Linking Forests to Faucets: Investigating Alternative Approaches for Securing Long-Term Funding for Watershed Restoration in New Mexico

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Author Note

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Introduction

Due to a mix of inter-related human and natural factors, such as climate change, drought, beetle damage, 20th century fire suppression policy and associated hazardous fuels build-up, and the expansive growth of the Wildland-Urban Interface (WUI), many montane forests in New Mexico (NM) and elsewhere in the western United States (US) have become increasingly susceptible to high-severity wildfires. Critical sources for public drinking water systems often originate in montane forests, where wildland fires can alter hydrologic systems, and degrade watersheds, while creating significant runoff, debris, and water quality impacts downstream. As the impact of high severity wildfires expands significantly beyond the proximal burn area, the scale of institutional arrangements does not match, and old rules for forest management and wildfire risk mitigation often fail. Recent efforts in NM have sought to bring together land owners and managers, water users, and other stakeholders to address forest management and watershed restoration at these new regional scales. Current forest and watershed efforts are not sufficient to significantly reduce high regional wildfire risk. A critical issue is the creation of sustainable, long-term funding mechanisms for financing greatly expanded watershed restoration efforts to mitigate wildfire risk.

There have been a number of recent efforts in the Middle Rio Grande of NM, and surrounding forests and watersheds of northern NM targeted at securing funding and increasing the rate of forest and watershed restoration to mitigate the risk of high severity wildfires. These efforts have happened at several different scales, including introduction of a payments for forest ecosystem services program in the Santa Fe, NM municipal watershed, and the work to create collaborative funding mechanisms for forest thinning by the Rio Grande Water Fund (RGWF).

In the 2015 NM State Legislature, several bills regarding watershed restoration were advanced, but eventually failed.

The objective of this research is to conduct a policy analysis of the feasibility, appropriate scale, and advantages and disadvantages of the primary alternative institutional arrangements for securing long-term funding for NM watershed restoration. Borrowing heavily from the work of institutional scholar and Nobel laureate Elinor Ostrom (Bish, 2014), we apply a theoretical framework (McGinnis & Ostrom, 2014) for looking at interconnected social-ecological systems, the development of these policy problems, and the efforts to address them, in order to highlight institutional variables that may be important for connecting forest health and forest land owners with downstream water users. Upstream forests are already understood to be connected downstream in natural systems, though policy and financing of land management is not. Of note, we observe that using payment for ecosystem services models as a guide, rather than a panacea, has developed arrangements that are tailored to their purpose and deviate from the traditional payment for ecosystem services arrangements. The polycentric nature of governance in the US ensures that new arrangements work alongside myriad jurisdictions, and should be focused on meeting needs for long-term watershed restoration planning. Finally, we argue that the recent failure to create new state-level policies for watershed restoration may be viewed as a positive or temporary setback, if it sets the stage for more successful efforts in the future. NM's Strategic Water Reserve, established in 2005, provides an example of creating a policy mechanism without a financing mechanism, which may have resulted if the 2015 Forest & Watershed Restoration Act (FWRA) had passed. As part of this research, key connections with policy networks are already been established (e.g., collaboration with The Nature Conservancy). The expected result of this analysis is to elucidate and inform public debate in NM.

Background

Overview. Noting that every ecosystem is part of a watershed, Greiber (2009) described how water, as it moves through a landscape to downstream water users and other ecosystems, is enhanced, supported, and regulated by that landscape. The quality, quantity, and temporal characteristics of the water flowing into and within rivers is determined by the geography, geology, soils, vegetation, and land use and other anthropogenic activities within the watershed (Smith, de Groot, & Bergkamp, 2006). Therefore, water-related ecosystem services are closely tied to the places that they originate—a fact that places emphasis on the scale of Payment for Ecosystem Services (PES) projects. Local governance is a likely component of project success (Greiber, 2009). Scaling up of watershed restoration in northern NM from only National Forest lands (in the case of the Santa Fe Municipal Watershed) to include at least seven different federal and state agencies, multiple local governments, several conservation areas and tribes, and many private ownerships, means that new mechanisms may be necessary to coordinate contributions and diverse interests, and administer implementation with a multitude of stakeholders. Further, the identification of stakeholders is an important part of developing a PES program. In the case of the Santa Fe Municipal Watershed (SFMW), there are a limited number of stakeholders: the U.S. Forest Service (USFS), the City of Santa Fe, NM, and a water utility and its users. RGWF is planned to involve many more actors, including Albuquerque, NM (as far as 200 miles downstream). The misidentification of stakeholders may lead to "free-riding" by beneficiaries. The possibility of leaving out beneficiaries and potential donors can increase with the breadth of the PES scheme. The United Nations Economic Commission for Europe (UNECE, 2007) noted that the involvement of all stakeholders ensures ownership, integration of knowledge, and greater financial contributions. UNECE also noted that the valuation of ecosystem services is affected by

scale: small studies often underestimate values that exist at larger scales, and large projects have difficulty in using indirect methods of valuation across larger land units for services that are not traded in actual markets.

Contextual background.

New Mexico background. To begin with a prominent, high-profile example: in 2011, the Las Conchas Fire burned over 156,000 acres of forest in northern NM. Half of the burn area covered the Santa Fe National Forest, 14% was within Pueblo lands, and 3% was private property (Southwest Fire Science Consortium [SFSC], 2011). The fire also burned one third of the Valles Caldera National Preserve (Parmenter, 2011) and most of the Bandelier National Monument (National Park Service, 2012). Rains following the Las Conchas fire created large ash and debris flows into the Rio Grande River, such that downstream water utilities in Albuquerque and Santa Fe, NM were forced to shut down water withdrawals, used for drinking water, to avoid damage to river-water facilities (The Nature Conservancy [TNC], 2014a). Sediment and ash that enter reservoirs must be dredged to avoid damming and adverse impacts to water withdrawals that can continue for extended periods (City of Santa Fe Water Division [SFWD], 2013). Walter and Chermak (2014, as cited in TNC, 2014a) estimated that the total costs of the Las Conchas fire are between $156,000,000 and $336,000,000 (between $998/acre and $2,150/acre).

Although frequent, low-severity fires are normal in ponderosa pine and dry mixed–conifer (PP–MC) forests in NM (Swetnam & Baisan, 1996), suppression of natural fires over the past 110 years has changed forest structure and fuel loads so that there is increased risk from fires. However, it is difficult to accurately determine the number of acres that burn each year in the state. From 1980 to 2013, based on reporting from the USFS and U.S. Department of Interior (DOI) agencies, both the number of acres burned by wildfire in NM and the number of wildfires

greater than 1,000 acres increased (Figure 1). The share of burned acres due to larger fires (more than 1,000 acres) was 50% or greater in 20 of the last 25 years (1989–2013). The National Interagency Fire Center (NIFC, 2015a) developed similar statistics for total wildfire acres, including state lands, for years 2002–2014. These data show that some acres defined as NM State lands may have been classified under federal agencies by USFS and DOI reporting, or vice-versa. An assessment of federal fire occurrence data by Brown, Hall, Mohrle, and Reinbold (2002) observed that 10% of USFS data 1970–2000, in some databases, may be unusable due to incorrect spatial coordinates, duplication, and incomplete records. Unusable records for DOI agencies were estimated to be 30% overall for the period, with most agencies having a trend of decreasing percentage of usable records 1980–2000. The RGWF Comprehensive Plan (TNC, 2014a) used multiple data sources (although they are unsourced), and showed a similar trend of increasing acres burned from 1985 to 2013 in the state, noting that the largest fire recorded in NM (Las Conchas in 2011) was more than five times the previous record. The RGWF also noted that wildfire severity, including the percentage of trees that die and seeds that do not survive, has increased.

Increasing wildfire risk can be connected to areas where there is high debris flow risk in order to predict where the greatest downstream impacts may happen (Cannon et al., 2009). In determining focal areas for forest and watershed management, RGWF used multiple data models, giving greater weight to potential fire risk and water quality and supply, including debris flow risk. Finney, McHugh, Grenfell, Riley, and Short (2011) simulated the occurrence and growth of fires in 134 Fire Planning Units in the US using the large-fire simulation system (FSim), including modules for weather, historical large fire occurrence, fire growth, and probability of containment. This simulation was focused on NM to output the likelihood of

wildfire and annual burn probability in the East Mountains (including the Sandia and Manzanos Mountains) (TNC, 2014b). The FlamMap model (Finney, 2006) has also used topography, fuels and fuels moisture, and weather, to estimate the probability of forest crown fire. By linking these outputs to debris flow modeling from the U.S. Geological Survey (USGS) Landslide Hazards Program (Cannon et al., 2009), the RGWF was able to estimate debris flow risk to watersheds. Using the same predictors of debris flows, including slope, soil type, and burn severity, the RGWF developed a rapid assessment of the northern Rio Grande watershed (Figure 2) to identify priority areas for forest and watershed management. A more general analysis, adding factors of economic opportunity (timber and biomass availability), forest health (risk of tree mortality), and the presence of crucial wildlife habitat has also been applied to the entire state (Figure 2) to identify other subwatersheds in need of restoration.

