New Mexico Forest Industry Association

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July 14, 2011

New Mexico Interstate Stream Commission
Attn: Craig Roepke
P.O. Box 25012
Santa Fe, New Mexico 87504-5102

Dear Mr. Roepke,

Attached is a proposal submitted to the New Mexico Interstate Stream Commission for projects to be funded under the Arizona Water Settlements Act.

The New Mexico Forest Industries Association (NMFIA) has assembled an interdisciplinary team to conduct a 10-year forest restoration project aimed at improving water yield and watershed health in the Gila Basin of southwest New Mexico. This project proposes to thin approximately two square miles of overstocked ponderosa pine forests primarily by mechanical thinning near Reserve, New Mexico. Such thinning has been shown to increase water yield by up to 35% in Southwest ponderosa pine forests while at the same time decreasing the potential for catastrophic wildfire. Mechanical thinning will be the primary management tool used to reduce the overstocked forests. The long-term approach is to create a vegetative pattern so the Gila National Forest can maintain the effects of thinning by prescribed burning, which can be used as a cost-effective tool for the long-term management of forest density to maintain watershed health.

The interdisciplinary team includes the Gila National Forest/Quemado District, New Mexico State University Climate Center, New Mexico Department of Game and Fish/Habitat Stamp Program, New Mexico State Forestry/Socorro District, NMFIA, Collaborative Forest Restoration Program/Gila National Forest, Tom Paterson/Grazing Permittee, SWCA Environmental Consultants, and Ellen Soles. These entities plan to work together to secure additional funding sources in order to offset the high cost of National Environmental Policy Act (NEPA) and thinning, such as the Collaborative Forest Restoration Program and the New Mexico Habitat Stamp Program. SWCA Environmental Consultants and Ellen Soles have more than 20 combined years of experience in New Mexico successfully conducting research similar to that being proposed on the effects of forest thinning on watershed hydrology.

Mechanical thinning and the forest products produced from this thinning will produce jobs in this region. The NMFIA has experience coordinating similar efforts in New Mexico. Through worker trainings, its contacts with industry partners in the area, and its direction to pursue a healthy forest through a healthy forest industry, NMFIA will provide the mechanism to perform this project to the benefit of the watershed and New Mexico's citizens.

This proposal complements another proposal being submitted by the Grant Soil and Water Conservation District (SWCD) for similar work in the Burro Mountains and the Black Range of the Gila National Forest referred to as "Paired Watershed Study to Track Soil Moisture and Alluvial Water Response Before and After Brush Treatments in the Gila Watershed Region." That project is a continuation of an ongoing mechanical and prescribed burn thinning project aimed at increasing water yield, and the NMFIA and the Grant SWCD would like for these two projects to be considered as a combination for improving watershed hydrology using thinning and prescribed burning scenarios.

We look forward to working with the New Mexico Interstate Stream Commission on this important watershed health project. Please contact me if you need any additional information.

Sincerely,

José J. Varela López
Executive Director
New Mexico Forest Industry Association
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TIER-1 APPLICATION TO THE NEW MEXICO INTERSTATE STREAM COMMISSION
FOR NEW MEXICO UNIT OR WATER UTILIZATION ALTERNATIVE

APPLICANT INFORMATION (PRINT OR TYPE ONLY) **DATE:**

1. Legal Name: New Mexico Forest Industry Association	2. Organization: Non-Profit Association
3. Address (street, city, county, state, and zip code): PO Box 32191 Santa Fe, NM 87594-2191	4. Name, email, and phone number of contract person: José Varela López, Executive Director Ph: 505-660-5828 Email Address: jjvlchimex@aol.com
5. TYPE OF APPLICATION (check one): [ ] Final [x] Preliminary for review [ ] Revised	6. TYPE OF APPLICANT (CHECK BOX): [ ] local governments or municipalities
7. BRIEF PROJECT DESCRIPTION: To enhance surface water yield and watershed health in the San Francisco Basin of New Mexico and to mitigate the potential development of additional Southwest New Mexico Water Planning Region water resources under the auspices of the AWSA.	[ ] soil and water conservation districts, irrigation districts or commissions, acequias, or other political subdivision of the State of New Mexico [ ] institutions of higher education or a consortium of such institutions [X] non-profit organizations or associations
8. AREAS AFFECTED (describe by county, municipality, township, etc. as applicable):Catron, San Francisco River Basin	[ ] private individual/s [ ] federal agency (ies) [ ] Other (specify)

