# Taos County Return on Investment Study for the Rio Grande Water Fund

**Executive Summary**
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## Executive Summary

The Rio Grande Water Fund ("RGWF" or "Water Fund") is an initiative of the Nature Conservancy ("TNC") and partners to "accelerate ecological restoration of forests throughout the upper Rio Grande watershed for communities, fish and wildlife, wildfire protection, and clean-water security" by proactively addressing the threat of catastrophic fire, and the associated impacts on people and watersheds, through landscape-scale forest restoration treatments. The purpose of this study is to quantify the return on investment for funding forested watershed restoration near Taos. The study analyzes two representative fire scenarios in Taos County, which itself is a portion of the RGWF's focal area on the west slope of the Sangre de Cristo Mountains in Northern New Mexico.

**Fire Scenarios:**
We use fire-modeling software (FSIM) to develop the representative fires, each of which is simulated under two landscape conditions: one reflecting the current fuel conditions in Taos area forests ("without treatment"), and the other representing improved forest conditions after restoration treatments ("with treatment"). We use weather parameter assumptions based on those observed during the Las Conchas fire in 2011. The difference in impacts allows us to gauge the reduction in damages due to the Water Fund's proposed treatments in the event the representative fire occurs. Comparing this reduction in damages with cost of treatments yields an estimate of the net benefits of Water Fund investment for each fire scenario in the event that the fire actually occurs. Due to modeling constraints, we do not estimate the likelihood or timing of wildfires needed to calculate the probability that the fire scenarios will actually occur, though the modeled fires are consistent with recent observed fires in northern New Mexico. Fire 1, the smaller event, occurs in the Taos Ski Valley area and results in 51,919 burned acres in the "without treatment" case. Fire 2 occurs in the Peñasco/Pot Creek area and is substantially larger at 155,052 acres burned under current conditions. Locations of the two fires are presented in the map below.

For the purposes of this study, the assumed treatment area was drawn from the Taos Valley Watershed Coalition's Landscape Restoration Strategy (available at allaboutwatersheds.org/library/inbox/tvwc-landscape-restoration-strategy/view ) and therefore reflects the most recent planned programmatic implementation of the Water Fund in Taos County. Total treatable acreage for this area was estimated to be 101,647 acres of which 4,629 are Wildland-Urban Interface ("WUI") acres on private lands. Treatment acreage was held constant across both fires, reflecting the reality that the decision to treat is made prior to knowing where fires will occur. The map below depicts the treatments planned under the Landscape Restoration Strategy by treatment approach, along with the perimeters for the two representative fires.

As expected, fires were substantially less damaging in the "with treatment" scenarios (i.e. after RGWF implementation). While this result reflects the fire mitigation objective of RGWF, we developed a higher impact assumption out of conservatism to avoid overestimating treatment benefits.

**Results:**
Quantifiable damages from Fire 1 total $107 million. Based on methods described in this report, the estimated damages from the same fire after RGWF fuel treatments are estimated at approximately $17 million. **The value of reduced fire impact from RGWF treatments for Fire 1 is $90 million, while the cost of the treatment program is $58 million; quantified benefits outweigh costs by almost $33 million.** This is equivalent to a realized return on investment of 57%. The table below shows benefits by category for Fire 1.