With increased risk from fire partially resulting from the structure of forests and fuel loads, forest thinning and allowing natural and prescribed fires to burn have been noted as potential forest restoration strategies (Allen et al., 2002). SFSC observed that the Las Conchas Fire was moderated in areas where there had been recent fires. Hazardous fuel reduction practices in some areas assisted firefighters in preventing or reducing the northern spread of the fire (SFSC, 2011). Data from NIFC (2015a) show that NM utilized prescribed burns sparingly 2002–2013 (totaling 6,648 acres). Prescribed burn acre estimates more closely agree (than wildfire acres) between NIFC and USGS data (identical in 11 out of 12 years, 2002–2013), shown in Figure 1. In some years, prescribed burns of all land types exceeded the number of acres burned by wildfire, and increased during higher wildfire years as a wildfire management strategy. Before peaking at more than 245,000 acres in 2011 (the year of the Las Conchas fire), the average number of annual prescribed burn acres 2002–2010 was 68,000, primarily from

USFS (see Collaborative Forest Landscape Restoration Program discussion below). In addition, the RGWF Comprehensive Plan (TNC, 2014a) estimated that 3,000–5,000 acres of forest have been mechanically thinned each year in the Rio Grande and Rio Chama headwaters (the RGWF area in Figure 2).

Finney et al. (2007) noted that thinning and prescribed burn treatments, optimally 1% to 2% of a land area each year, could provide reduced fire spread rate, wildfire size, and burn probability for 20 years, beyond which continued treatment would be needed to maintain benefits. Therefore, of the 1,600,000 acres of PP–MC forest that have been identified in the Rio Grande and Rio Chama headwaters, 16,000–32,000 acres would need to be treated each year. This is between a three- and ten-fold increase in thinning treatments. RGWF has set a goal of treating 30,000 acres each year, resulting in 600,000 acres after 20 years. The cost of thinning and prescribed burns on a single acre is as much as $2,000 depending on the method used, but at the scale proposed by RGWF is estimated to average $700/acre (TNC, 2014a). At the treatment goal, the cost would be approximately $21,000,000 each year to treat PP–MC forests in the Rio Grande, Rio Chama, and tributary watersheds. RGWF's Comprehensive Plan noted that these estimates were only applicable to PP–MC forests, so other forest types, such as pine and pinion-juniper, comprise additional forest acreage in NM that are being treated, need to be treated, and that will need additional funds to address.

Several state programs are targeted towards watershed restoration, including 15 "high-priority" public land areas planned by the Energy, Minerals and Natural Resourced Department (EMNRD). Governor Martinez announced $6,200,000 in funding for these projects in June 2014 (Martinez, 2014), to treat approximately 7,700 acres with invasive species control, erosion control, habitat restoration, and forest thinning.

Federal wildfire suppression and prevention efforts. Even within the state-level context, federal planning, regulations, and practices are relevant to costs and expenses for watershed restoration and wildfire management. Snider, Daugherty, and Wood (2006) noted that federal land management agencies allocate vastly more funds for suppression than they do to hazard reduction before fires. This practice is deep-seated in organizational culture and public demand for strongly controlling natural fire cycles. All relevant federal and state agencies have their own fuel hazard reduction programs that apply to their own jurisdictions. It is the scope and scale of these efforts that is at issue. Wildfires do not recognize political or jurisdictional boundaries. However, through efforts such as the USFS's Collaborative Forest Restoration Program (CFRP), some collaborative, multi-jurisdictional, local mitigation measures have been taking place since 2001.

The CFRP was initiated in 2001 "in NM to provide cost-share grants to stakeholders for forest restoration projects on public land designed through a collaborative process" (American Forests, Forest Lewis College, & The Pinchot Institute for Conservation [American Forests et al.], 2005, p 1). CFRP forest restoration projects result in: "wildfire threat reduction; reestablishment of historic fire regimes; reforestation; preservation of old and large trees; and, increased utilization of small diameter trees" (American Forests et al, 2005, p 1). From 2001 to 2013, CFRP awarded more than $50,000,000 in grants, including more than $4,000,000 for small diameter wood utilization, $1,000,000 for habitat restoration, and $2,000,000 explicitly for planning of projects (USFS, n.d.-a). Individual forest and watershed restoration projects also involve planning and economic development objectives, making up the remaining $42,000,000 of grants. In 2007, $63,774 was awarded to the Santa Fe Watershed Association (USFS, n.d.-a) for planning of SFMW (SFWD, 2013). CFRP is a federal program that was piloted only in NM,

and has remained in effect. The program has helped lead the way to a larger federal program that is implemented nationally.

The Collaborative Forest Landscape Restoration Program (CFLRP) is also at work in NM, established in 2009 "to encourage the collaborative, science-based ecosystem restoration of priority landscapes" (Omnibus Public Land Management Act of 2009, 16 U.S.C § 7301). Egan (2014) noted that the scale of CFRP is larger than CFLRP (within the state, but CFLRP has multiple grants nationwide) and that CFRP is more focused on localized participation in its projects. However, in implementation, they have similar objectives. One of the grants under CFLRP was awarded in the Southwest Jemez Mountains area in 2010. The project area is 210,000 acres, of which 52% is in the USFS Santa Fe National Forest and 41% is in the Valles Caldera National Preserve. The remaining extent is shared by private landowners and the Pueblo of Jemez (Santa Fe National Forest & Valles Caldera National Preserve, 2010).

On the national level, wildfire management is more suppression-centric. The Federal Land Assistance, Management and Enhancement (FLAME) Act was passed in 2009 to provide additional reserve funding beyond that appropriated under the Wildland Fire Management (WFM) account and other emergency sources for wildfire suppression activities conducted by USFS and DOI across the United States (Federal Land Assistance, Management and Enhancement Act [FLAME], 43 U.S.C. § 1748a). USFS noted that the costs of fire suppression have increased such that they jeopardize the ability of the agency to fully fund its mission (USFS, n.d.-b, p 24). WFM funds have received a great deal of scrutiny because of the magnitude of funding that goes towards wildland fire suppression: $4,395,500,000 to WFM suppression, $407,500,000 to WFM emergency funds, and $1,642,300,000 for FLAME during FY2010–FY2013 (Congressional Research Service, 2013, Table 5, p 14).

From 1999 through at least 2008, USFS and DOI transferred billions in funds from nonfire programs in order to fund fire suppression. SFWD (2013) noted that USFS funding for fuels treatment, through 2008, were consistent in the Southwest Region, even as other programs saw decreases. In its testimony to the U.S. Congress regarding rising fire costs, the Government Accountability Office (GAO) pointed towards its recommendation to federal agencies to create a cohesive wildfire management strategy in 1999 and again in 2005 (GAO, 2009). A cohesive wildfire management strategy had not been developed by the time the GAO made the recommendation a third time in 2009, and so the agency's testimony to Congress primarily focused on improved decision-making tools to estimate suppression fund requirements, and reserve accounting for emergency suppression. Following the passage of the FLAME Act in 2009, the total cost of suppression of wildfires on USFS, DOI, and state and private lands nationwide continued to increase from $1,200,000,000 and $1,100,000,000 in 2009 and 2010, to $1,700,000,000 and $1,500,000,000 in 2013 and 2014 (NIFC, 2015b). The increasing cost of wildland fire suppression can also be viewed as the increasing costs of not engaging in restoration-based wildfire hazard reduction. Snider, Daugherty, and Wood (2006) argued that suppression may cost more than hazard reduction. Therefore, they contended that forested land management policies are "irrational" if they do not invest funding in hazard reduction.

Carpe Diem West (2011) called attention to the view that USFS has primary responsibility for watershed management under the original 1897 Organic Act, through which forest health and restoration, in the context of wildfires, may be deemed necessary to "secure favorable conditions of water flows" for uses that are downstream of National Forest System lands. However, under the regime of the current federal budgeting process (characterized by sequestration and continuing resolutions), fundamental reform of priority budgeting for

suppression is unlikely. Indeed, states, municipalities, water utilities, and private and commercial interests should critically evaluate their dependence on federal land management agencies to protect the natural sources of their water, and they should consider alternative, collaborative arrangements for protecting forest health and other resources from catastrophic wildland fires.

Theoretical background.

Ecosystem services. Ecosystem services are benefits to human well-being, standard of living, or development that arise from the natural functioning of ecosystems (Barbier & Markandya, 2013). Environmental/provisioning-type goods (e.g. fresh water), regulating services (e.g., climate, flood, and disease regulation, and water purification), supporting services (e.g. nutrient cycling and soil formation) and cultural services (e.g. aesthetic, spiritual, educational, and recreational) provided by forests (Millennium Ecosystem Assessment, 2005) are threatened by catastrophic fire events. Smith, de Groot, and Bergkamp (2006) used a landscape view of ecosystem services, similar to Greiber (2009), to apply the term "watershed services" to all benefits that people obtain from the ecosystems within a watershed.

