

HOVENWEEP AND NATURAL BRIDGES NATIONAL MONUMENTS RESEARCH SUMMARY 2010

1) Study Title: Soil Survey of Hovenweep National Monument, Utah

Permit No.: HOVE-2010-SCI-0001

Principal Investigator: Victor Parslow

Purpose of Scientific Study: To provide an updated soil and ecological site inventory for Hovenweep NM that meets National Cooperative Soil Survey (NCSS) standards and park management and planning needs.

Findings/Accomplishments for 2010: No field activity was conducted this report year. A draft manuscript and shapefiles were produced this year, and the soils database completed.

2) Study Title: NCPN Springs Monitoring Pilot Testing

Permit No.: HOVE-2010-SCI-0002

Principal Investigator: Rebecca Weissinger

Purpose of Scientific Study: Monitoring the status and trends in representative attributes and effects of an array of patterns and processes is an overarching goal of the NCPN Springs Monitoring effort. This effort is intended to provide park managers with information on the variability of spring systems and to provide early warning of system degradation. In the latter case, monitoring information can be used to determine the potential for mitigating actions, and where such actions are implemented, monitoring efforts can contribute to understanding the effects of these actions. The full set of procedures for the NCPN Springs Monitoring effort is still in development. Water quantity and quality methods are relatively standard and can be implemented immediately. However, vegetation measures and assessments of site condition need field testing for feasibility and refinement. At this time we propose testing field measures of vegetation structure, cover and diversity and site condition (visible natural and anthropogenic disturbances, etc.) at a subset of selected springs. Water quantity and quality may also be sampled at the same time. Future monitoring efforts may also include aquatic macroinvertebrate sampling, but those methods will be included in future permits as the need arises.

Methods testing is proposed for selected springs within SEUG park units. Final springs will be selected in conjunction with SEUG staff. Specific objectives of the overall springs monitoring effort are: for a selected spring, seep, or hanging garden, determine the status of and trends in any or all of the following:

- 1) the areal extent, cover, species composition and structure of spring-related vegetation (trees, shrubs, forbs, grasses)
- 2) target species such as rare plants and exotic plants
- 3) spring discharge
- 4) spring water quality

Findings/Accomplishments for 2010: No work was done.

3) Study Title: Southern Utah Visitor Profile Study 2010

Permit No.: HOVE-2010-SCI-0003

Principal Investigator: Emmett Steed

Purpose of Scientific Study: The purpose of this study is to understand Southern Utah's tourists, who stay overnight and travel more than 50 miles from their homes. The research seeks to answer the following questions:

1. What are the demographic characteristics of Southern Utah visitors?

2. What relationships exist among Southern Utah visitors in regard to place of origin, Southern Utah destinations visited, transportation utilized, activities selected while in Southern Utah, and trip expenditures?
3. Are there seasonal differences in origin, destinations, activities, and expenditures?
4. What are the information sources utilized by Southern Utah visitors?

Findings/Accomplishments for 2010:

Upon completion of 2/4 seasons of data collection we have initial demographic information and an initial count of the most influential information sources utilized by Southern Utah visitors. Below are descriptive statistics from initial data analysis (n=456).

Specific to national parks:

79% of visitor surveyed are visiting national parks;

71% are influenced by the internet;

62% are influenced by past knowledge in their travel plans; 53% are influenced by friends/family.

Demographics of survey visitors:

Gender: 50% male;

Ages: 27% 45-54; 24% 55-64; 18% 35-44;

Originating area codes:

27% mountain zone;

26% foreign zones;

16% pacific zone;

Marital status: 74% married

Education level: 38% graduated college; 38% post graduate degree

Profession: 25% professional; 16% managerial/executive; 18% retired; 13% education

Travel club affiliation: 47% belong to AAA; 26% belong to AARP

Household income: 41% >\$100,000; 25% \$60,000-\$99,999; <\$59,999 16%

4) Study Title: Soil Survey of Natural Bridges National Monument, Utah

Permit No.: NABR-2010-SCI-0001

Principal Investigator: Victor Parslow

Purpose of Scientific Study: To provide an updated soil and ecological site inventory for Natural Bridges National Monument (NABR) that meets National Cooperative Soil Survey (NCSS) standards and park management and planning needs.

Findings/Accomplishments for 2010: A channel type study and riparian vegetation assessment was conducted in 2010. Data collected will be used to complete the Ecological Site Descriptions for the Monument.

