

**STATEMENT OF WORK
COLORADO PLATEAU CESU AGREEMENT H2370094001
TASK AGREEMENT NUMBER**

Field Ecology and Technical Support for Long-Term Monitoring in National Parks of the Southern Colorado Plateau Network

PROJECT ABSTRACT:

As part of the Southern Colorado Plateau Network's (SCPN's) Vital Signs monitoring program, this project contributes to understanding the current status and tracking trends in condition through time for a selected suite of indicators of ecosystem condition. The overall purpose of the project described herein is for SCPN and NAU to collaborate to conduct long-term monitoring of upland, riparian/aquatic and landscape-level indicators in targeted park ecosystems and to communicate monitoring results to a broad audience of park managers, partners and the general public. Through this collaboration, NPS and NAU will contribute to describing regional ecological integrity and furthering scientific understanding of the current conditions of park resources, which often serve as reference conditions when evaluating the condition of public lands that are more impacted by human use. Results from this project will be publicly available through the SCPN website (<http://science.nature.nps.gov/im/units/scpn/index.cfm>) and the Learning Center of the American Southwest website (<http://www.southwestlearning.org/>). The specific objectives of this Task Agreement are to implement long-term monitoring projects for water resources and upland ecosystems, to develop the network's data management system, and to prepare reports, articles and other publications describing the program's purpose as well as inventory and monitoring results.

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PROJECT OBJECTIVES: The Southern Colorado Plateau Inventory and Monitoring Network (SCPN) is tasked with developing a monitoring program to assess status and trends in the condition of natural resources across 19 NPS units on the Colorado Plateau. Since 2005, following a 3-year planning effort, SCPN staff has been working cooperatively with the Northern Colorado Plateau Network (NCPN), other Intermountain Region I&M networks,

cooperators from NAU and other universities, and scientists from other agencies to develop long-term ecological monitoring protocols. The emphasis of our collaborative work has now shifted to implementing long-term monitoring in SCPN parks as outlined in the *Vital Signs Monitoring Plan for the Southern Colorado Plateau Network*.

A second important component of the NPS Inventory and Monitoring Division (IMD) mission is to communicate monitoring results and the broader ecological context for those results to a diverse audience of park managers, partners and the general public. Toward that goal, the results of most inventory and monitoring projects are published in the NPS Natural Resource Publication Series and are publicly available through network websites (see <http://science.nature.nps.gov/im/units/scpn/> for the SCPN).

In addition to these venues for science communication, SCPN is working collaboratively with three other Intermountain Region I&M networks (Chihuahuan Desert Network, Sonoran Desert Network, and Southern Plains Network) to develop and maintain the Learning Center of the American Southwest or LCAS (<http://www.southwestlearning.org/>) – a virtual learning center dedicated to attaining high quality scholarly and scientific information for our parks and protected areas and for making that information accessible to land managers, partners, and the public for use toward better resource stewardship.

NAU is the host university to the SCPN, providing free office and laboratory space to the NPS program staff within the Applied Research and Development Building. The SCPN collaborates with university faculty from NAU, as well as from other CPCEU partners and USGS scientists to develop long-term monitoring plans and protocols and implement these monitoring projects in SCPN parks. NAU employees and students involved in the I&M program gain direct experience with the development and application of a park-based science program.

The specific objectives of this Task Agreement are:

1. To implement long-term water resources monitoring of selected SCPN streams and springs and to provide technical support to SCPN staff toward the completion of water resources monitoring protocols and reports. Monitoring topics include 1) riparian ecosystems, 2) aquatic macroinvertebrates, 3) water quality, and 4) spring ecosystems.
2. To implement long-term upland vegetation and soils monitoring within selected upland ecological sites and to provide technical support to SCPN staff toward the completion of upland monitoring reports.
3. To implement the *SCPN Data Management Plan* and to provide technical support to SCPN staff toward developing and maintaining the program's data management and GIS capabilities.
4. To provide technical writing, editing, and report preparation support to the SCPN program. The writer/editor will work in collaboration with SCPN staff to produce Natural Resource Technical Report Series publications and other web-based or printed materials for the program. NAU will also provide printing services support to prepare final reports for distribution to SCPN parks and cooperators.
5. To develop science communication materials about the natural resources of SCPN parks and related NPS management and science issues/activities. These projects will contribute to public understanding of park resources and resource topics and may be written for the SCPN and/or LCAS websites. A NAU School of Communication Intern will be involved in some of these projects.
6. To provide support for the Learning Center of the American Southwest (LCAS) website in coordination with SCPN and the Chihuahuan, Sonoran, and Southern Plains Networks,
7. To provide project oversight and administration. The NAU Principal Investigator will supervise the NAU staff involved with tasks above and will serve as a senior scientist providing scientific review and guidance, as well as coordinate with SCPN staff.

PROJECT BACKGROUND:

National Park managers across the country are confronted with increasingly complex and challenging issues that require broad-based understanding of the status and trends of park resources as a foundation for making decisions, working with other agencies, and communicating with the public to protect park natural systems and native species. Monitoring data help to define the normal limits of natural variation in park resources, detect long-term environmental change, provide insights into the ecological consequences of change, and inform stakeholders and the general public of changes in resource conditions that may be caused by stressors operating at regional and global scales.

The NPS monitoring program provides information on the overall condition of park natural resources and the long-term effectiveness of management regimes based on changes in the status and trend of selected park resources. The process of selecting 'vital signs' or ecological indicators for each network began with scoping workshops to identify focal resources important to each park, agents of change or stressors, and key properties that characterize healthy ecosystems. Conceptual models were then developed to formalize our current understanding of ecosystem processes and dynamics, and how particular stressors may affect focal resources. The elements and processes that are monitored are a subset of the total suite of natural resources that park managers are directed to preserve "unimpaired for future generations.

The first few years of monitoring data are being used to document current conditions for selected vital signs across network park ecosystems. Over the long term, consistently collected monitoring data will provide park managers with information describing the status and long-term trends in resource condition. This information is fundamental to natural resources stewardship because it provides the context for interpreting observed changes and may provide the basis for modifying or initiating new management practices. The NPS I&M data will also have broad regional scientific utility because NPS lands often provide the closest approximation of undisturbed reference conditions as a point of comparison for areas that are more impacted by human use.

Southern Colorado Plateau Network Parks: includes 19 parks and monuments located throughout the northern Arizona, northwestern New Mexico, southwestern Colorado and southeastern Utah: Aztec Ruins National Monument (AZRU), Bandelier National Monument (BAND), Canyon de Chelly National Monument (CACH), Chaco Culture National Historical Park (CHCU), El Malpais National Monument (ELMA), El Morro National Monument (ELMO), Glen Canyon National Recreation Area (GLCA), Grand Canyon National Park (GRCA), Hubbell Trading Post National Historic Site (HUTR), Mesa Verde National Park (MEVE), Navajo National Monument (NAVA), Petrified Forest National Park (PEFO), Petroglyph National Monument (PETR), Rainbow Bridge National Monument (RABR), Salinas Pueblo Missions National Monument (SAPU), Sunset Canyon National Monument (SUCR), Walnut Canyon National Monument (WACA), Wupatki National Monument (WUPA), Yucca House National Monument (YUHO).

Table 1. Core SCPN monitoring projects and the vital signs to be monitored.

Monitoring Project	Vital Signs
Land surface phenology	Start & end of season, spring peak greenness, monsoon peak greenness, season-long productivity, snow cover extent & duration
Integrated upland ecosystems	Vegetation composition & structure, soil stability & upland hydrologic function
Habitat-based bird communities	Bird community composition & abundance; habitat metrics (vegetation cover by functional group, tree basal area, sapling density, canopy closure)
Aquatic macroinvertebrates	Aquatic macroinvertebrate composition & abundance; habitat metrics (water depth, water velocity, substrate size, canopy closure)
Integrated riparian	Streamflow & depth to groundwater, fluvial geomorphology, vegetation composition & structure
Spring Ecosystems	Spring flow & depth to groundwater, vegetation composition & structure
Water quality of streams & springs	Core parameters (temperature, pH, specific conductivity, dissolved oxygen, turbidity, flow); bacteria, nutrients, trace metals, & major ions