9. TOTAL FUNDING REQUESTED (in $1,000):

2012: $339,000	2013: $100,000	2014: $100,000	2015: $1,180,000	2016: $100,000
2017: $100,000	2018: $100,000	2019: $100,000	2020: $100,000	2021: $100,000

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 GOVERNI9NG BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED REQUIREMENTS AND ASSURANCES IF THE PROPOSAL IS

10b. TYPED OR PRINTED NAME OF AUTHORIZED REPRESENTATIVE: José Varela López	11. TITLE: Executive Director	12. PHONE NUMBER: 505-660-5828
13. SIGNATURE:		DATE: July 14, 2011

The New Mexico Forest Industries Association (NMFIA) has assembled an interdisciplinary team to conduct a 10-year forest restoration project aimed at improving surface water yield and watershed health in the San Francisco Basin of southwest New Mexico. This project proposes to thin two square miles of overstocked ponderosa pine forests primarily by mechanical thinning near Reserve, New Mexico. Such thinning has been shown to increase water yield by up to 35% in Southwest ponderosa pine forests while at the same time decreasing the potential for catastrophic wildfire. Prescribed burning and mechanical thinning will be the primary management tools used to reduce the overstocked forests. The long-term approach is to create a vegetative pattern so the Gila National Forest can maintain open stand forests by prescribed burning. Prescribed burning may be used as a cost effective tool for the long term management of forest density to maintain watershed health.

The interdisciplinary team includes the Gila National Forest/Quemado District, New Mexico State University Climate Center, New Mexico Department of Game and Fish/Habitat Stamp Program, New Mexico State Forestry/Socorro District, NMFIA, Collaborative Forest Restoration Program/Gila National Forest, Tom Paterson/Grazing Permittee, SWCA Environmental Consultants (SWCA), and Ellen Soles. These entities plan to work together to secure additional funding sources in order to offset the high cost of National Environmental Policy Act (NEPA) and thinning, such as the Collaborative Forest Restoration Program and the New Mexico Habitat Stamp Program. SWCA and Ellen Soles have more than 25 combined years of experience in New Mexico successfully conducting similar research on the effects of forest thinning on watershed hydrology.

1. State whether the proposal is for the "New Mexico Unit," a "water utilization alternative," or both.

This project is a water utilization alternative based on the definition in the Arizona Water Settlement Act (AWSA) Evaluation Process, Schedule, and Application, March 23, 2011, which states "water utilization is a project or activity that does not develop additional water from the Gila basin above that allocated to New Mexico prior to the 2004 AWSA or does not require exchange of CAP water for additional depletions by New Mexico in the Gila basin." The primary objective of this project is to enhance surface water yield and watershed health in the San Francisco Basin of New Mexico and to mitigate the potential development of additional Southwest New Mexico Water Planning Region water resources under the auspices of the AWSA.

2. 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.

The principal water demand in the Southwest New Mexico Water Planning Region, especially the San Francisco Basin, is for agricultural irrigation at 80% of total usage (Southwest Regional Water Plan 2004). The most recent water budget for the San Francisco Basin is balanced; therefore, no additional water is currently available for

consumptive use (Southwest Regional Water Plan 2004). The purpose of this proposed project is to restore San Francisco Basin watershed health, increase surface water yield or supply, and improve water quality and reduce the potential for catastrophic wildfire. The AWSA allows for additional water development in the San Francisco Basin, and this proposed project aims to increase surface water supply that may mitigate future water development and allocation in the basin.