5) Study Title: NCPN Integrated Riparian Monitoring in Natural Bridges National Monument

Permit No.: NABR-2010-SCI-0002

Principal Investigator: I&M NCPN

Purpose of Scientific Study: The National Park Service's Inventory and Monitoring Program (NPS I&M), in collaboration with 32 monitoring networks, are charged with monitoring natural resources. Vital signs represent a select set of physical, chemical and biological elements and processes of park ecosystems that are chosen to represent the overall health and condition of a park's resources. Together, the Northern and Southern Colorado Plateau Networks (NCPN and SCPN) have developed conceptual models of key ecosystems and identified an integrated set of vital signs for tracking resource conditions at 35 NPS units within or near the Colorado Plateau (Thomas et al. 2004, Oâ Dell et al. 2005). Riparian systems are a high priority vital sign for the NCPN (Oâ Dell et al. 2005). Riparian systems are disproportionately high in biodiversity relative to their spatial extent due to the year-round or at least frequent availability of water. In turn, healthy and natural riparian systems serve as a predictable source of water, and function to maintain the natural

diversity of riparian-adapted plants and animals across the Colorado Plateau region. Various dynamics interact to influence riparian systems. Ground-water levels, flood disturbance intensity and frequency, plant population, dynamics, and even upland conditions and dynamics collectively interact to shape the in-stream conditions and vegetative features of a riparian zone. Monitoring the status and trends in representative attributes and effects of an array of patterns and processes is an overarching goal of the NCPN Integrated Riparian Monitoring effort. This effort is intended to provide park managers with information on the variability of riparian systems, and to provide early warning of system degradation. In the latter case, monitoring information can be used to determine the potential for mitigating actions, and where such actions are implemented, monitoring efforts can contribute to understanding the effects of these actions. The full set of procedures for the NCPN Integrated Riparian Monitoring effort needs field testing for feasibility and refinement. However, the basic framework for selecting sites, for establishing stream-reach plots, for monitoring riparian vegetation, for surveying geomorphic surfaces across the riparian zone, and for measuring shallow groundwater levels and surface water stage is in place. These procedures can be implemented at this time as pilot implementation of the Integrated Riparian protocol. Pilot implementation is proposed for Armstrong Canyon in NABR. Specific objectives of the overall riparian monitoring effort are to determine the status and trends in:

- 1) the areal extent, cover, species composition and structure of riparian vegetation
- 2) exotic plant species
- 3) channel morphology of surveyed cross sections and the channel thalweg
- 4) floodplain ground-water levels and stream flow/discharge

Procedures for riparian monitoring incorporated pieces of the USGS Water Quality Assessment Program (Moulton et al. 2002) and EMAP procedures (Kaufmann et al. 1999) and were initially developed by Scott and Reynolds (draft). Further refinement has been completed by NCPN staff and by Steve Monroe and Ellen Soles of the SCPN.

Findings/Accomplishments for 2010: NCPN field crews established and sampled vegetation at Reach 1 and Reach 5 in Armstrong Canyon. Reconnaissance of potential future monitoring reaches was also completed.

6) Study Title: U.S. Historical Climatology Network Modernization (USHCN-M)

Permit No.: NABR-2010-SCI-0003

Principal Investigator: Dennis Atkinson

Purpose of Scientific Study: Support for the Department of Commerce (DOC), National Oceanic and Atmospheric Administration's (NOAA) U.S. Regional Climate Reference Network (USRCRN) program (formerly, Historical Climatology Network Modernization, USHCN-M).

The purpose of the USRCRN program is to provide a surface meteorological monitoring network that will allow scientists and the research community to have high quality data for use in climate evaluations and studies. These studies will allow determinations to be made with respect to regional climate signals, as they relate to different climate regimes. These climate studies will help predict and inform changes that affect humans, fauna, and flora, in addition to impacts on national, economic, and social infrastructures. This meteorological data will provide valuable on-site data for the National Park Service to monitor climate affects on sensitive elements throughout the parks and climate changes that affect the viability and use of the parks. At completion, the USRCRN program will consist of a national network of 538 surface meteorological monitoring sites across the United States. The USRCRN program is designed to provide a consistent spatial coverage of meteorological monitoring data across the United States. Each grid point (538 total) covers a radial out to 65km. One site per grid point is selected based on siting criteria and broader representation of the grid point characteristics. Sites which capture local or micrometeorological phenomenon are not appropriate to capture climate changes. Prior to selection, sites undergo a rigorous assessment and evaluation process, involving 3 NOAA line offices

(NWS,OAR,NESDIS). Each site is selected by vote ballot, based on an array of criteria affecting the measurement of temperature and precipitation.

Findings/Accomplishments for 2010: This site is currently transmitting temperature and precipitation measurements. The latest data is available from the following URL:

<http://www.ncdc.noaa.gov/crn/observations.htm?network=hcnm>

7) Study Title: NCPN Springs Monitoring Pilot Testing

Permit No.: NABR-2010-SCI-0004

Principal Investigator: Rebecca Weissinger

Purpose of Scientific Study: Monitoring the status and trends in representative attributes and effects of an array of patterns and processes is an overarching goal of the NCPN Springs Monitoring effort. This effort is intended to provide park managers with information on the variability of spring systems and to provide early warning of system degradation. In the latter case, monitoring information can be used to determine the potential for mitigating actions, and where such actions are implemented, monitoring efforts can contribute to understanding the effects of these actions. The full set of procedures for the NCPN Springs Monitoring effort is still in development. Water quantity and quality methods are relatively standard and can be implemented immediately. However, vegetation measures and assessments of site condition need field testing for feasibility and refinement. At this time we propose testing field measures of vegetation structure, cover and diversity and site condition (visible natural and anthropogenic disturbances, etc.) at a subset of selected springs. Water quantity and quality may also be sampled at the same time. Future monitoring efforts may also include aquatic macroinvertebrate sampling, but those methods will be included in future permits as the need arises. Methods testing is proposed for selected springs within SEUG park units. Final springs will be selected in conjunction with SEUG staff. Specific objectives of the overall springs monitoring effort are: for a selected spring, seep, or hanging garden, determine the status of and trends in any or all of the following:

- 1) the areal extent, cover, species composition and structure of spring-related vegetation (trees, shrubs, forbs, grasses)
- 2) target species such as rare plants and exotic plants
- 3) spring discharge
- 4) spring water quality

Findings/Accomplishments for 2010: No work was done.

8) Study Title: Wood Documentation and Research, Natural Bridges NM

Permit No.: NABR-2010-SCI-0005

Principal Investigator: Tom Windes

Purpose of Scientific Study: This study is to continue the wood documentation and tree-ring studies started in 2000 while I was an archaeologist in the Anthropology Programs, Santa Fe Support Office, during an inventory survey of sites at NABR. The goal is to map and inventory all structural wood resources in the park at sites exhibiting structural integrity. These are perishable resources which have never been systematically recorded nor mapped, are suffering from deterioration from weathering, wet soils, vandalism, natural displacement and other causes, and are part of the NPS mandate to protect and preserve the natural and cultural resources. Wood not only provides one of the most informative pieces of cultural information in archaeology but also detailed environmental records of the past regarding climate, fire histories, etc. My team of researchers are experienced, having worked in parks and other gov't lands throughout the Southwest, including Chaco Culture, Aztec Ruins, Mesa Verde, Pecos, and others, and form a unique team that records each piece of structural wood and the site within which it is associated. We also provide detailed maps of intact and semi-intact structures that provide the most-up-to date records of the cultural resources. Finally, dendrochronology is applied at each site to provide tree-ring

dates, species use, and samples curated and protected from further deterioration.

Findings/Accomplishments for 2010: In 2010, our goals were to provide large detailed maps of all the complex sites with numerous structural wood resources, to number and document every piece of structural wood (and occasionally large pieces of charcoal) on the maps as well as a 54-attribute-list for each piece of wood, and to sample by coring or cutting all samples with dating potential. These would augment the earlier studies at sites, which started in 1998 (see McVickar 2001). Many pieces have suffered extreme exposure to the elements, been moved from their prehistoric contexts by historic visitors or animals or gravity, or have been destroyed by natural (e.g., fires or lightning) and historic effects (collected for firewood, as souvenirs, or just tossed). Thus, it is very important to capture their present locations on maps to enable management and researchers to discern future negative effects to the site resources and to freeze-frame the site as we found and mapped it for conditional assessments and potential future research. In addition to the structural wood, large or rare artifacts, when encountered, were also mapped (e.g., hatch covers, manos, metates, projectile points, rare minerals, textiles, etc) as well as the general locations of bulk materials such as sherds from broken pottery, chipped stones, and corn cobs (e.g., specific areas of refuse). No artifacts were collected. We retrieved 49 tree-ring samples this year, which will augment the AD 1200s dates obtained in the past. The amount of tree-ring samples retrieved since the study began make this one of the best dated and documented Park Service units in the United States, as well as providing a priceless collection of samples useful for environmental and climatic studies. Between 31 July and 12 August 2010, four volunteers conducted archaeological work at five sites in Natural Bridges: 42SA6645, 42SA6788, 42SA6803, 42SA6804, and 42SA6837. Sixteen new detailed site plans and feature maps were produced in 2010, along with site tallies of artifacts, and several dozen more pieces of structural wood were documented. Copies of this material are housed in curation at the National Park Service office in Moab, Utah.

Despite the poor weather and small field crew, we accomplished much in a week and a half in 2010. We visited five sites in the canyons and completed or revised notes for them. Four had been documented and sampled by the Wood Project Crew previously, thus few new tree-ring samples were collected. But we expanded our field identifications of artifacts and rock art at the sites, and remapped or expanded our mapping for those sites previously documented. These sites now have a wealth of detailed information about them, which can be used for both future research and management. In addition, the new tree-ring samples should provide more dates from these sites on which to determine their initial construction and, perhaps, remodeling and newer additions, but also they help provide priceless environmental and botanical information of past conditions and tree presence.

Reference

McVickar, Janet L. (editor)

2001 An Archaeological Survey of Natural Bridges National Monument, Southeastern Utah. Intermountain Cultural Resources Management Professional Paper No. 64. Anthropology Projects, Cultural Resources Management, Intermountain Region, National Park Service, Santa Fe, NM.

9) Study Title: Southern Utah Visitor Profile Study 2010

Permit No.: NABR-2010-SCI-0006

Principal Investigator: Emmett Steed

Purpose of Scientific Study: The purpose of this study is to understand Southern Utah's tourists, who stay overnight and travel more than 50 miles from their homes. The research seeks to answer the following questions:

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