our webpage. One of the suggestions was that we combine our Landsat 5 and 7 data holdings in a single webpage rather than listing them separately. Based on this input we decided to combine our Landsat data holdings based on WRS1 and WRS2 schemes instead of listing them by satellites or sensors.

Objective 4. Continue to obtain and or download Landsat and MODIS data

One of the highlights of WyomingView data archive and distribution site is that, we provide data in ERDAS Imagine ™ or GeoTIFF formats. This enables users in government agencies, academic institutions and private companies to save time associated with importing data from multiple files and formats. We imported and compressed all the Landsat data we obtained from UMAC and other sources.

We are also in the process of downloading Landsat data (1980s, 1990s and 2000s) from the Global Land Cover Facility at the University of Maryland. Format conversion is not complete for all the scenes but we expect to complete it in the next funding year.

We are downloading MODIS scenes from the EDC direct broadcast website. We will be clipping these scenes based on a buffered boundary for our state. Users can browse the images and directly download the files without submitting any request.

Objective 5. Develop interfaces for distributing ASTER data

Since the ASTER scene footprints are not fixed like Landsat, we have asked our users (mostly BLM, WGF, NRCS and ARS, our consortium partners) for input on data browse and order interface. Several suggestions have been made. One suggestion is to include them in WyoVis and not provide a second interface similar to the one we offer for Landsat. The second suggestion was to create a shapefile of polygons corresponding to the scene footprints. The IDs of these polygons will be the ASTER scene ID. Users can search geographically and also obtain pertinent scene information. We plan to implement these suggestions in the upcoming fiscal year.

Part C. Education and Training Activities

Objective 1. Continue remote sensing training activities

During the 2nd half of this funding year we concentrated on developing the following short courses to meet the needs of our consortium members:

1. Remote Sensing Basics and Project Management: This 1 day workshop focuses on the basics of remote sensing and provides insights about various steps of putting together and managing a remote sensing project. Course materials include different sources of

imagery and technical components of a request for proposals. The BLM and NRCS personnel provided valuable feedback for developing these courses.

2. Introduction to free-ware data viewers: This 1 day workshop trains participants in viewing and manipulating satellite images using the ERDAS ViewFinder ™ (VF) software. ERDAS VF software is available free of charge. This course targets personnel who have some interest in satellite imagery but do not have the resources to purchase fully featured software such as ERDAS Imagine or ArcGIS.

These courses will be offered to personnel in all government agencies and anyone who is interested in attending. Project leaders and specialists will be targeted for course #1, whereas field specialists and biologists will be targeted for course #2.

We were not successful in offering the digital photogrammetry workshops due to lack of interest. We assume after the c.2002 DOQ Quads are released for general use, there will be interest from the user community.

Additional activities conducted but not proposed in the RCA:

a. Dr. Driese will offer a graduate seminar series titled "Advanced Topics in Remote Sensing" for the spring (2005) semester that will expand current remote sensing offerings at UW. This addition to the UW curriculum is results directly from AmericaView support.
b. We have finalized the details of the WyomingView scholarship program. For 2004-2005 academic year we are offering scholarships jointly with the Wyoming Space Grant Consortium (WSGC). WSGC has been offering scholarships to support graduate and undergraduate student research activities and has funded some remote sensing research activities in the past. WyomingView is augmenting this program by providing funding for two additional $1000 scholarships. Students will submit one application for all available grants and WyomingView will select two remote sensing research proposals for funding.

Part D. Research and Technology Transfer

Objective 1. Initiate pilot research projects

a. **USDA-ARS**: We have been working with the ARS High Plains Grassland Research Center in Cheyenne to test the utility of Landsat data for monitoring and estimating vegetation in rangelands. ARS is currently using costly, high resolution aerial photographs for this task. Incorporating satellite data reduces the cost and time required for developing estimates of plant cover in rangelands. The first phase of this work was presented at the Society of Range Management meeting in Salt Lake City, UT last January, and we are currently working on the manuscript which will be submitted to the *Journal of Range Management*. The second phase of this work was presented at the ASPRS Annual Conference in Denver, CO in May 2004.