Aside from provisioning-type ecosystem services, such as physical water supply, watershed services from forests in NM are considered nonrivalrous because one party's benefit from water quality, nutrient cycling, or other regulating, supporting, and cultural services does not generally diminish the benefits to another party. Costanza (2008) considered the classification of ecosystem services according to their excludability and rivalness, noting that most regulatory services can be considered public goods, rather than common pool or open-access resources (Table 1). Ostrom, Gardner, and Walker (1994; as cited in Ostrom, 2000) made the same observation that resource units that are appropriated in open-access or common-pool systems are not available to other users, making them rivalrous. Since flood, water quality, and

water purification regulation are services that forests provide, and downstream water users cannot practicably be prevented from benefitting from them, these services can also be considered non-excludable. Lant, Ruhl, and Kraft (2008) noted that overconsumption of services due to open access is not necessarily a problem for all ecosystem services. Instead, nonrivalous use of nonexcludable public goods (i.e. consisting of natural capital and the flow of benefits it yields) can lead to "underprovisioning" of those goods. As the gap between what society demands (water supply and quality) and what is being provided grows (particularly when benefits are impacted by wildfire), there is a greater need to protect these resources. Barbier and Markandya (2013) noted that a "zero price" for ecosystem services, according to the theory of supply and demand in resource economics, results in increasing demand. However, the fact that many of these ecosystem services are not even recognized or incorporated in economic functions results in underprovisioning rather than underpricing. One barrier to fully recognizing these values results from ecosystem structures and functions being distinct from the ecosystem goods and services that they provide (i.e. the natural part and the human valuation part). Ecosystem change affects structures and functions directly, driven by human values and uses for goods and services (Figure 3).

Greiber (2009, p 6) defined Payment for Ecosystem Services as "virtually all financial and legal incentive mechanisms for promoting conservation and good environmental citizenship, or only specific ones, such as the provisioning and enhancement of water supply and quality that forests provide." More specifically, those that pay for PES, known as "Donors" (Table 2), must be aware that they are paying for an ecosystem service that is valuable to them or their constituents as "Beneficiaries." Parties that receive the payments must perform meaningful and measurable activities as "Suppliers" and "Intermediaries."

Additionally, Barbier and Markandya (2013) divided PES into three categories: voluntary contractual arrangements (VCA), public payment schemes (PPS), and trading schemes. These categories differ in both the mechanism of payment and their level of reliance on legal frameworks. In private schemes, or VCAs, the primary parties are private ones though government can serve a role in defining property rights and contractual requirements (Barbier & Markandya, 2013), and may also be a land owner and manager (i.e. supplier). VCAs are expected to have a low need for legal instruments, because a nested approach of upscaling from local to regional levels likely requires little regulation (Greiber, 2009). However, it can be expected that a PPS relies heavily on law in order to promote development of the PES, create certainty, and ensure good governance and trust between stakeholders. In this case, government has a primary responsibility for determining payments, collecting and disbursing funds, and setting priorities (Barbier & Markandya, 2013). The third type, trading schemes, are characterized by the establishment of government standards that inform individual allocations (e.g. tradable permits, pollution caps) that can be traded.

Smith, de Groot, and Bergkamp (2006) noted that, because watersheds determine the flow of water, they are also the appropriate scale for organizing the management of water resources and watershed services. However, this points towards the incongruence of government and jurisdictional scales with natural scales of forests, wildfire disturbance, and the flow of water that is connected to watershed services. Therefore, the ultimate goal of institutional arrangements and policy decisions in NM must be to link the condition of watersheds to downstream benefits, whether through PES (Smith, de Groot, & Bergkamp, 2006) or otherwise.

Making Policy Decisions. There is a need to address all aspects of forested land management in fire-prone and fire-adapted ecosystems. Indeed, while FLAME is a minor part of

potential responses to issues in the WUI and the overall priorities of federal land management agencies (i.e. other priorities include cost efficiency under limited resources), it is an important tool in the myriad policy and social instruments that are available. Flexible policy instruments are able to deal with uncertainties (Hahn, 1989) about stakeholder and market behavior, and potential changes in scientific and political understanding. Hahn noted that the use of multiple instruments is the rule rather than the norm. However, more instruments may mean greater costs. Therefore, an appropriate mix of policy instruments must be chosen, particularly in dealing with multiple levels of government and types of stakeholders. Similarly, efforts to reduce carbon emissions from deforestation and forest degradation using accounting and incentive mechanisms have been proposed under three approaches: direct support to projects (small scale), direct support to states/countries (large scale), or a hybrid of the two ("nested") (Angelsen, Streck, Peskett, Brown, & Luttrell, 2008).

A nested approach can be a more flexible mechanism that either starts at the project level and gradually moves to larger scales, or exhibits a coexistence of multiple scales at the onset of the project. In nearly all cases, by the nature of federated government powers in the US, there are multiple authorities at work, with overlapping jurisdictions. The term for this is "polycentricity," first coined by Polanyi (1951, p 170) and applied to municipal government and natural resource issues by Vincent Ostrom and co-authors in the early 1960s (Ostrom, Tiebout, and Warren, 1961). Ostrom, Tiebout, and Warren noted that polycentricity is characterized by the presence of multiple areas of decision-making that "are formally independent of each other" (p 831). Therefore, there can be challenges in harmonizing between scales (i.e. a cohesive plan between projects and scales). Policies implemented and proposed from multiple agencies and stakeholders have the potential to create a de facto nested response to wildfire dynamics, risk within the WUI,

and limited budgets. However, even though multiple levels and primacies (i.e. opposite of polycentrisms) of government are focused on wildfire mitigation, governance is not sufficiently connective between efforts. Therefore, lapses, redundancies, and inefficiencies exist in wildfire management response.

Although the science regarding wildland fires is fairly clear, the planning of actions to address them can be considered a "wicked problem": they have unclear missions, it is difficult to determine when they have been solved, and solving them involves "elusive political judgment" (Rittel and Webber, 1973, p 160). E. Ostrom (2000) pointed towards the "danger of self-evident truths": common-sense wisdom is not always correct, and wherever the planner begins to address a problem will dictate their understanding of it. Instead, the planner's inquiry must not be biased towards one solution over another, or at the very least it must have multiple points of entry. Many solutions have been tried to address wildfire problems in the WUI; while some have worked, none have addressed all aspects of the system. Managing fire-prone and fire-adapted lands means that the balance between social values (e.g. protecting property, limiting budgets) and scientific understanding (e.g. using prescribed fires, letting natural fires burn) may continually tip back-and-forth in either direction. The current condition of many forests indicates that a monocentric policy of suppression may be doing more harm than good. Further, if the planner accepts the idea that fire suppression is not the only option, then there will always be future forest fires and they may each need to be addressed in different ways.

Similar to traditional scientific experiments, policy changes and management actions can be observed to see what works, what does not work, and how the planner may do better next time. However, the planner does not usually work in a laboratory, and management actions have lasting and potentially irreversible impacts on environmental and human systems. At the core of

impacts to human systems, in particular, are social values. Therefore, the planner must attempt to understand as many aspects of a system as possible, including social values, in order to understand the potential impacts of their actions. This information may also be useful in managing the aftermath of policies that go awry. Korten (1980) added that the planner should "embrace error" by being aware of limitations of their knowledge, acknowledging mistakes, and engaging in learning and corrective action in the aftermath of errors.

A solution that works in one community is not likely to work perfectly elsewhere. Ostrom, Janssen, and Anderies (2007) used the term "panacea" to describe the application of a single solution to many problems, resulting in what Ostrom (2007) described as a fixation on specific variables that ignores other variables and causes the planner to overlook better solutions. Ostrom, Janssen, and Anderies (2007) call for social scientists to diagnose, monitor, and learn from the applied sciences. By applying a diagnostic framework, using interdisciplinary knowledge (i.e. anthropology, biology, ecology, economics, environmental sciences, geography, history, law, political science, psychology, and sociology), monitoring system indicators, and learning from successful actions and failures, planners may improve how they successfully address wicked problems.

Therefore, the planner is bounded on two sides: by the need to avoid panaceas, and the necessity of using a holistic diagnostic method. The first broadens the solutions that are available to planners, but excludes "silver-bullet" answers. The second requires that planners follow a more careful and complicated process that avoids simple solutions (i.e. the former addresses the scope of solutions and the latter addresses the process to identify solutions). Korten's (1980) blueprint approach is distinct from the concept of "fit," under which programs, beneficiaries/actors, and institutions are responsive to beneficiary needs, build the institution to

be strong, and make the program work. Instead of achieving fit by looking towards a final program or organizational blueprint and applying it elsewhere, a proper fit is found through the process of developing programs and institutions concurrently. Again, the focus is on the process rather than the result.