DETAILED TASK DESCRIPTIONS:

1. **Water Resources Monitoring.** NAU will support one part-time temporary position to serve on the water resources monitoring crew. The water resources crew will work with SCPN staff (including SCPN hydrologist, water resource crew leader & hydrologic technician), park staff, and cooperating scientists to develop and implement specific long-term monitoring projects. The water resources crew will be focused on the following tasks during the 2014 and 2015 field seasons.
 - a. Assist SCPN staff by compiling scientific literature, reports, data and other information to support the development and implementation of water resource monitoring projects.
 - b. Contribute to the development, testing and revision of protocols related to monitoring riparian ecosystems, stream and spring water quality, and spring ecosystems.
 - c. Work with SCPN staff to organize, schedule, and execute a wide variety of water resource monitoring projects.
 - d. Serve as field crew members and/or lead and coordinate field inventory and monitoring activities or related field surveys and research within SCPN parks.
 - e. Conduct routine data summary and analysis. Write summaries of projects and assist with preparation of reports and publications.

The 2014/2015 work will emphasize:

- Completion of integrated riparian monitoring protocol
- Working toward completion of springs monitoring protocol
- Continued establishment of riparian monitoring sites and implementation of integrated riparian protocol at those sites.
- Continued implementation of aquatic macroinvertebrate protocol at established sites.
- Continued implementation of water quality monitoring protocol.
- Data summary for monitoring completed in 2013/2014.

2. ***Integrated Upland Monitoring.*** NAU will support two part-time temporary positions to serve on the upland monitoring crew. The upland monitoring crew will work with SCPN staff (including SCPN plant ecologist and botanist), and park staff to implement specific long-term monitoring projects. The uplands crew will be focused on the following tasks during 2014/2015.
 - a. Assist SCPN staff and cooperators by compiling scientific literature, reports, data and other information to support the development and implementation of upland vegetation and soils monitoring projects.
 - b. Work with SCPN staff to organize, schedule, and execute a wide variety of upland inventory and monitoring projects.
 - c. Serve as field crew members and/or lead and coordinate field inventory and monitoring activities or related field surveys and research within SCPN parks.
 - d. Conduct routine data summary and analysis. Write summaries of projects and assist with preparation of reports and publications.

The 2014/2015 work will emphasize:

- Continued establishment of upland monitoring sites and implementation of integrated upland protocol at those sites.
- Resampling of upland monitoring sites previously established.
- Data summary for monitoring completed in 2013/2014.

3. ***Data management and GIS Support.*** NAU will support one part-time temporary position to provide spatial data management and GIS support.

The Sr. Research Specialist (GIS) will work with SCPN staff (including the SCPN data manager and GIS specialist), park staff, and cooperating personnel to assist in the gathering, processing, archival and distribution of spatial data. The following tasks will be the focus of work in 2014/2015.

- Process MODIS data in preparation for statistical analysis of landscape greenness and snowcover in parks and adjacent areas.
- Load and download plot coordinates onto GPS units for SCPN field crew use.
- Create consistent attribute structure and assign attribute metadata for datasets being created as part of the monitoring program.
- Provide map products for routine SCPN tasks including permit applications, and annual reports, and field maps.
- Complete metadata in GIS catalog for inventory and query of SCPN spatial datasets.
- Find and download new and updated spatial datasets from local, state and federal websites.

4. ***Technical writing/editing of SCPN project reports.*** NAU will support one benefit-eligible position to provide technical writing/editing and report preparation support. NAU will also provide graphic design and printing of SCPN reports, and other science communication materials.

The Sr. Research Specialist (Science Writer/Editor) will focus on the following tasks in 2014/2015:

- a. Assist SCPN staff and cooperators with preparation of technical reports.
- b. Confer with authors and other staff members regarding editorial changes and revisions.
- c. Edit, write, and revise articles for publication or web-posting.
- d. Develop layouts for report publication. Coordinate galley and page proofing, and the generation of tables, graphs, cartographics and other illustrations.

