

**TIER-1 APPLICATION TO THE NEW MEXICO INTERSTATE STREAM COMMISSION
FOR NEW MEXICO UNIT OR WATER UTILIZATION ALTERNATIVE
UNDER THE ARIZONA WATER SETTLEMENTS ACT**

APPLICANT INFORMATION (PRINT OR

DATE:

| | | | | | | | | | | | |
|---|---|-------------|------------|------------|------------|------------|------------|------------|-------|-------|-------|
| <p>1. Legal Name: Gerald J. Gottfried and Daniel G. Neary</p> | <p>2. Organization: U.S. Forest Service, Rocky Mountain Research Station</p> | | | | | | | | | | |
| <p>3. Address (street, city, county, state, and zip code): Rocky Mountain Research Station Tonto National Forest 2324 E. McDowell Road Phoenix, AZ 85006</p> | <p>4. Name, email, and phone number of contract person: Gerald J. Gottfried ggottfried@fs.fed.us 602-225-5357</p> | | | | | | | | | | |
| <p>5. TYPE OF APPLICATION (check one): <input checked="" type="checkbox"/> Final <input type="checkbox"/> Preliminary for review <input type="checkbox"/> Revised</p> | <p>6. TYPE OF APPLICANT (CHECK BOX): <input type="checkbox"/> local governments or municipalities <input type="checkbox"/> soil and water conservation districts, irrigation districts or commissions, acequias, or other political subdivision of the State of New Mexico <input type="checkbox"/> institutions of higher education or a consortium of such institutions <input type="checkbox"/> non-profit organizations or associations <input type="checkbox"/> private individual/s <input checked="" type="checkbox"/> federal agency (ies) <input type="checkbox"/> Other (specify)</p> | | | | | | | | | | |
| <p>7. BRIEF PROJECT DESCRIPTION: The funding is requested to continue a research study on the Cascabel Watersheds in Hidalgo County. The study is evaluating the effects of cool-season and warm-season prescribed fires and a wildfire on the hydrology, erosion, and ecological resources of the oak savannas. The study involves 12 gauged headwater watersheds.</p> | | | | | | | | | | | |
| <p>8. AREAS AFFECTED (describe by county, municipality, township, etc. as applicable): The project is in the Peloncillo Mountains in Hidalgo County. The area drains into Animas Creek on the west side of the Continental Divide.</p> | | | | | | | | | | | |
| <p>9. TOTAL FUNDING REQUESTED (in \$1,000):</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">2012: \$128</td> <td style="width: 20%;">2013: \$42</td> <td style="width: 20%;">2014: \$56</td> <td style="width: 20%;">2015: \$11</td> <td style="width: 20%;">2016: \$65</td> </tr> <tr> <td>2017: \$12</td> <td>2018: \$69</td> <td>2019:</td> <td>2020:</td> <td>2021:</td> </tr> </table> | | 2012: \$128 | 2013: \$42 | 2014: \$56 | 2015: \$11 | 2016: \$65 | 2017: \$12 | 2018: \$69 | 2019: | 2020: | 2021: |
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| 2017: \$12 | 2018: \$69 | 2019: | 2020: | 2021: | | | | | | | |
| <p>10a. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED REQUIREMENTS AND ASSURANCES IF THE PROPOSAL IS ACCEPTED.</p> | | | | | | | | | | | |
| <p>10b. TYPED OR PRINTED NAME OF AUTHORIZED REPRESENTATIVE Gerald J. Gottfried:</p> | <p>11. TITLE: Research Forester</p> | | | | | | | | | | |
| <p>12. PHONE NUMBER: 602-225-5357</p> | | | | | | | | | | | |
| <p>13. SIGNATURE: <i>/s/ Gerald J. Gottfried</i></p> | <p>DATE: 06/27/2011</p> | | | | | | | | | | |

14. Evaluation criteria. Comprehensive responses to criteria A through D should be supported where possible by the best available science and scientific data, studies, models, and, where applicable, cite state, regional, or other water plans. Where such data and information is not available, applications should include best estimates and describe how such information would be obtained. Applications that do not include the requested information will not satisfy Tier-1 standards and, therefore, will not be eligible for Tier-2 consideration. Use Form 14a if needed.

A. State whether the proposal is for the “New Mexico Unit,” a “water utilization alternative,” or both.

The study would fit into both categories. Animas Creek does not drain into the Gila River but water supply and quality are concerns in the Animas Creek Watershed in Hidalgo County. Private and public land managers are using prescribed fire as a tool to restore grasslands that now support shrubs and trees. What are the impacts of prescribed fire and wildfires on water yields and water quality? How does burn severity effect soil stability and permeability? How do the overstory and herbaceous layers respond to fire; how quickly does the land recover? Is there an impact of reduced tree cover on water yields? (Continued on page 9.)

B. Describe how the proposal will meet a “water supply demand” in the Southwest New Mexico Water Planning Region, comprised of Catron, Grant, Hidalgo and Luna Counties.

