

**Award Number:** P14AC01084

**Project Number**: NAU-451

**CFDA #:** 15.945

**Park/NPS Unit: FLAG (WUPA)**

**Title of Project: Conduct Research to Identify Effective Riparian Restoration Methods for Deadman Wash, Wupatki National Monument**

**Administered through the:**  Colorado Plateau Cooperative Ecosystem Studies Unit Cooperative Agreement Number P14AC00921

**CESU Partner:** Northern Arizona University

**PROJECT CONTACTS:**

**Principal Investigator:** Dr. Kevin Grady, Northern Arizona University, School of Forestry, Flagstaff, AZ 86011; (480) 254-8620; Kevin.grady@nau.edu

**Partner Administrative Contact:** Cindy Judge, Grants & Contracts Admin. P.O. Box 4130, Flagstaff, AZ 86011-4130, (928) 523-6197, Fax (928) 523-1075, Cindy.Judge@nau.edu

**NPS Certified ATR:** Paul Whitefield, Natural Resource Specialist, Flagstaff Area National Monuments, 6400 N. Highway 89, Flagstaff, AZ 86004, (928) 526-1157 ext. 235; Paul\_Whitefield@nps.gov

**FUNDING INFORMATION:**

**Amount Funded: $36,000**

**NPS Account Numbers (amounts in parentheses):**

1. PPIMIMRO3B PPMRSNR1Y.NI0000 PX.XIMREPP14.00.1 ($11,000)

2. PPIMFLAG70 PMTDODO26.XF0000 PX.DFLAG0004.00.1 ($25,000)

**Fund Source (e.g., ONPS, FLREA, CRPP, CESU, etc.):**

1. Southwest Exotic Plant Mgmt Team ONPS

2. WUPA Natural Resource Donation Account

[x] NPS Funding

[ ]  Is this funded using a reimbursable account number? If yes, IMR contracting needs a copy of the Interagency Agreement.

**PROJECT DATES:**

**Start Date:** July 1, 2014

***NOTE: This Task Agreement will become effective on the date of final signature or the effective date of the Award document, whichever is later.***

**End Date:** December 31, 2015

**NPS Administrative Contacts**

**Interim CESU Coordinator (May 18 – September 13, 2014):** Todd Chaudhry, National Park Service/CPCESU, NAU P.O. Box 5765, Flagstaff, AZ 86011, 928-523-6638, Fax: 928-523-2014; todd\_chaudhry@nps.gov

**Intermountain Region Administrative Contact:** Kelly Adams, Grants and Agreements Specialist, National Park Service, 12795 West Alameda Pkwy, Lakewood, CO 80228. Phone: 303-969-2303 Fax: 303-969-2992 Email: Kelly\_adams@nps.gov

**FEDERAL FINANCIAL REPORTS:**

***Federal Financial Reports*** (Check as required for project based on spending plan, period of performance, risk, cooperator history, etc.)

{ } Quarterly {X} Semi-annually { } Annually

Final (required): November 30, 2015

**Project SCHEDULE AND TECHNICAL REPORT DEADLINES:**

List all technical reports and products in sequential order as required in the scope (more lines and milestones can be added as needed):

*Project Start Date* – July 1 2014

*Technical progress reports*  - Due by December 31, 2014 and April 20, 2015

*Investigator’s Annual Report (IAR)* – Due in the online NPS Research Permit & Reporting System by March 30 each calendar year project is active: https://irma.nps.gov/rprs/Home

*Draft Final Report* – October 31, 2015

*Final Report* – November 30, 2015

*Project End Date* – December 31, 2015

*Replicate Datasets, Field Notes, and Maps provided to the NPS ATR* – December 31, 2015

*Final SF425 FFR* - must be submitted within 90 days of project end date

**PAYMENTS**

**2 CFR PART 215.22*:*** Cash advance (drawdown) to recipient organization shall be limited to the minimum amounts needed and be timed to be in accordance with the actual immediate cash requirements of the recipient organization in carrying out the purpose of the approved program or project. The timing and amount of cash advances shall be as close as is administratively feasible to the actual disbursements by the recipient organization for direct program or project costs and the proportionate share of any allowable indirect costs.