The FY2014/2015 work will emphasize:

- Publication of SCPN monitoring protocols within the NPS Natural Resources Series.

- Editing, formatting and publishing of SCPN monitoring reports in the NPS Natural Resources Data Summary Series.
- Working collaboratively with SCPN staff, park staff, and cooperators to publish I&M related research reports in NRTR Series.
- Development of materials for the SCPN website and for the related Learning Center of the American Southwest website.

5. *Science communication products for SCPN and LCAS websites.*

The Sr. Research Specialist (Science Writer/Editor) and a Communications Student Intern will work with SCPN staff, park staff and cooperators to develop, write and edit science communication products for the SCPN and LCAS websites. These may include written products such as resource and project overviews and summaries, as well as slideshows, videos and podcasts.

6. *Learning Center of the American Southwest Website Management.*

NAU will hire a part-time temporary Junior Web Designer to oversee content management and maintenance of the LCAS website. Duties will include:

- Maintain the LCAS Virtual Learning Center (VLC) website.
- Assist with management of LCAS website content, to include 1) updating content, graphics and images, 2) assisting with posting of new content, and 3) maintaining content linkages.
- Maintain and repair web pages including coding, textual and graphical components and making minor improvements to site organization and navigation.
- Coordinate with the network program managers and VLC developers on new LCAS development needs and priorities.
- Provide training and documentation on the use of the website including web tools and software applications.
- Work with NPS website developers to evaluate the merit of moving the LCAS website to a nps.gov url. If the decision is made to move LCAS, work with NPS website developers during transition.

- 7. *SCPN – NAU Project Oversight and Administration.*** The NAU Principal Investigator will supervise the NAU staff involved with tasks above, will serve as a senior scientist providing scientific review and guidance, and will coordinate closely with SCPN program manager, project managers, and technical staff to ensure that NPS safety procedures & monitoring protocols are followed and science standards are met. The NAU Project Coordinator will coordinate day-to-day activities with the NPS Project Managers and Field Crew Leaders and will provide NAU administrative functions including time-keeping and travel processing. NAU will also assist with hosting meetings and workshops of agency and university scientists to support monitoring program goals.

NPS SUBSTANTIAL INVOLVEMENT: National Park Service staff from SCPN will be fully engaged with NAU staff throughout the course of this project. The NPS will continue to provide overall coordination of the project and to set the priorities and work schedule. NPS will provide relevant reports, data and other supporting materials from SCPN and park files. NPS will also provide timely review of products associated with this project and input as needed. NAU staff will use NPS vehicles to accomplish field work described herein. NPS will provide field and office equipment to accomplish monitoring objectives (e.g. computers, water quality probes, GPS equipment, data loggers, etc.). NPS and NAU will work collaboratively to meet project objectives.

PRODUCTS AND SCHEDULE: All cooperators shall continue to have full opportunity to review, cooperate in the planning, execution, and publication of the results of the work conducted under this agreement. NPS will be

responsible for management review and approval of all products. NAU cooperators will prepare I&M annual reports as appropriate to meet NPS deadlines.

1. Trip reports to describe results of riparian, water quality, aquatic macroinvertebrate, and other water resource related monitoring trips – due by December 1 of the year in which the work occurred.
2. Annual reports to summarize data collected during the previous field season -- due six months after field work is completed for riparian and water quality monitoring; due one year after field work is completed for macroinvertebrate monitoring.
3. Trip reports to describe results of upland monitoring trips – due by December 1 of the year in which the work occurred.
4. Annual reports to summarize integrated upland data collected during the previous field season – due six months after field work is completed.
5. Multiple I&M reports and other materials to be published in NRTR Series and posted to appropriate websites.
6. Science communication products (written reports and multi-media products) for posting to park, SCPN and LCAS websites.
7. Brief report abstract suitable for public distribution. 2 hard copies, 1 electronic copy (pdf format) of final report provided to the NPS Research Coordinator.