Increased water yield or water supply should result from forest thinning and/or prescribed burning of select overstory trees. One of the most researched sites for forest water yield studies has been the Beaver Creek Watershed, Coconino National Forest, Arizona (Brown et al. 1974; Clary et al. 1974; Baker 1982, 1986). At this experimental forest site, researchers found that thinning of ponderosa pine woodlands (with reductions in basal area up to 120 square feet/acre) generate stream flow increases of 35% (Johnson 1996).

In order to see if this may occur in the San Francisco Basin as well, a scientifically sound study design using the paired watershed approach will be implemented. This approach will objectively quantify the effects of forest thinning treatments on watershed runoff, soil moisture, and soil erosion from vegetation management responses. An objective of this management approach is to establish an herbaceous understory capable of sustaining fire return intervals of five to eight years. Current overstock forest conditions do not support an herbaceous understory capable of carrying frequent low-severity surface fires (Figure 1).

Project methods will include measurements of stand structure, herbaceous understory, soil moisture, stream runoff, shallow groundwater levels, rainfall, ambient temperature, and relative humidity. The New Mexico Climate Center will model evapotranspiration levels in the paired watersheds (Figure 2) using data from mini-meteorological stations that will be installed in each watershed to accurately record precipitation inputs (Figure 3). Stream piezometers (Figure 4) will be used to measure surface water runoff from the watersheds, and shallow groundwater piezometers (Figure 5) will be used to measure shallow groundwater levels in response to the forest thinning treatments. The project will evaluate hydrologic changes and interactions between soil moisture, groundwater, surface water, and climate before and after thinning where vegetation is altered to enhance watershed function and restore a natural fire regime. This multidisciplinary forest/watershed management approach to forested landscapes throughout the basin will have applicability to the entire Southwest New Mexico Water Planning Region to meet growing regional surface water demands.

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

The Gila River system in New Mexico provides valuable water resources for a variety of human uses and supports a variety of habitats for wildlife and a number of federally and State of New Mexico protected species. Those aquatic and riparian environments are fragile and highly sensitive to changes in water availability and water quality. Therefore, proper management of water resources and those associated environments and species are

critical to water management within the Southwest New Mexico Water Planning Region. Some of the key water management issues identified in the Southwest Regional Water Plan (2004) relative to regional water-related environmental concerns include:

1. In the northern to central part of the region, surface water from the Gila and San Francisco Rivers supplies agricultural demands. Recent legislation has provided a mechanism for allowing greater withdrawals from the Gila and San Francisco Rivers in exchange for use of Central Arizona Project (CAP) water downstream. Determining how to use the additional water without adverse environmental impacts is a key planning issue.
2. A large portion of the Southwest Region consists of National Forest and private forested lands. Watershed management in these areas is important, to guard against catastrophic forest fires, to protect water quality, and potentially to increase yields in key areas.

3. The largest water use in the region is irrigated agriculture. Water planning issues associated with the agricultural sector include the potential for agricultural water conservation, as well as mechanisms for short-term leasing of agricultural water rights, such as water banking (Southwest Regional Water Plan 2004).

This proposed project is intended to address all three of the above Southwest New Mexico Water Planning Region management concerns within the San Francisco Basin. Specifically this project will:

Increase surface water yield for agricultural use without adverse environmental impacts, and at the same time improve overall watershed health and environmental integrity.

Address watershed management in forested ecosystems to reduce the potential for catastrophic wildfire and soil erosion, and to enhance water quality and to potentially increase surface water yield or supply, especially for agricultural irrigation.

Ecological and hydrological processes are interrelated in water-limited environments such as the ponderosa forests of the Southwest. Densely forested watersheds, characteristic of the degraded southwestern ponderosa pine woodlands, have been linked to decreasing total stream flows, peak flows, base flows, and overall water yield (Middleton and Thomas 1997). Southwestern ponderosa pine woodlands have for the last 20 years or so been the focus of restoration under the auspices of water resource management, where treatments are targeted at restoring pre-settlement hydrology and water yield. Many studies have attempted to quantify the hydrologic effects of such restoration, with varying results (Keppeler and Zeimer 1990; MacDonald and Stednick 2003; Ice and Stednick 2004).