**2 CFR PART 215.25 (8)(e)(1):** Incur pre-award costs 90 calendar days prior to award or more than 90 calendar days with the prior approval of the Federal awarding agency. All pre-award costs are incurred at the recipient’s risk. (i.e. the Federal awarding agency is under no obligation to reimburse such costs if for any reason the recipient does not receive an award or if the award is less than anticipated and inadequate to cover such costs.)

**CESU REQUIRED PRODUCTS (may be different from those products required by the ATR – See Statement of Work for Products required by the NPS unit):**

The Principal Investigator will prepare a brief report abstract suitable for public distribution and two hard copies and an electronic version (in PDF file format) of the final report and mail all toTodd Chaudhry, National Park Service, CPCESU, NAU P.O. Box 5765, Flagstaff, AZ 86011. Please be sure to include the project number (e.g.; NAU-###, UMT-###, UAZDS-###) and the P number on the cover page of the final report.

**PROJECT ABSTRACT:** Approximately 1½ miles of the Little Colorado River (LCR) flows along the eastern boundary of Wupatki National Monument (WUPA). The reach of the LCR within WUPA is highly degraded from long-term livestock overgrazing and other intensive land use and water diversion along the entire river corridor. Riparian vegetation along the river corridor is now dominated by extensive thickets of non-native invasive tamarisk, Russian olive, and camelthorn. From 2009 through the present, the NPS and Northern Arizona University (NAU) have cooperated on two prior projects via the Colorado Plateau CESU to restore 20 acres of native riparian vegetation within the Deadman Wash (DMW) - LCR confluence area within WUPA. Efforts have included eradicating tamarisk, assessing the survival of outplanted native riparian trees, and conducting groundwater and soil moisture investigations. The knowledge gained from these investigations, along with the arrival of the herbivorous tamarisk beetle during 2013, have caused the cooperators to shift strategies from eradicating tamarisk and restoring native trees to instead establishing understory cover where tamarisk has been cleared. Under this Task Agreement, new research will be conducted to: (1) test soil amendment treatments to reduce soil salinity and improve plant growing conditions; and (2) identify methods to maximize the survival of greenhouse-grown, out-planted grasses, shrubs, and rhizomatous riparian species within the DMW drainage channel.

**Scope of Work:**

**Introduction.** Streams and associated riparian corridors are rare across the arid Colorado Plateau, but are essential to supporting a large proportion of the region’s overall biological diversity. Approximately 1½ miles of the Little Colorado River (LCR) flows along the eastern boundary of Wupatki National Monument (WUPA). The river flows ephemerally, typically with spring runoff from winter snowmelt, and more sporadically during the summer thunderstorm season. An estimated 25 acres of open channel and 50 acres of riparian vegetation occurs along the LCR within the WUPA boundary. As with other Southwestern rivers, the entire length of the LCR is highly degraded from its pre-settlement condition. In early historic descriptions and photographs, the river had groves of Fremont cottonwood (*Populus fremontii*) and extensive thickets of narrowleaf willow (*Salix exigua*). Since the 1860’s, livestock overgrazing, floodplain farming, water diversion, and ground water pumping from the flooplain aquifer have favored invasion by non-native phreatophytic tree species, primarily tamarisk (*Tamarix chinensis*) and Russian olive (*Elaeagnus angustifolia*). Upper floodplain terraces and tributary drywash channels are also extensively infested with non-native camelthorn (*Alhagi maurorum*), a short, heavily-thorned shrub, which spreads via highly persistent subsurface root systems. Narrow strands of native shrub willows growing along natural channel levee deposits are the most notable persistent native vegetation, and remnant old and decadent cottonwood trees grow in small numbers up- and down-river from WUPA.

Cattle continue to graze on adjacent lands, including both LCR banks upstream and downstream from the monument, and have constant access to the riverbed. Few to no cottonwood seedlings survive to grow above the browse line. Reducing or eliminating livestock grazing is important for the recovery of native riparian vegetation and functional wildlife habitat within the LCR corridor through the WUPA area. The boundary of WUPA was fenced to exclude livestock in the late 1980’s, but the NPS is unable to effectively fence the entire LCR riparian corridor within the boundary because seasonal high flows would likely destroy any fencing located too close to the main channel. However, Deadman Wash (DMW), a large ephemeral wash that flows through WUPA, lies within the boundary fence almost to its confluence with the LCR. Most of the DMW-LCR confluence has been effectively fenced to exclude livestock for more than 25 years, including a persisting tamarisk thicket of approximately 20 acres within the lowest reach of DMW channel. Historic accounts in NPS administrative files, together with the long-term persistence of tamarisk indicate that reliable groundwater occurs in DMW off of the main river channel.