COOPERATIVE AGREEMENTS OR TASK AGREEMENTS INVOLVING COOPERATORS WORKING ON-SITE

Background

In cooperative agreements or task agreements with universities where the university utilizes interns, student employees, research associates (RAs) or cooperators on-site (hereafter called “cooperator personnel”), these cooperator personnel sometimes work on government sites in close proximity to federal employees. It is illegal (without specific statutory authority) for federal employees to directly supervise the cooperator personnel or any university employees or for the students or other university employees to supervise federal employees. When cooperator personnel are working on an NPS site, it is important that there is a clear distinction between students and federal employees.

Office Environment and Vehicles

- The office space of the cooperator personnel and NPS personnel should be clearly labeled (Name and NPS or University affiliation on office or cubicle space).
- Cooperator personnel should be listed separately from NPS personnel in telephone lists, other identification or organizational rosters, and publication credits.
- Cooperator personnel should not receive “all-employee” e-mail or other communications intended for NPS personnel (unless it relates directly to the work the cooperator is doing for the NPS). When the e-mail does relate to the work being done, a copy of the same e-mail message should be sent to the University or cooperator’s supervisor.
- Cooperator personnel may use NPS e-mail systems when the communication relates directly to the work the cooperator is doing for the NPS. The e-mail addresses of the cooperator personnel must include a label associated with their NPS e-mail address that identifies the cooperator’s status (i.e., “Linda Webb, Cooperator” would be the label associated with the e-mail address, linda_webb@contractor.nps.gov). Doing so clearly identifies this individual each time they send an e-mail message using the NPS system, and it identifies their status as a research associate, student intern or student employee in the e-mail directory.
- Unless stipulated in the agreement, cooperator personnel should not drive government vehicles.

- Unless stipulated in the agreement, cooperator personnel should not ride as a passenger in a government vehicle. When this is planned as part of the agreement, an appropriate amount of liability insurance should be negotiated.
- Prior written approval by the Park Superintendent or Center Manager must be obtained in order for a task to allow cooperator personnel to drive or ride in government vehicles.

Supervision and Scheduling

- Each task must specify the university's/cooperator's supervisor for the cooperator personnel.
- Unless stipulated in the agreement, NPS staff should not set hours for cooperator personnel, specify where the work should be done, or conduct performance appraisals. National Park Service staff may give performance feedback to the cooperator personnel supervisor.
- Cooperator personnel should report leave, scheduling, and other related issues to the university or cooperator's supervisor, not to NPS employees. The supervisor of the cooperator personnel should then communicate with the NPS. National Park Service employees cannot directly supervise cooperator personnel on a day-to-day basis. Work should be given to the cooperator personnel (via the cooperator's supervisor) on a "task basis." Cooperators should work without NPS supervision to accomplish each task, although technical consultations and cooperation is permissible.
- The Cooperator will be responsible for any disciplinary action needed to correct student employee conduct or performance problems. The NPS agreements technical representative will inform the university/cooperator's supervisor of any conduct or performance problems.
- The Cooperator will remove student employees from their positions if they fail to improve performance or address conduct issues.
- The NPS will review and provide feedback to students or interns regarding work assignments.
- The NPS will inform the cooperator of conduct or performance problems with cooperator personnel so that the university can counsel employees and correct the performance problems.
- The NPS will recommend to the cooperator dismissal of cooperator personnel based on conduct or performance issues.
- The Cooperator will hire students, interns or RAs to work on NPS tasks identified in the agreement. Hiring will be conducted in consultation with the NPS Agreements Technical Representative (ATR).
- The Cooperator will: pay students, interns or RAs for hours they have worked in support of the agreement.

Representation and Communication

- Cooperator personnel cannot in any way represent themselves to the public as NPS employees.
- Cooperator personnel are required to wear visible identification at all times.

Other Issues

- Cooperator personnel should not list an NPS affiliation on publications, but rather should list the cooperative agreement under which the work was performed.
- Cooperator personnel should not be invited to official NPS "social" events.
- Cooperator personnel will follow the local policy of the facility when federal facilities are closed due to early release for holidays, snow days, etc.