b. **WG&FD:** Mapping the extent of conifer encroachment into aspen stands is a priority for the WGFD Jackson field office. WGFD personnel conducted a field survey in the summer of 2003 to collect ground data describing aspen/conifer mixtures in Jackson Hole, Wyoming. Using statistical techniques we tested the Landsat-based class separability between pure aspen stands and those mixed with conifers. We submitted a proposal to the Elk Foundation (an active funding organization in Wyoming) to secure funding for extending this work into a portion of the Bridger-Teton National Forest. We also continue to support the WGFD in many of their remote sensing efforts and have been instrumental in 1) advising them on image classification issues, 2) connecting them to other groups in the state with similar goals thus reducing redundant projects, and 3) performing mapping projects directly. We currently are conducting a cumulative impacts analysis on SE Wyoming shrublands and building a database in support of moose habitat modeling for the WGFD in collaboration with UW faculty and grad students.

c. **BLM:** In the fourth quarter, the BLM awarded a technical contract to Sivanpillai and Driese to test the utility of LANDSAT data for mapping cheatgrass in NW Wyoming.

d. **UW Department of Anthropology:** We are collaborating with a professor in the UW Dept. of Anthropology to use remote sensing for mapping dune complexes in western Wyoming that are associated with archaeological sites. This work is just getting underway but represents a new area of collaboration for us (anthropology).

e. **UW Department of Renewable Resources:** We are collaborating with a professor in the UW Dept. of Renewable Resources to map grasshopper habitat in Central Asia (Kazakhstan, Uzbekistan, and Russia) with shared support between UMAC and WyomingView. Sivanpillai traveled to Uzbekistan during the 4th quarter to conduct workshop on remote sensing and to collect field data regarding locust habitats. We also submitted an abstract to the upcoming ASPRS conference in Baltimore, MD regarding our locust habitat mapping work.

***Objective 2*.** Continue to provide technical support for BLM, NRCS and USDA-FS personnel.

a. The Wyoming State Office of the BLM is a consortium member and an active partner in remote sensing research and we enjoy a mutually beneficial relationship with them. We have provided imagery and technical advice in support of a cheatgrass mapping project being conducted by BLM personnel.

b. Direct support by AmericaView supported a visit by Dr. Sivanpillai to the USGS EROS Data Center where he met with Collin Homer of the USGS about opportunities for UW support of ongoing NLCD activities. Specifically, we collect lots of field data during our remote sensing research that will be of use to the NLCD program. Currently, we have collected more than 300 ground reference data points from BLM, and other ongoing research projects at WYGISC. We will be providing this data to Mr. Collin Homer, Deputy Manager at EDC in September 2004, for calibrating the NLCD dataset. We are

talking to other agencies and NGOs to obtain additional ground reference data for the above set purpose.

c. Importantly, it should be stated that USGS/AmericaView funding is primary support for Dr. Sivanpillai who coordinates the WyomingView Program and conducts extensive outreach and networking in Wyoming towards the general objective of promotion of remote sensing technology as a tool for a variety of applications. The progress that has been made in the last two years in general and in the current funding period has been significant and in many ways is difficult to express in tables and charts—the awareness of remote sensing in Wyoming and the level of excitement about remote sensing has increased noticeably as a result of Sivanpillai's efforts. Additionally, opportunities for leveraging AV support through other proposals are increasing rapidly. Other pending proposals are for specific research applications and are largely possible due to support of Sivanpillai.

Other WYView Activities and Items of Information

1. Kenneth L. Driese presented a paper on WyomingView at the 2004 ASPRS annual conference at Denver, CO.

2. Kenneth L. Driese and Ramesh Sivanpillai attended the AmericaView winter business meeting at USGS Headquarters in Reston, VA, on February 11, 2004. We presented a poster on WYView activities during the Congressional reception at the Rayburn Building on February 12, 2004 (pictured below). Two WyView project fact sheets were prepared and handed out at the exhibition. On the following day we visited the offices of the Wyoming senators and House representative to update them on WyView and AmericaView activities.