Research Methods

This policy analysis investigates the feasibility, appropriate scale, and advantages and disadvantages of primary alternative institutional arrangements for securing long-term funding for NM watershed restoration. Research begins with a literature review of efforts in NM to secure long-term funding for watershed restoration, including the SFMW program and RGWF. We attended NM Legislature committee hearings during the 2015 session in Santa Fe, NM to observe presentation, debate, and decision-making regarding House Bill (HB) 38 "Forest & Watershed Restoration Act," (FWRA) and HB 474 "Fire Protection Fund to Watershed Restoration" (Table 3).

Potential funding sources for RGWF are identified, and several approaches are considered from both state and federal forest restoration programs (e.g., the USFS Collaborative Forest Restoration Program, and efforts to implement user fees by public utilities). This study also looks at combinations and modifications of existing programs as potential mechanisms for incentivizing local participation, and receiving public funding support from current mechanisms.

A policy analysis of potential funding and governance mechanisms for watershed restoration must begin with a framework that recognizes and addresses the variables involved in wicked problems. Elinor Ostrom (2011) distinguished between frameworks and theories, noting that frameworks identify the elements or variables of a system and relationships among them, and theories are used to specify which elements and relationships are relevant to a research question; that is, the framework comes first in an inquiry.

Ostrom's original Institutional Analysis and Development Framework (IADF) was developed to assess institutional reforms by identifying institutional variables (Ostrom, 2011). In the practice of applying IADF to systems with both institutional and biophysical components, it

was ultimately incorporated into the Social-Ecological System (SES) Framework (Figure 4). The SES Framework (McGinnis & Ostrom, 2014) is a possible framework for understanding the wicked problem of funding and governance mechanisms that can link NM water users with the watershed services that they rely on.

The initial SES Framework was applicable to common-pool resources and resource systems with users extracting resource units. Recall that forest ecosystems, in the context of the ecosystem services received by downstream users/actors, are considered public goods (providing a suite of ecosystem services), not common-pool resources. Revision of the framework by McGinnis and Ostrom (2014) resulted in a broadened scope of "Actors" to include all donors, beneficiaries, suppliers, and intermediaries, and recognition that resources can be "flows" rather than just units (i.e. many ecosystem services are non-rivalrous and indivisible). McGinnis and Ostrom noted that these changes allow the SES Framework to be applied to systems that "generate public goods and services, most notably the ecological or ecosystem services on which many markets depend for their continued operation" (2014, p 3).

Figure 4 shows the conceptual model of the revised SES Framework. Solid boxes are the first tier variables, with multiple tiers under these to denote logical categories and subdivisions. Interacting with the variables are the social, economic, political, and related ecosystem settings. The variables interact with each other directly, and via action situations in which actors make choices based on the information that they have about other variables. Direct links and feedbacks between settings, variables, and action situations allow this framework to meet the requirements of not being rigid or closed-ended, lacking a formulaic final solution, and being unique based on whatever variables are included depending on what systems are being looked at.

Data collected during literature review, and during Legislative hearings, inform the 2nd 3rd, and 4th tier variables of the framework. Some connections between variables are already demonstrated by recent policy decisions and debate. Other potential or missed connections are also present that may inform future efforts or serve as lessons of current efforts that have failed, and these also inform the narrative and conclusions of this study.

Description of Efforts in New Mexico and Application of the Framework

The use of PES at the local level, collaborative forest restoration planning and funding at the regional level, and efforts to enact state-level funding that can pull even more funding from federal sources, represent multiple methods that can nest within each other, and inform and leverage funding across multiple jurisdictions. Working together, these activities could potentially scale up to greatly expanded watershed restoration efforts to mitigate wildfire risk.

Using Payment for Ecosystem Services Schemes in New Mexico

Payment for Ecosystem Services schemes seek to reverse the underprovisioning of ecosystem services by connecting service users to lands and the people that manage them through payment and governance arrangements, with goals of maintaining the health of the lands that provide the services and mitigating potential threats.

The SFMW Plan (SFWD, 2013) described an effort in the watershed of Santa Fe, NM to address vegetation management and fire use, water management, public awareness and outreach, and financial management based on PES. The costs of forest restoration in the 17,384 acre watershed over 20 years ($5,100,000) have been estimated to be less than one half the cost of wildfire suppression and rehabilitation ($11,900,000 minimum) and one-fifteenth the cost of sediment dredging, hauling, and disposal ($80,000,000 minimum). From 2003 to 2009, the federal government provided earmarks for $7,000,000 of planning and hazardous fuels reduction in the lower part of the watershed, resulting in the treatment of more than 5,200 acres of forest. Fuel loads in the mixed-conifer and spruce-fir forest in the upper half of the watershed, above one of the city's reservoirs, had not been addressed (SFWD, 2013). Although users pay for the capture, treatment, and delivery of water by the City of Santa Fe, and emergency management (firefighting and post-fire forest rehabilitation via taxes), they do not pay for the watershed

services that produce the water and prevent catastrophic fires. The SFMW Plan (SFWD, 2013) noted that these services are not typically paid for by water users, because they are not included in conventional markets.

When SFMW was developed 2007–2009, and adopted by the City Council in 2009, it used the model of PES to develop a financial management plan for 20 years of forest and watershed restoration activities. By estimating restoration costs and the avoided costs of fire, and providing recommendations for financing agreements and mechanisms, the SFMW Plan sought to develop a PES scheme in which "beneficiaries of the watershed (Santa Fe consumers) will knowingly pay for ecosystem services" (SFWD, 2013, p 78). Beginning with this foundation, SFMW was awarded a grant by the NM Water Trust Board to cover 85% of the first three years of program costs (Phase 1). During this period, the cost-per-water user paid by the Water Trust Board and City of Santa Fe was listed as a credit on a separate line on user water bills. Between 2011 and 2013, when the grant (Phase 1) ended, SFMW estimated that more than $1,400,000 would be spent on vegetation management (43%), water and habitat monitoring and infrastructure (29%), and education and outreach (47%). In Phase 2, the fee would be assessed to the user as a part of water usage. Over the next 17 years, SFMW estimated that the cost of vegetation management would decrease as work became more focused on maintenance of previously treated forest, while annual water management and education/outreach costs would remain the same. By the end of the total project period (20 years), approximately $6,656,000 would be spent (SFWD, 2013).

The SFMW is driven by a public agency, the Santa Fe Water Division, which collects payments as a form of user fees from parties that purchase the municipal water supply that it provides. The government, as supplier, and water users, as donors and beneficiaries, define this

arrangement as a PPS. As a provider of ecosystem services from forests that it manages, the City of Santa Fe applies user fees to the management of the watershed. Through a Memorandum of Understanding and Collection Agreement, Santa Fe is also able to work with USFS as another donor. The SFMW Plan (SFWD, 2013) recognized that much of thinning in the watershed has, historically, been performed by USFS. Even if USFS's funding for hazardous fuels reduction decreases as suppression takes priority, these agreements facilitate the continued involvement of USFS in the PES scheme.

The SFMW has addressed the institutional and revenue issues related to the arrangement of PES, including the valuation, delivery, and payment mechanism for ecosystem services by combining funding from multiple sources (state and federal) along with line item fees on users' water utility bills. SFMW goes further by including many of the rules for its activities and decision-making in the SFMW Plan, including a review of past restoration and monitoring actions, specific responsibilities of each participant, and recommendations for how funds can be spent based on priorities for the watershed.

At a larger scale, led by the collaborative-building efforts of TNC, RGWF has characterized PP–MC forests in northern NM that can be prioritized for thinning and restoration in order to prevent high-intensity fires. A total of 1,600,000 acres of PP–MC forest have been identified, comprised of multiple land ownerships (Table 4) (TNC, 2014a, p 19). Although the area identified for restoration is more than 90 times that of SFMW, the institutional arrangements described in RGWF's Comprehensive Plan (TNC, 2014a) have some of the same characteristics as SFMW. RGWF has noted the need for Memorandums of Understanding between the fund and its participants, in this case to facilitate public-private cooperation, and lay out commitments of those who participate. These Memorandums would also lay out donation rules for "Investors," as

the non-profit TNC administers the funds. Initial investors to the RGWF included USFS and other federal agencies, the University of New Mexico, water and electrical utilities, State water agencies, Soil and Water Conservation Districts, other non-profits, county government, and private businesses and foundations (TNC, 2014a, p 27). In particular, those governments and non-profits have previously worked together in the landscape on watershed and forest management, so past and current efforts can facilitate more coordinated action by RGWF. An important example of this is the USFS CFLRP project in the Southwest Jemez Mountains area.