NPS resource managers have long recognized the potential for restoring native riparian vegetation within the DMW-LCR confluence area, first initiating herbicide trials in the late 1980’s to eradicate both tamarisk and camelthorn. In 2009, the Natural Resource Program for the Flagstaff Area National Monuments (FLAG) finalized an Invasive Plant Management Plan, emphasizing the control of tamarisk and camelthorn within WUPA. Beginning in 2010, NPS exotic plant management teams and public land corps groups began treating tamarisk with chain-saw cut & stump herbicide treatments. To date, approximately 11 acres of tamarisk trees have been cleared, piled, and burned. During the 2013 growing season, the introduced Tamarisk beetle arrived at the DMW reach of the LCR, rapidly defoliating the remaining tamarisk. Although first-year beetle defoliation is often near 100%, based upon casual observations in adjacent drainage basins, complete mortality from tamarisk beetle herbivory is not anticipated and over a longer time period may prove to be highly variable among different stream reaches. While some level of long-term survival within DMW is anticipated, further herbicide treatments may be deferred until more monitoring and trend information is available.

In 2010, FLAG resource managers also began cooperative restoration efforts with faculty and students at (NAU), including field work at the site and a series of studies, funded either via research grants to NAU or by the NPS. Since 2011, NAU has been collecting data on experimental out-planting of 200 cuttings of selected genotypes of six widespread Southwestern riparian tree species. The study is intended to understand how underlying genetic fitness affects each individual genotype’s survival, growth rate, responses to environmental variables (temperature, soil salinity, and soil moisture regimes), and overall tolerance to direct competition by established tamarisk trees. During 2011-2012, the NPS and NAU completed a preliminary hydrological investigation to confirm the presence of shallow groundwater within a fluvial perched aquifer beneath the DMW channel (CPCESU Task Agreement NAU-372: Hydrogeological Investigations and Water Table Monitoring at Deadman Wash and Little Colorado River). Contrary to historic accounts and site evidence, no reliable groundwater is present within the channel deposits to a depth of at least 12 feet. Reasons a shallow aquifer is either not present or is deeper than indicated by historical evidence include: (1) groundwater depletion by tamarisk over the last 70 years; (2) Reduced recharge during the extended drought period that began in 1996; (3) Channel deposits of very fine clay layers are inhibiting water infiltration; and, (4) the DMW channel has been aggrading since tamarisk invasion, slowing streamflows, and causing the buildup of sediment in the channel. In late 2013, NAU cooperators initiated data collection on the spatial and temporal distribution of soil moisture within the DMW channel, in order to determine areas where out-planted native riparian species are most likely to survive (CPCESU Task Agreement NAU-434: Deadman Wash Hydrology Assessment and Restoration Planning). The early results indicate that the surface deposits in some areas of the drainage channel remain wet for most or all of the time, particularly the southern side where the channel abuts a bedrock bluff of highly porous, volcanic basalt.

Most recently, the NPS began participating in the NAU-led LCR Restoration & Community Stewardship Program, a collaborative effort involving Arizona and Federal land and resource management agencies, private landowners, and tribal partners. Deadman Wash is one of four pilot restoration sites the lower LCR. The primary objectives for the stewardship sites are: (1) serve as science and educational areas for developing restoration methods; (2) stimulate adjacent land manager and general public interest in restoring more of the LCR corridor; (3) increase the amount of functioning riparian plant and wildlife habitat at the landscape scale; and (4) enhance ecosystem resiliency in order to conserve native biodiversity as the Earth’s climate continues to warm. The cooperative restoration research is also intended to foster the next generation of riparian stewards and conservation expertise for the LCR, including: NAU internship programs for both graduate and undergraduate students; outreach to local Native American tribes; NPS staff involvement and mentoring of undergraduate and graduate students conducting research and restoration activities; educational site tours led by NAU ecologists and NPS resource managers; and organizing at least one restoration activity event for park visitors.