Most water yield studies have used a paired watershed approach to assess the effect of excess tree removal. Time-trend studies have also been completed; however, they are often criticized as having no climatic control to separate vegetal cover effects from

climatic effects. Hibbert (1967) made the following observations regarding forest disturbance effects on water yield: 1) reduction of forest cover increased water yield, 2) establishment of forest cover (reforestation) decreased water yield, and 3) response to treatment is highly variable. More recent studies (more than 94 in number) have had similar findings, with the additional claim that the magnitude of change in water yield is most strongly related to the amount of precipitation and the intensity of the treatment.

Ponderosa pine and mixed-conifer communities in the Southwest, like those within the San Francisco Basin, have experienced major changes in ecological structure, composition, and process over the last century (Cooper 1960; Covington et al. 1997; Fulé et al. 1997; Allen et al. 2002). Before Euro-American settlement, Southwestern ponderosa pine woodlands were composed of low-density, park-like stands with a dense grass understory and highly flammable leaf litter. Historically these forests experienced frequent low-intensity wildfire, creating heterogeneous forest spatial patterns at local and landscape scales. Disruption to the natural fire regime, harvesting, and intensive grazing practices of these forests has drastically altered their historic structure and has made them extremely vulnerable to unnaturally severe stand-replacing fires, insect outbreaks, excessive soil erosion, and other deviations from historic conditions.

Based on available information we believe that watershed forest thinning within the San Francisco Basin will increase surface water yield for agricultural uses downstream, improve water quality, enhance wildlife habitat, reduce the potential for catastrophic wildfires and soil erosion, and improve the environment for human recreation.

We will work directly with the U.S. Forest Service as the NEPA process is being followed for this and other watershed projects in the region. Through this process the U.S. Forest Service will be able to identify the potential negative impacts associated with this project. As potential impacts to the natural ecosystem are identified during the planning process, mitigation measures will be identified and implemented prior to impacts. Some of the potential negative impacts associated with this project may include the use of mechanized equipment, which has the ability to alter surface soils and hydrology, destroy herbaceous vegetative cover, and introduce exotic weeds. Mitigation measure such as soil surface smoothing, revegetation of the two-track roads, and cleaning of equipment are a few ways to alleviate these impacts. Potential threatened and endangered species in the project area will be evaluated prior to any on-site activities, and if potential for threatened and endangered species are identified, surveys will be conducted prior to on-site activities. If found, mitigation measures will be taken to ensure the restoration is done in such a way as to avoid any negative impacts to the species.

This project also has the potential to help mitigate new water development activities within the San Francisco Basin by increasing surface water yield to compensate for any increased withdrawals up to the 4,000 acre-feet allowed by the AWSA. New water development projects funded by the AWSA have the potential to negatively impact the San Francisco Basin aquatic and riparian environments and native wildlife species; however, this project has the potential to mitigate those impacts by potentially adding more surface water to the San Francisco River system.

4. 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.

Surface water in the San Francisco Basin has historically been used primarily for agricultural irrigation (Southwest Regional Water Plan 2004). The agricultural communities within the San Francisco Basin are dependent on water for irrigation to sustain their livelihoods; however, population growth and increasing drought conditions across the region are leading toward increased surface water demands and decreased surface water supply. Future anticipated water demand in the Southwest New Mexico Water Planning Region has been projected to continue to dominated by agricultural irrigation with a projected water balance gap in Catron County to be a 114-acre-foot deficit by 2040 (Southwest Regional Water Plan 2004).