By pairing government expenditures on forest and watershed restoration with private investments, RGWF has defined land managers and downstream users as stakeholders (Table 5) that would benefit and pay for restoration on lands in Table 4 (TNC, 2014a, p 28). As the administrator of donations to RGWF, TNC has been the most important "private" part of the public-private partnership. As a form of contract, the Memorandums of Understanding, and the donations that Investors voluntarily provide, have defined RGWF as a VCA or private PES scheme. RGWF acts as an intermediary, any of the organizations in Table 4Table 1 may be a supplier, and essentially any downstream user of water (including donors) are beneficiaries. As a VCA, government agencies would not be expected to serve a role beyond property rights assignments and legal enforcement in RGWF (Barbier & Markandya, 2013). However, Table 4 demonstrates that federal, state, and local governments own more than 75% of PP–MC forests in the RGWF area. Given the public good nature of the watershed services flowing from these lands, and the "checkerboard" (TNC, 2014a, p 4) pattern of property rights in the RGWF area, coordination by a single intermediary (that isn't a primary land owner) best links donors, beneficiaries, and suppliers. RGWF's advisory board, comprised of more than 45 New Mexico entities (TNC, 2014a, p 7), has essentially been made up of beneficiaries and intermediaries that

are responsible for outreaching to other stakeholders and supporting the development of RGWF, providing guidance about the research and plans that should be completed, and determining the structure and rules of the VCA.

Assessing the value of ecosystem services is an important part of PES projects because the price that is paid by donors must cover the costs of land management by suppliers that deliver the benefits of ecosystem services to beneficiaries (Table 2). In the case of RGWF, there is no direct mechanism for incentivizing fees or taxes from every downstream water user, as there is in SFMW. Therefore, well-defined system boundaries, information-sharing, and valuation are important for the RGWF as it demonstrates the importance of restoration and mitigating wildfires. Forest Trends, The Katoomba Group, and United Nations Environment Programme (2008) noted that the price for ecosystem services, as determined by what the buyer (donor) is willing to pay and what the seller (supplier) is willing to accept and deliver, is affected by the economic value of benefits of the services, the costs of replacing damaged services (i.e. fire suppression and rehabilitation), and the relative cost of alternatives (i.e. water filtration, groundwater pumping, sediment removal). TNC and RGWF have used actual costs after past forest fires in NM, the SFMW Plan (SFWD, 2013), the Walter and Chermak study (2014, as cited in TNC, 2014a), water utility costs from the region, and a watershed avoided cost analysis for the Sierra Nevada in California, to estimate costs from wildfire avoided by treating forests in the RGWF project area. For 145,000 acres of treated forest, low and high estimates were made for avoided costs related to wildfire suppression, forest rehabilitation, human structure value loss, loss of timber, and reservoir dredging. The analysis compared the low and high avoided cost estimates (present value of total costs), between $156,477,865 and $1,263,290,378, to the estimated costs to mechanically treat and reduce fuel loads on those areas, which ranges between

$72,608,783 and $174,261,078. Other variables not included in the analysis, such as the costs of lost tourism and commercial business, road repair and reconstruction, and other water utility impacts (e.g. water treatment), increase the avoided costs (RGWF, 2014).

The TNC and RGWF avoided cost analysis used estimated treatment costs of between $700 and $1,200 for each acre (RGWF, 2014). A similar cost range, $700–$2,000 is used in the RGWF Comprehensive Plan. Both the SFMW Plan (SFWD, 2013) and RGWF (TNC, 2014a) note that the cost per acre of treatment decreases at greater scales (i.e. unit cost is less for multiple acres than it is for a single acre). Further, as the project progresses, some acres may only need to be maintained following thinning, which has a lower cost.

Efforts in the New Mexico State Legislature

2013 and 2014 memorials. Moving from the local/watershed (Santa Fe, NM) and regional (northern NM) scales up to the state-level, stakeholders worked together to introduce several memorials and bills in the NM Legislature in 2013, 2014, and 2015 that extended the scope and reach of their efforts with the SFMW and RGWF. House Memorial (HM) 65 in the 51st NM Legislature (2013) (Figure 5) was passed unanimously (Watershed Health Planning & Management [HM 65], 2013b), and addressed the need for collaboration between the USFS and NM agencies in watershed health planning and management, by referencing the Organic Act of 1897. HM 80 and Senate Memorial (SM) 95 both passed unanimously (Long-Term Forest & Watershed Plan [HM 80], 2014b; Long-Term Forest & Watershed Plan [SM 95], 2014b) in the 51st NM Legislature (2014) (Figure 5) with identical language, and recognized that wildfires extend beyond their own scale, outside of the jurisdictions of state agencies. These memorials also pointed towards the need to leverage federal dollars for long-term funding for forest and watershed restoration. The Congressional Research Service (2007) noted that memorials are

requests that "Congress take some action, or refrain from taking certain action." Indeed, Memorials 65, 80, and 95 were sent to the NM Congressional delegation. Leckrone and Gollob (2010) observed that more than 10% of all memorials sent from states to the U.S. Congress between 1987 and 2006 were related to environmental issues, and another 8% were concerned with public lands and water management. Only defense and health policy issues were more prominent state memorial topics.

Bills in 2015. Full legislative bills in 2015 sought to enact policy and funding mechanisms for forest and watershed restoration by building off agreement on issues identified in the 2013 and 2014 Memorials, and extending the goals of the RGWF. Bill sponsors, Representative Paul Bandy (San Juan) and Senator Peter Wirth (Santa Fe), worked with expert witnesses from the New Mexico Forest Industry Association and TNC to develop language and work the bills through 10 committee and floor hearings (Table 3) over the 60 days that the NM Legislature was in session.

Initially, HB 38 (Figure 6) directed funding from the Insurance Department Suspense Fund, which receives fees and taxes from life, health, property, vehicle, casualty, and other types of insurance business premiums, certifications, and licenses (59A NM Stat. § 6-1) (Figure 7). In FY2014, this fund collected $209,500,000, of which $74,345,229 went to the Fire Protection Fund. (New Mexico Office of Superintendent of Insurance [OSI], 2014, pp 19-20). Current statues describe more than six transfers from this fund, as well as additional distributions for fee refunds (e.g. overpayments). The Legislative Finance Committee (LFC), bill sponsors, and OSI sought opportunities for intersections between the purpose of the Forest and Watershed Restoration Fund (FWRF) proposed by HB 38, and the purposes of other funds shown in Figure 7. Under the Introduced version of the Bill (Forest & Watershed Restoration Act [FWRA],

2015a) there would be $1,250,000 transferred monthly from health insurance premium surtaxes, which have increased due to the growth in insurance coverage in NM from the federal Patient Protection and Affordable Care Act (ACA) (*HB 38: Forest and Watershed Restoration Act* [HB 38], 2015a). FY2014 revenue from the premium insurance surtax was $30,456,607 (OSI, 2014, p 19), of which the annual transfer for watershed restoration is nearly 50%. However, left over funds from the health insurance premium surtax are due to transfer to the State's General Fund. Given the tightness of the State's budget in this Legislative session (HB 38, 2015c) and other demands on the General Fund (HB 38, 2015d), the Bill was substituted to remove all appropriated funding sources. The substitute also made additions to the Forest and Watershed Restoration Board (Board) in order to incorporate overlapping jurisdictions with the NM Interstate Stream Commission (NMISC) and Department of Game and Fish (NMGF), and to pull in habitat restoration funding from NMGF. As a measure of compromise with the Bill's primary opponent, the State Forester, the Bill was amended before the final Senate Floor vote to make the Board advisory to EMNRD's State Forestry division, rather than a decision-making body. The Fiscal Impact Report for the Final version of the Bill (LFC, 2015) noted that $2,000,000 in one-time funding would come from the State's Game Protection Fund, Trail Safety Fund, and EMNRD, and $250,000 in recurring funds would come from the Healthy Forest Program. The Fiscal Impact Report also estimated that $1,400,000 of these funds would be needed for start-up activities before the Board would be fully functioning, and that $650,000 would be needed for recurring operating costs for the program. This Bill passed both the House and Senate unanimously. Using RGWF's estimated treatment costs per acre ($700, TNC, 2014a), only 3,200 acres of PP–MC forest could be treated after start-up costs; this is about equal to what is currently being treated. Future years would not cover operating costs.

In order to address long-term, recurring funding for FWRA, HB 474 "Fire Protection Fund to Watershed Restoration" (Figure 8) was introduced just after the House Energy, Environment & Natural Resources Committee substitute for HB 38. In HB 474, FWRF would receive a portion of the funds being transferred to the Fire Protection Fund for grants to fire districts. In 2015, this amount would be approximately 10% ($729,600) of the estimated distribution that would go to the Fire Protection Grant Fund, and by 2025 this proportion would increase to approximately 36.6% ($10,079,700). In 2025, FWRF would receive nearly one half of the annual funds that the RGWF estimates are necessary to effectively manage forests ($21,000,000) (TNC, 2014a). However, this proposal relied on taking a share of funds that are already purposed in statute. Opponents of HB 474, namely the State Fire Marshall and local fire departments, pointed towards their reliance on these funds for department operations. Nearly 30 fire fighters from departments across the state attended and spoke in opposition at the hearing of the Bill before the House Ways & Means Committee, outnumbering the Bill's proponents (*HB 474: Fire Protection Fund to Watershed Restoration* [HB 474], 2015b). Members of the Ways & Means Committee signaled that they would likely vote in opposition to the bill, and several of them invited the Bill's sponsors to meet with the State Fire Marshall to come to a consensus. The Ways & Means Committee tabled the Bill and the meeting never occurred.