At the WUPA DMW restoration site, although livestock access has been controlled and invasive tamarisk is actively being reduced, adverse site conditions severely constrain the rate at which native vegetation can re-establish. Factors include: the prevailing arid climate, hot summers, short growing season; hyper-saline soils following tamarisk invasion; sporadic flows within the DMW drainage; and lack of any healthy and diverse native riparian vegetation within seed dispersal range. Now that the remaining tamarisk is being reduced by the tamarisk beetle, the open channel may lead to rapid encroachment of camelthorn, which is difficult to eradicate once established, and/or vulnerable to rapid channel incision and erosion into an arroyo. The recent finding that reliable shallow groundwater is not present also means the area is not as suited for extensive planting of riparian tree species as the cooperators had originally planned. Even with active management, the recovery of native plant cover, channel geomorphic adjustment, and potential groundwater recovery will likely require ten to twenty years for mature and fully self-sustaining native vegetation to develop.

Given existing conditions and what has recently been learned about the restoration site, the NPS and NAU now recognize that a change in strategy is needed from eradicating tamarisk and establishing riparian tree species to instead establishing native groundcover on the barren 11 acres where tamarisk has been cleared from the channel. The next restoration stage also requires reducing soil salinity, improving soil texture, and increasing hydrological permeability within the drainage channel. In December of 2013, the NAU Investigator and NPS ATR under this Task Agreement collaborated on a grant application for a DisneyNature Impact Grant from the National Park Foundation. The focus of the grant is to test methods to establish native shrubs and grasses and highly-adapted riparian shrub and rhizomatous species which already naturally occur within the DMW channel and confluence area. Additional experimental treatments are proposed to test various soil amendments to reduce salinity and to increase plant survival. The proposal was successful, resulting in a National Park Foundation grant of $25,000 to the NPS. The NPS Desert Southwest Exotic Plant Management Team (DSEPMT) is also contributing $11,000 for this purpose. Because establishing native trees will take much longer than originally anticipated, a minimum of 8 acres of remaining mature tamarisk canopy area will be retained indefinitely as surrogate songbird habitat, until native woody vegetation is sufficiently developed to provide adequate structure and foliar cover. The priority for invasive species control will shift from tamarisk removal to preventing camelthorn from encroaching where tamarisk has been removed. Herbicide treatments will be completed by the DSEPMT and local public land corps groups. The cooperators will also initiate long-term monitoring of stream flow and channel morphology in DMW at the confluence area.

**Scope of Work.** Under this Task Agreement, NPS funding is allocated to expand ongoing efforts with NAU to restore native riparian vegetation within the DMW-LCR confluence area at WUPA. New research will be conducted to identify the most effective methods for establishing native riparian understory vegetation within the 11 acres tamarisk removal area. An experimental approach will be developed to: (1) test soil amendment treatments to reduce soil salinity and improve plant growing conditions; and (2) maximize the survival of greenhouse-propagated and out-planted grasses, shrubs, and rhizomatous riparian species out-planted within the DMW channel. The NPS and NAU will cooperate to meet these objectives and implement the subtasks described below.

The Investigator will:

* Take the lead on developing a research design, preparing a study plan, and submitting to the NPS for use in updating NAU’s current research permit.
* Oversee NAU interns in establishing experimental plots; acquiring seed, cuttings, and other plant materials; completing soil and revegetation treatments; and collecting field data.
* Organizing and analyzing resulting study data.
* Establish the format and content for the final report and other product datasets, and ensure the study report is reviewed.
* Ensure that scientific knowledge gained from the effort is adequately documented and disseminated to the larger scientific community to contribute to this and other riparian restoration efforts.
* Present the study results to NPS staff with the Flagstaff Area National Monuments.