***Results – Fire Scenario 1 (Taos Ski Valley)***

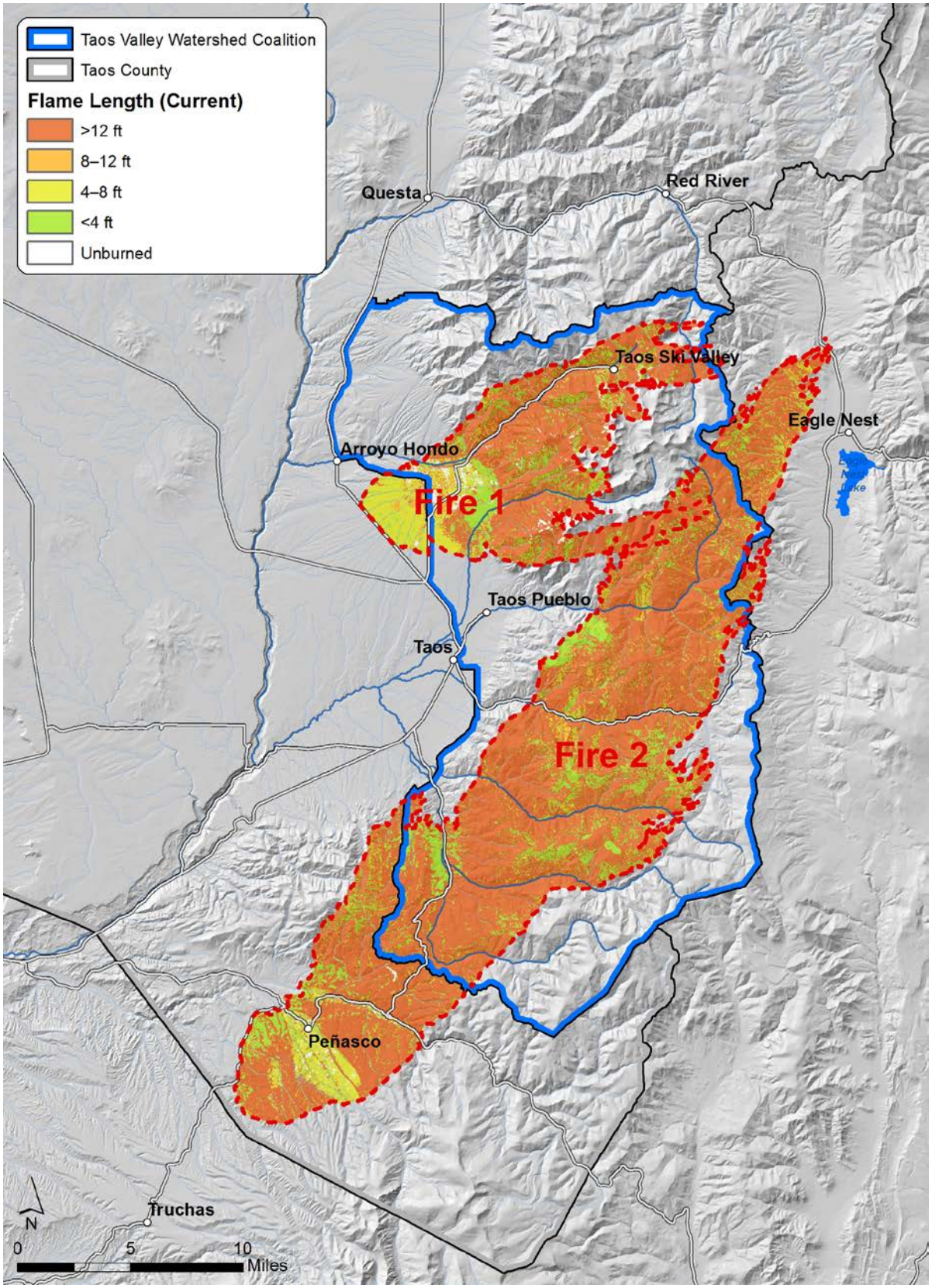
| Category | Present Value (2015$m) | | |
|---|---|---|---|
| | w/o RGWF | w/ RGWF | Benefit |
| Treatment | $0 | $57.9 | -$57.9 |
| Suppression & Recovery | $13.3 | $2.0 | $11.3 |
| Property | $52.5 | $8.1 | $44.4 |
| Infrastructure | $0.6 | $0.1 | $0.5 |
| Surface Water | $7.4 | $1.7 | $5.7 |
| Industry | $27.6 | $3.8 | $23.8 |
| Personal Use | $0.5 | $0.1 | $0.4 |
| Heath | $5.2 | $0.7 | $4.5 |
| Other | $0.1 | $0.0 | $0.0 |
| TOTAL | **$107.3** | **$74.6** | **$32.8** |

Estimated damages from Fire 2 total $149 million. If the same fire scenario were to unfold after RGWF fuel treatments, **we estimate the damages would total approximately $23 million, implying that the Water Fund's activities would reduce damages of Fire 2 by some $126 million**. When combined with the estimated $58 million in costs for currently planned RGWF treatments in the TVWC planning area, the quantified benefits still outweigh the costs by $68 million. This is equivalent to a realized return on investment of 118% in the Fire 2 scenario.