When HB 38 was unanimously passed by the Senate two weeks later and moved to the desk of the Governor, it was only attached to $2,050,000 of funding. The Governor vetoed HB 38 in April 2015, noting that only executive agencies, rather than the Board, could respond to "critical and pressing needs" (Martinez, 2015). The Governor specifically named the Department of Homeland Security and Emergency Management, NM Environment Department's (NMED) River Stewardship Program, and State Forestry in EMNRD as executive state agencies with

current watershed restoration activities that would be limited by the Bill. On June 8, 2015, the NM Legislature convened for a special session and passed an additional capital outlay bill, including $2,500,000 for watershed restoration and $1,000,000 for wildfire mitigation. The Governor's announcement of the funding (Martinez, 2015b) noted that these funds would be for 15 watershed projects across the state, of which six had already started, under EMNRD.

Reflection. Despite the failure of these bills, the successful passage of the 2013 and 2014 Memorials, public statements during the hearings on HB 38 and HB 474, the Governor's veto message, and the announcement of funding in the capital outlay, indicate that there is some level of agreement on the connection between forest management, watersheds, and downstream water users.

During discussion of HB 38 and HB 474 in the NM Legislature (HB 38, 2015a - e; HB 474, 2015a - b), RGWF's estimates for the number of treated acres each year (30,000) were used, and it was understood that at least $21,000,000 would be needed each year for thinning treatments and other costs. The Introduced version of HB 38 (FWRA, 2015a) proposed the most funding of all of the options that were considered, and it was still less than half of what would be needed to meet the treatment goal. One interpretation of this is that there was an implied understanding that the remaining funds or thinning would come from other sources, such as RGWF and through leveraging federal dollars. In fact, one of the arguments for the Bill, provided by bill sponsors, was that even a modest commitment of funds from the State would demonstrate its ability and willingness to compete for federal grants. Further, they argued that the Board would be able to coordinate multiple funding sources from local, regional, state, and federal sources, making sure that projects under FWRA are working best with non-FWRA projects (Figure 6). In the case that this arrangement had successfully passed through the

Legislature and was signed by the Governor—either with funding distributions directly from the Insurance Department Suspense Fund, or from the Fire Protection Fund—the Board would still have needed to coordinate and leverage RGWF and federal funds in order to meet the 30,000 acres/year restoration goal.

A common theme of local, regional, and state-level efforts has been the nexuses between land management and wildfire risk, wildfire risk and property insurance premiums, and all of these to the ecological and cultural services (e.g. recreation, aesthetic) from forests that are threatened by catastrophic wildfires. At the center of these issues is the connection between forests as headwaters and water quality and quantity in the minds of downstream users that depend on the watershed services that forests provide to them. Although HB 38 and 474 would have increased funding for watershed restoration in the state, they used different mechanisms from the SFMW and RGWF. Denied the opportunity to observe the implementation of the FWRA and Board, it cannot be determined whether state-level efforts would have been able to connect forest health to water quality and quantity in the same way, or even as successfully, as SFMW has done by educating water users and having them directly pay for watershed restoration. The sharing of information and outreach is also an important part of RGWF.

Application of the Social-Ecological System (SES) Framework

Overview. These nexuses that connect "forests to faucets" are part of the decision-making that takes place in "action situations" at the center of the SES Framework, involving the interplay of actors, their assigned responsibilities and actions, the information and control that they possess, and the net costs and benefits they assign to potential outcomes (Ostrom, 2011). Action situations can be chosen from the many spaces where actors have exchanged information, goods, and services, made decisions, or exercised authority over each other in the development

of the SFMW and RGWF, passage of the 2013 and 2014 Memorials, and debate of HB 38 and HB 474.

Application of the SES Framework focuses on analyzing the variables at work in these action situations, with a goal of illuminating how restoring watersheds will improve water security for communities. This application recognizes that institutional adaptations for restoration and financial management must be established before consistent restoration practices can be ensured for the 20-year lifetime that is proposed for RGWF and then again by HB 38 and HB 474. The expected result of this analysis is to elucidate and inform public debate in NM, which involves many issues beyond water security, and therefore involves many diverse actors. Utilizing the McGinnis and Ostrom (2014) rendition of the SES Framework, Table 6, Table 7, Table 8, Table 9, Table 10, Table 11, and Table 12 index the multiple settings and variables that are linked within the framework. Earlier work by Elinor Ostrom (2009) provides additional context for how elements of the framework should be indexed under the first tier.

Table 7, Table 8, Table 9, and Table 10 represent the first-tier and second-tier variables of Resource Systems (RS), Governance Systems (GS), Resources Units (RU), and Actors (A). Table 6 and Table 12 are the tiered variables of the social, economic, political (S), and related ecosystems (ECO) settings. Table 11 addresses action situations.

Conclusions

Linking Watershed Condition to Downstream Benefits

Barbier and Markandya (2013) note that taxes and fees on resource use, in practice, have had an emphasis on revenue-raising rather than incentives for particular resource use choices. Revenue-raising from other sources (not directly from taxes and fees on resource use) were proposed in the NM Legislature in order to fund forest and watershed restoration. At first glance, the proposed arrangement could be considered a PPS because the payments and funds are managed by government. However, the arrangements differ from the traditional forms of PES schemes described by Greiber (2009) and Barbier and Markandya (2013) because "payments," as they are understood in PES transactions, are not flowing directly from downstream water users to upstream land owners and managers. Still, bill sponsors and other parties looked towards examples of PES schemes, such as SFMW, to build an alternative arrangement at the larger scale. Instead of proposing direct payments from beneficiaries to suppliers, bill sponsors and the LFC looked for the State funds and revenue sources that best intersected with the purposes of forest and watershed restoration, resulting in the public as a whole, and certain tax and fee payers (e.g. anyone that pays for insurance), being the donor(s) in the arrangement. These intersections were found with habitat restoration, health insurance premiums, property insurance, and other forest and watershed restoration activities in EMNRD. New beneficiaries were also identified through this negotiation process, including NMISC (potential of increased flows from headwaters) and NMGF (habitat improvement for game species). Further, the value of ecosystem services and the costs of restoration are progressively becoming better-defined through economic estimates, forest product markets, and ecological studies. Therefore, the outcomes of negotiation

in the NM Legislature and the Final version of HB 38 resulted in many if not all characteristics of PES transactions (Figure 3).

This observation is also made by looking at SFMW and RGWF, which were designed according to PES models, but do not exactly meet the traditional PES types described in Greiber (2009), that are more applicable to arrangements with less concrete property rights, lack strong legal and institutional frameworks, and involve other types of ecosystem goods and services (Table 1). In a physical sense, each of these programs fit within each other at progressively larger landscape scales (local, regional, state). It's also clear that they build on each other by borrowing many of the same stakeholders, referencing each other, and setting similar restoration goals. However, the most important element that these arrangements have in common is the use of some form of education and outreach that is focused on creating economic incentives or mental models to connect downstream water users to headwaters (i.e. "forests to faucets"). In arrangements where payments do not come directly from beneficiaries and go directly to suppliers (e.g. FWRA), any activities that better define and value ecosystem services for beneficiaries become much more key. In this way, even less traditional arrangements may fulfill the voluntary and informed donor requirements that are so important for private and public (VCA and PPS) PES schemes.

Legislation as Panacea, and Lessons from the Strategic Water Reserve

If HB 38 had been signed by the Governor, it would have contributed no funding to FWRF beyond what would be necessary for start-up costs. Recurring funding, set at $250,000 each year from the Healthy Forest Program, would have fallen short of the estimated annual operating costs ($650,000). Therefore, an institutional arrangement would have been created without the ability to sustain itself.

To help put this in context, NM's Strategic Water Reserve (Reserve) was created in 2005 to allow NMISC to purchase or lease water rights in order to comply with water compacts, or to manage water to benefit threatened or endangered species or to avoid listing (i.e. environmental flows) (72 NM Stat. § 14-3.3). The Legislature appropriated $2,800,000 in 2005, $2,000,000 in 2006, and $500,000 in 2007. In 2009, $1,500,000 was de-authorized from the Reserve (a budget crisis year; Utton Transboundary Resources Center [UTRC], 2015) and the remaining funds were frozen. Remaining funds were de-authorized the following year (NMISC, 2015).

After seven years without new appropriations, the Legislature provided $2,000,000 in 2014 for the purpose of purchasing water rights for habitat restoration projects (NMISC, 2015). In the interim, NMISC had explored water rights acquisitions in the Middle Rio Grande, and alternative implementations given limited funding to the Reserve. One of these acquisitions, that was not completed, would have involved the transfer of water rights and $10,000,000 for use by the Reserve from a private business (UTRC, 2015).