The NPS ATR will:

* Participate in identifying and evaluating restoration concepts for the restoration research.
* Coordinate updates to NAU’s current research permit and the NPS environmental compliance record.
* Assist with GIS-mapping of study plots, other data collection sites, and related restoration activity locations with high-accuracy GPS.
* Provide native plant seed from the FLAG plant seed cache for WUPA.
* Assist with acquiring additional plant seed, cuttings, and other plant materials as needed for revegetation tasks.
* Coordinate NPS SWEPMT efforts to control camelthorn encroachment into the restoration site.
* Coordinate tamarisk slash pile burning under procedures established within the FLAG Fire Management Plan.
* Coordinate public outreach and educational field events with the FLAG Management Team and WUPA field staff.
* Review and comment on the final report.
* Coordinate delivery of the final report, other products, and specimen collections to the Natural Resource Program files, staff library, GIS, and museum/archive collection for the Flagstaff Area National Monuments.

The Investigator and NPS ATR will ensure NAU students, FLAG Natural Resource Program staff, and public land corps members are involved in implementing the restoration research, including: site preparation, acquiring native plant seed and cuttings, propagating native plants, implementing soil amendment treatments, replanting the site with native plants, and observing and documenting plant survival. At least one site restoration activity, along with a number of other educational field trips, will be organized for university students, partners in the LCR Restoration & Community Stewardship Program, local Native Americans, NPS staff, and park visitors.

**Sub-Tasks and Schedule.**

A. Initial Meeting and Field Site Reconnaissance (July 2014):NAU and NPS cooperators will meet, conduct field reconnaissance of the DMW-LCR Confluence area, and collaborate on the next steps for revegetation with native plant species at the restoration site. They will review pertinent scientific literature on riparian restoration genetics at comparable ecological sites, along with recent technical information acquired at the DMW-LCR site on groundwater, soil moisture variation, and survival of out-planted riparian tree cuttings. Other pertinent observations on recent vegetation dynamics and drainage channel response to tamarisk eradication treatments will also be considered. The cooperators will identify the next phase of restoration data needs, identify feasible restoration methods to test in an experimental framework, and develop a timeline for implementation.

B. Prepare a Research Plan (July 2014): The Investigator, with assistance from the NPS ATR, will take the lead on developing a research design, preparing a Study Plan, and finalizing a schedule for implementing the research. The plan will incorporate an experimental array of fixed study plots, with randomized treatments to reduce soil salinity, improve plant productivity, and identify the most effective native plant propagation/establishment methods. Control areas include the drainage channel immediately upstream of the DMW restoration site, along with approximately 9 acres of retained tamarisk thicket, where tamarisk beetle effects may also be monitored. Proposed treatments include:

* Gypsum soil amendment, using commercial gypsum
* Ash soil amendment, using ash from tamarisk burn pile areas
* Organic matter soil amendment, using leaf litter and small diameter woody debris from nearby the site
* Inoculation of soil with mycorrhizal fungi and other beneficial soil organisms
* Transplanting plugs of functional soil from upstream in DMW
* Applying tamarisk slash as coarse woody material

C. Update NPS Research Permit and Compliance Record (July-August 2014): The NPS will utilize the Study Plan to update the Investigator’s existing NPS Research Permit and environmental compliance record.

D. Install Network of Research Plots (July - October 2014): The Investigator will take the lead on laying out and installing a network of plots, with assistance by NAU interns, NPS staff, and public land corps groups. The plots, treatments, and other restoration activity/instrument locations will be GPS-mapped and incorporated into the FLAG GIS.

E. Propagate Native Plants from Seed and Cuttings (July 2014 – April 2015): NAU and the NPS will acquire sufficient native plant seed and cuttings for propagation in containers by the NAU greenhouse. A target of 2,000 plants is desired. Potential species include riparian species herbaceous and shrub species that occur within the DMW channel upstream of the confluence area or other riparian areas within and nearby WUPA. Suitable species include:

*Salix exigua*

*Atriplex canescens*

*Sporobolus aeriodes*

*Artemesia filifolia*

*Pleuraphis jamesii*

*Forestieria pubescens*

*Sarcobatus vermiculatus*

*Rhus aromatica*

*Phragmites communis* (locally-indigenous genotype)

F. Acquire Baseline Data on Soils within the Research Plots (July – September 2014). The Investigator will oversee NAU interns in the collection of baseline data on soils within the research plots and identified control areas. Environmental variables of interest include salinity, texture, and compaction/water permeability.