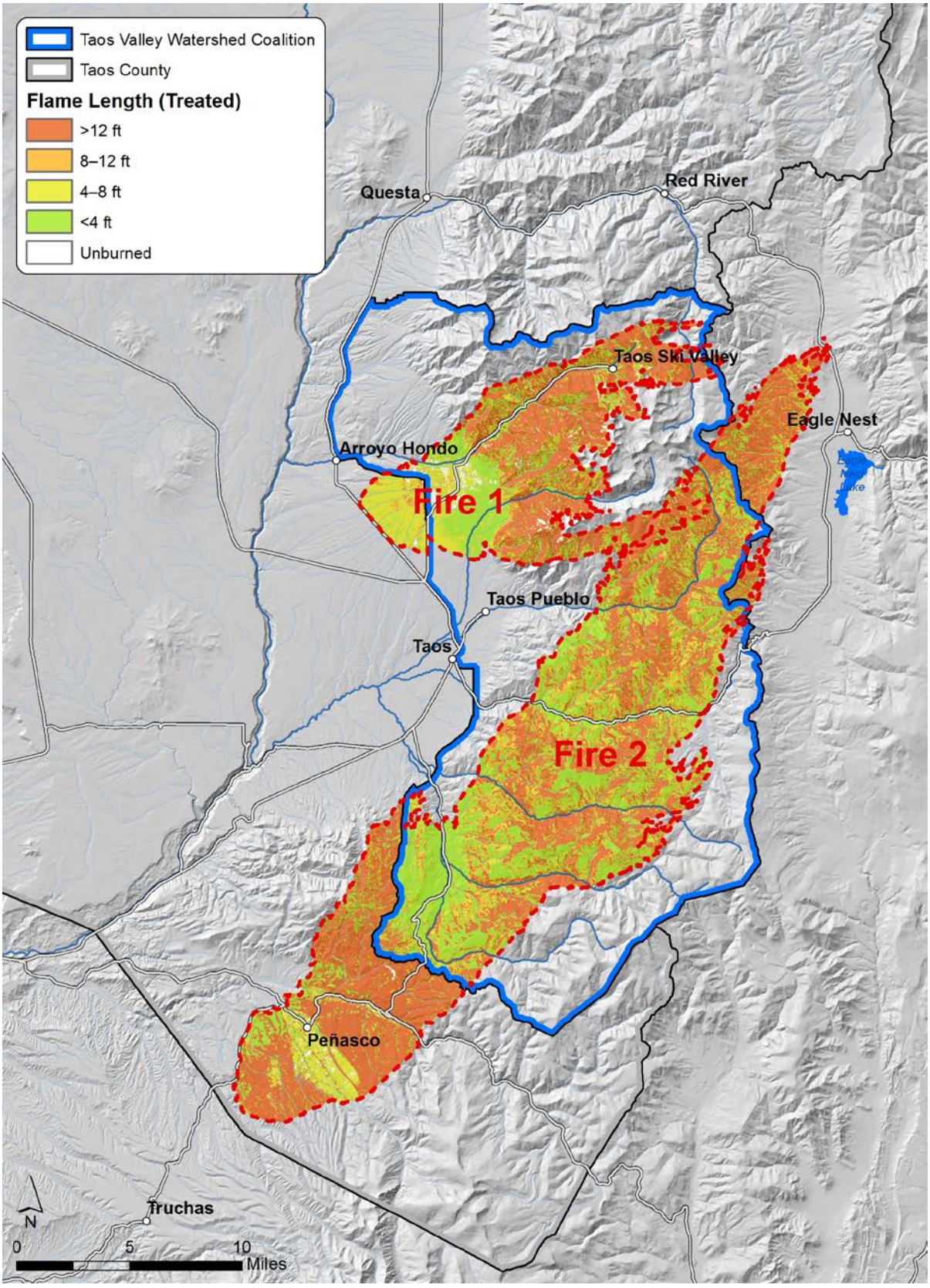
***Results – Fire Scenario 2***

| Category | Present Value (2015$m) | | |
|---|---|---|---|
| | w/o RGWF | w/ RGWF | Benefit |
| Treatment | $0 | $57.9 | -$57.9 |
| Suppression & Recovery | $41.2 | $6.2 | $35.0 |
| Property | $61.7 | $9.5 | $52.2 |
| Infrastructure | $4.4 | $0.7 | $3.7 |
| Surface Water | $7.4 | $1.7 | $5.7 |
| Industry | $27.8 | $3.8 | $24.0 |
| Personal Use | $1.1 | $0.3 | $0.8 |
| Heath | $5.2 | $0.7 | $4.5 |
| Other | $0.3 | $0.1 | $0.1 |
| TOTAL | **$149.1** | **$81.0** | **$68.2** |