A. Vegetation manipulations can increase water yields from forests at higher elevations. However, potential water yield augmentation is minimal in drier vegetation such as oak savannas and woodlands. Prescribed fire can reduce the potential for wildfires, which tend to degrade water quality and impair water availability for domestic and agricultural uses. Judicious management of the oak savannas can insure higher natural supplies of high quality water by reducing tree cover and wildfires. Any water yield increases would be available for local landowners and ranchers either as surface water or as augmented groundwater. A program of staged prescribed fires to restore oak savannas and reduce the occurrence of wildfires would ensure long-term supplies of high quality water. Research is designed to answer these questions about water production, water quality, and about maintaining productive ecosystems. The Cascabel Study is evaluating the impacts of fire on birds, deer, reptiles and other wildlife as well as soils. The Cascabel is typical of oak savannas within the Gila Basin, so results should be applicable to a larger area. Oak savannas and woodlands cover approximately 250,000 acres on the Gila National Forest in New Mexico and 847,000 acres on the Coronado National Forest in New Mexico and Arizona.

The Cascabel Watersheds have the potential to monitor any potential climate changes that could impact the Southwest in the future. Many authorities project a drying climate in the Southwest that will impact all ecosystems, and the local economies. If ranching or agriculture becomes too unprofitable, the result could be landscape fragmentation as rural landowners sell out to land developers.

C. Describe how the proposal considers the Gila environment and describe how any negative impacts might be mitigated.

The Cascabel Study is designed to consider the Gila River Watershed environment. It examines an entire suite of natural resources to determine how they are affected by prescribed burning programs and a wildfire. It attempts to determine if there are environmental consequences of cool-season or warm-season prescribed burning to determine if either are detrimental or if both options are beneficial or neutral. Corrective measures can be conducted if any negative impacts are identified during the research. The intensive monitoring instrumentation and sampling grids will allow scientists to monitor the environment for signs of potential climate change.

Future research could examine repeated burning treatments or monitor ecological dynamics and potential climate change effects on water yield and the environment in the oak savannas of the Peloncillo Mountains of southwestern New Mexico.

D. Describe how the proposal considers the historic uses of and future demands for water in the Southwest New Mexico Water Planning Region and the traditions, cultures and customs affecting those uses.

The historic water use in the Animas Valley is by ranches, a few small towns, agriculture around Animas and Cotton City. High quality water in surface and groundwater resources would benefit all water users. Any augmented streamflows, whether as surface water or contributing to ground water, should increase water supplies for traditional uses. Water would benefit wildlife that uses the stream system and the playas near Lordsburg. The Cascabel Watershed Study is conducted in cooperation with the Malpai Borderlands Group and its members, including the Diamond A Ranch.

No archeological sites have been identified within the Cascabel Study area.

Awareness of a changing climate through intensive monitoring would allow private and public entities the ability to prepare for the future. This could result in modification of management strategies to account for a drier and hotter environment. Ranchers and farmers could evaluate alternate crops, irrigation techniques or livestock species and grazing techniques in preparation for a modified environment.

FORM 14A

USE THIS FORM TO COMPLETE ANSWERS TO CRITERIA 1 THROUGH 4. NUMBER EACH ADDITIONAL RESPONSE WITH THE CORRESPONDING CRITERIA NUMBER AND SUB-CRITERIA. USE AS MANY PAGES AS NEEDED.

A. The Cascabel Watershed Study attempts to provide answers about the ecological impacts of burning and burning season (cool-season compared to warm-season), and a wildfire on southwestern New Mexico watersheds. The study is being conducted on 12 gauged watersheds where hydrologic and ecological data are being collected. The prescribed fires and wildfire occurred in 2008. Results have provided information about the impacts of fire on oak woodland and savanna meteorology, hydrology, erosion and sedimentation, vegetation, wildlife, soils, and fuels. The hydrologic instrumentation, which includes sets of Parshall flumes on each watershed and weather stations and gauges, and biological and soil sampling grids are in place and can be used to monitor climate change within the Boot Heel of New Mexico or to evaluate repeated prescribed burning treatments. Long-term data are vital for hydrologic and ecological research, and effective land management since short-term studies may only provide an erroneous snap-shot of the actual long-term dynamics. More than 10 years of data already exist from Cascabel. Long-term monitoring is an essential component of any studies of climate change and can provide public and private land managers with information that allows them to adapt to the changing environment. The Forest Service is requesting financial assistance to continue the Cascabel research into the future. Research results will be used to develop and test hydrologic models for the common oak woodland and savanna ecosystems.

More information about the Cascabel Study and cooperation among private and public partners can be found in:

Gottfried and others. 2009. Private-public collaboration to reintroduce fire into the changing ecosystems of the Southwestern Borderlands Region. *Fire Ecology* 5: 83-98,

and

Gottfried and others. 2007. An ecosystem approach to determining effects of prescribed fire on Southwestern Borderlands oak savannas: a baseline study. *Proceedings of the 23rd Tall Timbers Ecology Conference*: 140-146.

Numerous scientific articles have been published or are in preparation about results from individual studies conducted under the main study plan at Cascabel. Additional information can be found on the Rocky Mountain Research Station web site: <http://www.rmrs.nau.edu/awa/cascabel/> A sample of individual articles can be downloaded or read on the web. A larger bibliography or individual articles can be provided by the principal investigators.

The funding requested in 2012 is to upgrade the hydrologic installations and instrumentation at Cascabel. The original structures were installed under a contract with a company from the Animas Valley.