Despite its role as an important tool for water management, and having spent more than $3,200,000 to purchase and lease water rights between 2005 and 2014 (NMISC, 2015), the Reserve lacks a long-term funding mechanism. The program is dependent on individual appropriations from the Legislature, much like the state level watershed restoration projects announced by the Governor. As a state level water agency, NMISC is able to do water acquisition planning even when the funds are not available to make purchases. The Forest and Watershed Restoration Board would not have this luxury, meaning that it would likely need to go to the Legislature each year to request funding for restoration above what it would also need to request for its operations.

Having a long-term funding mechanism in place at the on-set of FWRA, based on the estimated costs for restoration activities, would ensure that the Board and its activities could operate for 20 years. However, as the failure of HB 474 and revisions to HB 38 demonstrate, it is not viable to rely on a single funding source that has already been purposed by the Legislature. The unanimous passage of HB 38 by both the Senate and House indicates that, more likely, arranging multiple, smaller funding sources is more acceptable.

An alternative conclusion is that establishing the institutional mechanism, even without financing, would have signaled the State's commitment to start planning long-term watershed restoration and begin coordinating between multiple jurisdictions. More simply, we can ask if it is better to have some mechanism, rather than no mechanism, for coordinating long-term watershed restoration. Preferring an unsustainable mechanism over continued work on a better state-level financing mechanism ignores the current work being done by SFMW and RGWF, which are already coordinating multiple jurisdictions at those scales. Therefore, the FWRA did not only fail in developing a sustainable funding mechanism, it's veto by the Governor also means that it failed to resolve jurisdictional issues at the state-scale.

Missed Opportunities, and Opportunities for Future Success

Without a new state-level mechanism for watershed restoration, attention likely returns, at least temporarily, to the RGWF and the possibilities for self-organization by stakeholders in the State. However, these and future legislative efforts can be informed by this observations about the failure of HB 38 and HB 474.

The Governor's veto message for HB 38 focused on emergency management and other executive functions that are involved in forest restoration and wildfire response. One interpretation of this is that the administrative/executive branch, in control of its agencies, is not

thinking long-term and is more focused on emergency response in reaction to wildfire, and not forested watersheds that contribute to wildfires. There is no reason to believe that RGWF would have replaced current forest and watershed restoration activities with its own. Rather, the push for a state-level coordinating body recognizes the need for long-term funding and coordination between state executive functions and other efforts that are already in the State. To demonstrate: the objectives of the NM River Stewardship Program, under NMED, include the restoration of stream and river hydrology, the enhancement of river and riparian habitats, and the leveraging of federal funds from the Clean Water Act. The Governor's inclusion of the River Stewardship Program in her veto message points towards overlap in objectives with FWRA. However, rather than there being conflict or competition between the work of these two programs, we believe that there would be the possibility for synergy. NMED's project priority criteria (NMED, n.d.-b) demonstrate that the Program is focused on water quality and stream habitat restoration for impaired streams, including those affected by past wildfires. FWRA's activities would have been focused on mitigation of wildfire effects on streams and rivers before they become impaired. In fact, the avoided cost analysis being conducted by TNC and RGWF (RGWF, 2014) noted that impacts to local economies and increased water quality treatment due to wildfire could be included as costs that are avoided by using restoration and mitigation before fire happens. Ultimately, the continuing disconnect between short-term incremental funding for watershed restoration and wildfire response, and long-term, well-financed restoration and wildfire mitigation is a jurisdictional issue that will need to be resolved before future state-level efforts can move forward.

One of the questions that was raised by Legislative committee members, on several occasions but was not discussed in detail, was whether bill sponsors had insight into potential

decision-making rules, project priorities, and expected spending for the Board. One of the likely reasons these questions could not be answered is that most of these things could not be decided until the Board had an opportunity to meet for the first time. Looking from local up to the state scale, we see a set of strong rules and more direct, reliable funding mechanisms in SFMW, and a lack of initial decision-making rules and financing proposed in FWRA. The model of SFMW has informed how RGWF is structured, and there was a similar opportunity to use the model of RGWF to educate and respond to committee members about potential decision-making rules and restoration priorities—RGWF and PES were not described during committee hearings. The SES Framework includes a 2nd tier element, "A7 – Knowledge of Social-Ecological System/Mental Models" under "Actors" (Table 10), indicating that any models that Actors have to work with can inform the decisions that they make. Legislative committee meetings offered an opportunity to describe the underlying PES model extending from SFMW and RGWF (and described in this paper) as way to show the direction that FWRA is headed and what some of the decision-making rules for the Board may look like.

Further Study

Interest-based negotiation and conflict resolution, as applied to both organizational conflict management (i.e. human resources) and multi-party bargaining and decision-making, is defined as a process through which parties seek to identify and respond to needs and interests of all of the parties through collaborative problem solving (Roche & Teague, 2012; Western Rural Development Center, 1992). Interest-based methods borrow from A. H. Maslow's model for human motivation (Maslow, 1943), known as "Maslow's Hierarchy of Needs." Further study should focus on conflicts in the SES Framework (I4, Table 11) regarding the 2015 bills, and other action-situations through which the needs and interests of Actors (Table 10) were

expressed and negotiated leading up to the failure of the bills. Maslow's model may be used as a lens for categorizing met and unmet stakeholder needs (i.e. safety, love/acceptance, esteem, and self-actualization/idealism), describing the reasons why Actors either supported or opposed the bills because of those needs, and how bill sponsors may have successfully responded to or may have better incorporated the needs of Actors in negotiation of the bills. A simple example of this the opposition to HB 474 by local firefighters and the State Fire Marshall. The Bill would leave less money available for grants to their departments, signaling a potential threat to the safety of their operations. Despite a shared purpose with the bill sponsors to mitigate fires, the fulfillment of that purpose did not address the safety need that is more basic in Maslow's hierarchy. In addition, Egan (2014) lamented that "it is too often assumed that interest in the socio-economic dimensions of forest restoration necessarily equates to expertise" in the context of how CFRP presumes that participants will come to the table because they have an interest and have something to contribute. From the point-of-view of interest-based negotiation, there is a similar presumption that every party's perspective is valid and deserves equal consideration. Therefore, even in more structured negotiations, focusing on meeting the interests and needs of various parties means that collaborative decision-making is occurring.

Local and downstream water and land users do not typically pay for the value of ecosystems that benefit them because the services are not included in conventional markets. Multiple methods exist to estimate the value for watershed services. Such approaches can help us better understand the value of these services and justify PPS versions of implementing PES models. For example, they can be calculated indirectly (at least partially) in increased home and property insurance rates due to wildfire risk (TNC, 2014a) as a form of hedonic pricing (Barbier & Markandya, 2013). Donovan, Champ, and Butry (2007) indicated that the use of hedonic

pricing related to wildfire risk and housing prices was not common ten years ago. However, as shown in a recent review, the application of these techniques is growing (Hansen, Mueller, & Naughton, 2014). Replacement costs, in the form of paying for alternatives to lost ecosystem services and treatment of damages (Barbier & Markandya, 2013), such as the thinning and prescribed burning of forests and treatment of water quality due to ash and sediment, can also be used. This type of pricing, in the form of avoided cost analysis, is being conducted by TNC and RGWF; it will inform the decisions of voluntary donors as they compare the cost of watershed restoration to the cost of potentially catastrophic fires (the no-action scenario).

Table 1

Ecosystem Services Classified According to their Excludability and Rivalness

	Excludable	Non-excludable
Rival	Most provisioning ecosystem services (market goods)	Some provisioning ecosystem services (open-access resources)
Non-rival	Some recreational/cultural ecosystem services (club goods)	Most regulatory and cultural ecosystem services (public goods)

Note. Adapted from "Ecosystem services: Multiple classification systems are needed," by R. Costanza, 2008, *Biological Conservation, 142*(2).

Table 2

PES Stakeholder Types.

Stakeholder Type	Notes
Donors	Donors provide contributions/funds for acquiring ecosystem services.
Beneficiaries	Private or public organizations that benefit from ecosystem services (downstream). May also be a donor.
Suppliers	Owners of land or management rights of resources (property) that provide ecosystem services.
Intermediaries	Intermediaries link donor, beneficiaries, and suppliers through development and administration of the PES project.

Note. Adapted from *Payments for Ecosystem Services: Legal and Institutional Frameworks*, edited by T. Greiber, 2009, p 8.