G. Pilot Test and Evaluate Soil Amendment Methods (July - September 2014)**:** The Investigator will oversee NAU interns in pilot testing soil amendment treatment methods at the project site; evaluate the results; and adjust soil treatment methods, if needed.

H. Implement Plot Treatments and Out-plant Greenhouse-grown Native Plants (August 2014 – April 2015): The cooperators will fully implement soil and revegetation treatments across the network of study plots, maximizing opportunities for participation by public land and youth corps groups, students, Native Americans, NPS staff, park visitors, and partners in the LCR Restoration & Community Stewardship Program.

H. Acquire Data on Soil Amendment Effectiveness and Plant Survival and Growth (September 2014 – September 2015):The Investigator will oversee NAU interns in data collection on soil response and plant survival within the plots. NPS staff and public land corps groups may assist with data collection. The Investigator will also ensure effective data quality control, organization, statistical analysis, and management of the resulting datasets.

I. Technical Progress Reports (December 2014 and April 2015): Technical progress reports will be prepared by the cooperators by December 31, 2014, and by April 30, 2015. They will be submitted to the National Park Foundation to satisfy requirements under the DisneyNature Impact Grant Program.

J. Organize Educational Outreach and Visitor Restoration Activities (March - April 2015): The Investigator and NPS ATR will organize at least one site restoration activity for park visitors to participate in replanting the site with native plants. Other educational field trips will be coordinated for university students, partners in the LCR Restoration & Community Stewardship Program, local Native Americans, and park visitors.

K. Prepare and Submit Draft Final Report (October 2015): The Investigator will prepare a study report for the NPS. The report content will be organized according to accepted scientific format and style, and fully document the study objectives, study plot locations, experimental treatments, data collection methods, resulting data, data analysis, conclusions, and recommendations for the most effective restoration methods for the DMW site. The NPS ATR will review and comment on the draft.

L. Submit Final Report and Other Identified Products (November 2015): The Investigator will edit the draft report in consideration of NPS and other review comments, and submit a Final Report and requested pertinent replicate datasets and other products to NPS.

M. Present Study Results to NPS Staff (September - October 2015):The NAU Investigator and NPS ATR will coordinate a presentation to NPS staff with the Flagstaff Area National Monuments. The presentation will provide an overview of the restoration research, but be intended for a non-technical audience.

**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.

**PRODUCTS:**

At the conclusion of research under the Task Agreement, the NAU Investigators will provide the following products to the NPS:

Draft Study Report: A draft Study Report will be submitted to the NPS ATR for review at least 30 days before the final report is due. The Investigator will consider the NPA ATR’s review comments and suggested edits while preparing the final report.

Final Study Report: An unbound hardcopy of the Final Study Report and electronic copy in Adobe Acrobat format will be provided to the NPS ATR.

CESU Required Products: The Investigator will also provide a brief report abstract suitable for public distribution, along with two hard copies and an electronic version (in PDF file format) of the final report to the CPCESU Coordinator.

Publications: The NPS requests digital or reprint copies of scientific journal papers or other publications resulting from riparian restoration research at the WUPA DMW site.

Supporting Data: At the conclusion of the study, the NPS requests pertinent documentation and data for the FLAG Archive at the Museum of Northern Arizona. Examples of useful documentation to be provided to the NPS ATR includes:

* Replicate copies of raw datasets and spreadsheet/database files containing observations and measurements on study variables and responses.
* Legible copy of field notes.
* Blank data recording form(s).
* Provenance records for all planted species not sourced within a radius of 10 miles surrounding WUPA.
* Photographic documentation.

Voucher Specimens: Any plant, animal, or other natural sciences voucher specimens collected within the Flagstaff Area National Monuments (unless they are destroyed during analysis) shall remain public property of the NPS, and the agency shall remain legally responsible for their indefinite curation. The Investigator will coordinate with the Flagstaff Area National Monuments on the cataloging and disposition of any voucher specimens resulting from the study. Sufficient provenience information for all retained specimens should be provided in the Final Report or to the NPS Technical Representative to allow the NPS to update the Automated National Catalog System database. The NPS will be responsible for assigning NPS Museum Catalog numbers and entering records into ANCS+.

**BUDGET:***See attached spreadsheet.*