The primary objective of this proposed watershed improvement project is to demonstrate that forest watershed yield or supply can be increased through appropriate forest watershed management practices. Such an increase in water supply could alleviate the projected water balance deficit for the San Francisco Basin, and the entire Southwest New Mexico Water Planning Region if adopted on the broader forested landscapes throughout the region. Thus, this project may demonstrate how surface water supply may be increased in a sustainable way to maintain regional cultures, customs, and traditions by accommodating future water demands. Additionally, an increase in forest thinning management in the region would improve and increase habitat for game wildlife species, such as mule deer, elk, wild turkey, and game fish species, which would lead to increased opportunities for game hunting and fishing. Removal of trees from overstocked watersheds also would lead to employment opportunities in the forest products sector to market trees and other wood products produced through the thinning process. A goal of this watershed management approach is to use prescribed fire as a management tool that can be used cost effectively on a local level without the need for large outside funding sources.

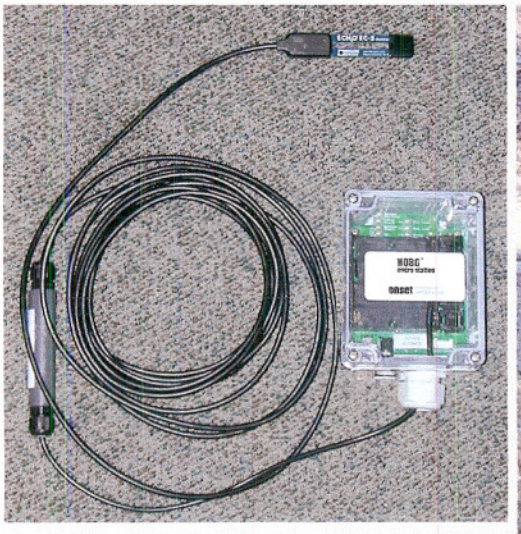
FIGURES

Figure 1. Current conditions at the Reserve site, overstock forests with little herbaceous understory.

Figure 2. New Mexico State University Climate Center Staff weather station at a site in the Burro Mountains.

Figure 3. A mini-weather station used by SWCA to monitor watershed rainfall inputs in the Manzano Mountains for a forest thinning monitoring project.

Figure 4. A stream piezometer used by SWCA to monitor watershed stream levels in the Manzano Mountains relative to forest thinning.



Above, assembled soil moisture sensor and datalogger. Each logger accepts up to four sensors. Right, installing a recording pressure transducer in stream channel piezometer.

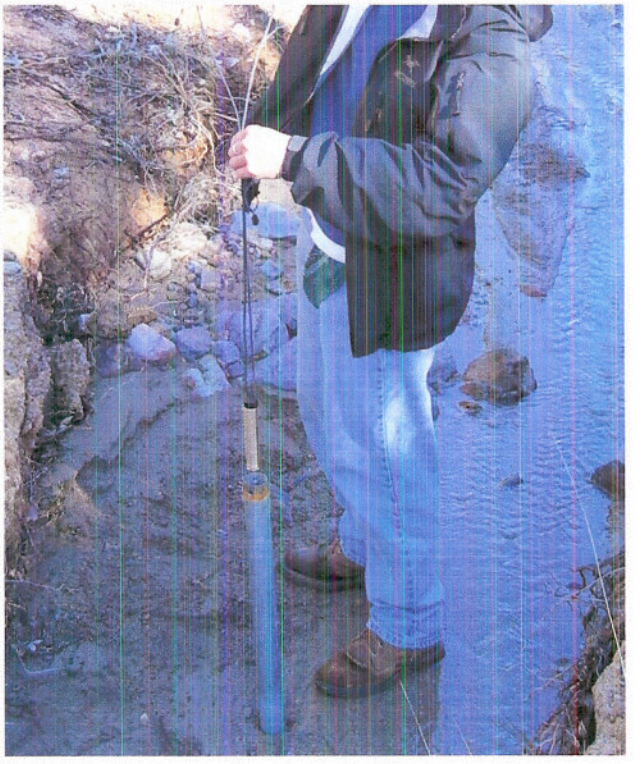


Figure 5. Soil moisture sensor and stream channel piezometer used by Ellen Soles to monitor stream groundwater levels relative to forest thinning in the Burro Mountains.

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