**Discussion and Conclusion:**
Our analysis clearly demonstrates that investment in RGWF fuel treatments dramatically reduces the potential financial impacts from severe wildfire, and that the value of this reduction outweighs the cost of program implementation by $32.8 to $68.2 million for fires 1 and 2 respectively.




**Representative fires under current conditions.**




**Representative fires after treatments.**

Limitations: This result is based on our "representative fire" methodology grounded in the specific event where one of the two fires occurs. The actual realized value of RGWF implementation in Taos County would depend on the number and distribution of future fires, which is, of course, unknown. Results can be scaled to provide some insight into the range of outcomes. For example, if both Fire 1 and Fire 2 were assumed to occur, then an estimated $216 million in combined damages would be avoided. This reduction would occur at the same RGWF treatment cost of $58 million, implying net benefits of $158 million (because RGWF implementation must only be funded once).

The RGWF functions as natural insurance, the benefits of which would increase with larger or more frequent fires. By the same token, if no fire were to occur, there would be no "benefit" of RGWF under this method. While we do not attempt to project the likelihood that our representative fires would occur, both fires are well within the spatial scale and intensity of recent actual fires in New Mexico. Fires could occur in larger or smaller sizes, in locations more perilous or relatively benign, and in greater or fewer numbers. The economic case for the RGWF will vary accordingly, with our representative fire scenarios one plausible outcome among many.

Distribution of Benefits: Unsurprisingly, the bulk of benefits accrue to Taos County, where the Water Fund succeeds in protecting property valued at $44-52 million from destruction. Avoided costs of fighting fire are substantial, with $11 and $35 million respectively in savings due to RGWF in the two fire scenarios. Estimated downstream benefits to municipal water providers are somewhat lower, due to the distance from Taos to urban centers, the location of Cochiti Reservoir, which can mitigate sedimentation, and the ability of utilities to switch to alternative sources of water during periods of poor water quality.

Importantly, while this study is a reasonable approximation of the benefits of the larger RGWF program for Taos County, which would receive few benefits from downstream or Rio Chama focal areas, it is only a minor portion of the total benefits expected to accrue to downstream stakeholders in the Middle Rio Grande valley. Future studies will be needed to quantify the return on investment to downstream users of RGWF treatments in the other focal areas, some of which are more critical water sources for municipal and agricultural use.

Other Values: This study focused primarily on conservative estimation of financial benefits substantiated in market values for property, goods, and services with the potential to be impacted by wildfire in the study area. Using financial values is appropriate for stakeholders contemplating investing financially in RGWF alongside other potential uses of capital. This approach is inherently conservative—if RGWF provides an attractive investment based solely on market values, then the broader societal economic case for protecting and restoring other environmental, cultural, and other resources only bolsters value of the Water Fund. Finally, non-market valuation is inherently difficult and controversial, and avoiding questionable assumptions is desirable in gaining acceptance of the analysis.

Several benefits were not explicitly included in the study's estimates of value, including economic multiplier effects, the value of some lost infrastructure where specific data were not readily available, consumer surplus related to increased satisfaction with healthy forests, cultural and spiritual values related to Taos Pueblo lands, heritage values of traditional acequia irrigation, and ecosystem services related to ecological function, wildlife habitat, and carbon sequestration. Their exclusion is not intended to imply minimal value – to the contrary the non-market values in these areas are expected to be substantial. Additionally, reduced chronic risk and increased watershed resilience can allow other long-term investments and avoided adaptation costs that are not captured in individual fire scenarios. Importantly, all of these values are expected to increase the net benefit of RGWF implementation, bolstering the case for investment above that presented in our formal estimates of economic benefits.

Even under our conservative approach, RGWF implementation in Taos County is expected to yield benefits that vastly outweigh implementation cost.