Table 3

Milestones of Watershed and Forest Restoration Bills in the 2015 New Mexico Legislature

Bill Number	Hearing/Meeting	Date	Vote/Action
HB 38		12/15/2014	Introduced
HB 38	House Agriculture, Water & Wildlife*	1/30/2015	Pass (Unanimous)
HB 38	House Energy, Environment & Natural Resources (HEENC)*	2/11/2015	
HB 38 HEENC Substitute	House Energy, Environment & Natural Resources (HEENC)*	2/16/2015	Pass (Unanimous)
HB 38 HEENC Substitute	House Appropriations & Finance*	2/24/2015	Pass (Unanimous)
HB 38 HEENC Substitute	House Floor	2/27/2015	Pass (Unanimous)
HB 38 HEENC Substitute, Amended	Senate Conservation*	3/12/2015	Pass (6/1)
HB 38 HEENC Substitute, Amended	Senate Finance	3/18/2015	Pass (Unanimous)
HB 38 HEENC Substitute, Amended #2	Senate Floor*	3/20/2015	Pass (Unanimous)
HB 474		2/18/2015	Introduced
HB 474	House Energy, Environment & Natural Resources (HEENC)*	2/25/2015	Pass (7/4)
HB 474	House Ways & Means*	3/9/2015	Tabled

Note. Asterisk (*) indicates hearing/meetings observed by the author.

Table 4

Land ownership of ponderosa pine and mixed conifer forests identified by RGWF

Ownership	Acres	Percent of Total
U.S. Forest Service	1,103,926	68.22
Private Lands	243,470	15.05
Tribal Lands	157,312	9.72
Valles Caldera National Preserve	37,655	2.33
National Park Service	31,894	1.97
Bureau of Land Management	15,611	0.96
State Parks and Wildlife Conservation Areas	13,537	0.84
Other Federal (Reclamation, Defense, Energy)	10,316	0.64
State Trust Lands	3,835	0.24
Local Government Lands	619	0.04

Note. Adapted from "Rio Grande Water Fund Comprehensive Plan," by The Nature Conservancy (TNC), 2014a, p. 19.

Table 5

Key RGWF Investor Types

Federal Land & Water Management Agencies
Tribes & Land Grants
Local Governments
Utilities
Corporations, Water Users, and Other Donors
State Land & Water Management Agencies

Note. Adapted from "Rio Grande Water Fund Comprehensive Plan," by The Nature Conservancy (TNC), 2014a, p. 28.

Table 6

Social, Economic, and Political Settings (S) of the Social-Ecological System Framework

S1 – Economic Development
S1.1 – Small diameter forest products are becoming more viable (e.g. work by CFRP)
S1.2 – The forest products sector has grown smaller in recent years due to the scaling back of silviculture activities on public lands
S1.3 – Capital outlay bills in the past two NM Legislatures have included watershed restoration and wildfire work, partially for the purpose of job development
S2 – Demographic Trends
S2.1 – Relatively high unemployment in NM
S2.2 – Population growth in WUI
S3 – Political Stability
S3.1 – Gubernatorial elections take place every four years
S4 – Other Governance Systems
S5 – Markets
S5.1 – Provisioning of water
S5.1.1 – Municipal water (public)
S5.1.2 – Water rights
S5.2 – Provisioning of timber
S5.2.1 – U.S. Forest Service silviculture
S5.2.2 – Forest products: traditional use, small diameter, building materials
S6 – Media Organizations
S7 – Technology

Table 7

Resource Systems (RS) of the Social-Ecological System Framework

RS1 – Sector
RS1.1 – Water
RS1.2 – Forests
RS2 – Clarity of System Boundaries
RS2.1 – Watersheds can be determined by the flow of water
RS2.1.1 – Water and watershed managers know the boundaries of their watershed
RS2.1.2 – Most water users do know where their watershed is
RS2.2 – Ecosystem/forest boundaries are not based on land ownership boundaries
RS2.3 – Wildfires have no fixed boundaries, but will respond based on forest/land condition. In (emergency) response to large wildfires, jurisdictions may be less rigid.
RS3 – Size of Resource System
RS3.1 – Water (hydrologic)
RS3.1.1 – The Upper Rio Grande watershed: 2,082,248 acres (102,258 in CO)
RS3.1.2 – Rio Grande-Santa Fe watershed: 2,081,253 acres
RS3.1.3 – Rio Chama watershed: 2,020,419 acres (52,301 in CO)
RS3.2 – Forests
RS3.2.1 – Santa Fe Municipal Watershed: Small (17,000 acres)
RS3.2.2 – Rio Grande Water Fund: Large (1,600,000 acres)
RS4 – Human-Constructed Facilities
RS4.1 – Homes
RS4.2 – Reservoirs and Dams
RS5 – Productivity of System
RS6 – Equilibrium Properties
RS6.1 – Natural fire regimes are considered equilibrium
RS7 – Predictability of System Dynamics
RS7.1 – Modeling
RS7.1.1 – Wildfire risk
RS7.1.2 – Wildfire severity
RS7.1.3 – Debris flow risk
RS7.1.4 – Drought/climate
RS8 – Storage Characteristics
RS9 – Location

Table 8

Governance Systems (GS) of the Social-Ecological System Framework

GS1 – Government Organizations
GS1.3 – Suppliers (primary, because of land management agencies)
GS1.3.1 – Anti-donation rules (for government transfers to private sector)
GS2 – Nongovernment Organizations
GS2.1 – Intermediaries
GS2.4.1 – Fiscal agency rules (for non-profit intermediaries)
GS3 – Network Structure
GS4 – Property-Rights Systems
GS4.1 – Water rights (water)
GS4.2 – Land rights (public/trust property and private property)
GS5 – Operational-Choice Rules
GS6 – Collective-Choice Rules
GS7 – Constitutional-Choice Rules
GS8 – Monitoring and Sanctioning Rules
GS8.1 – Firewise Communities USA Program

Table 9

Resource Units (RU) of the Social-Ecological System Framework

RU1 – Resource Unit Mobility
RU1.1 – Water is mobile, interacting with all downstream elements
RU1.2 – Forests are stationary, and exist wherever ecological conditions and land management practices allow
RU2 – Growth or Replacement Rate
RU2.1 – Surface water supply is dependent on precipitation, snowpack, and rate of melting of snowpack
RU3 – Interaction Among Resource Units
RU3.1 – Less dense forests can yield greater recharge to aquifers and surface runoff to rivers
RU4 – Economic Value
RU4.1 – Water
RU4.1.1 – Determined by water markets
RU4.1.2 – Determined by economic analysis of watershed services (e.g. willingness to pay, avoided cost)
RU4.2 – Forests
RU4.2.1 – Determined by forest product markets
RU4.2.2 – Determined by economic analysis of watershed services (e.g. willingness to pay, avoided cost)
RU5 – Size
RU6 – Distinctive Characteristics
RU7 – Spatial and Temporal Distribution

Table 10

Actors (A) of the Social-Ecological System Framework

A1 – Number of Relevant Actors
A1.1 – Donors
A1.1.1 – RGWF Investors (~23)
A1.1.2 – Water users (essentially, anybody that pays for watershed services via their water bill)
A1.2 – Beneficiaries
A1.2.1 – New Mexico Stream Commission
A1.2.2 – Water users (essentially, anybody that uses surface water in the watershed)
A1.3 – Suppliers
A.3.1 – More than a dozen federal, state, and tribal land owners/agencies
A.3.2 – All private land owners
A1.4 – Intermediaries
A1.4.1 – The Nature Conservancy
A1.4.2 – RGWF Advisory Board (~43)
A1.4.3 – Potential Actors (Forest and Watershed Restoration Advisory Board)
A2 – Socioeconomic Attributes
A3 – History or Past Experiences
A3.1 – Las Conchas Fire
A3.2 – Collaborative Forest Restoration Program
A3.3 – Collaborative Forest Landscape Restoration Program
A4 – Location
A5 – Leadership/Entrepreneurship
A6 – Norms (Trust-Reciprocity)/Social Capital
A7 – Knowledge of Social-Ecological System/Mental Models
A7.1 – Payment for Ecosystem Services (PES) Models
A8 – Importance of Resource (Dependence)
A9 – Technologies Available
A9.1 – Biomass facilities

Table 11

Action Situations: Interactions (I) Leading to Outcomes (O) of the Social-Ecological System Framework

I1 – Harvesting
I2 – Information Sharing
I2.1 – SFMW education and outreach
I2.2. – RGWF education and outreach
I3 – Deliberation Processes
I4 – Conflicts
I4.1 – Budget decisions
I4.2 – Overlapping jurisdictions (polycentricity: conflict rather than collaboration)
I5 – Investment Activities
I5.1 – Payments from user fees
I5.2 – Donations
I6 – Lobbying Activities
I6.1 – Several stakeholders have been going to the NM Legislature since 2013 to raise issues of watershed planning and wildfire risk
I6.2 – Fire departments and State Fire Marshall appeared at NM Legislature to lobby against HB 474
I7 – Self-Organizing Activities
I7.1 – Voluntary participation in PES
I8 – Networking Activities
I8.1 – Overlapping jurisdictions (polycentricity: collaboration rather than conflict)
I9 – Monitoring Activities
I10 – Evaluative Activities
O1 – Social Performance Measures
O1.1 – Awareness
O1.1.1 – House Memorial 65
O1.1.2 – House Memorial 80 and Senate Memorial 95
O2 – Ecological Performance Measures
O3 – Externalities to Other Social-Ecological Systems

Table 12

Related Ecosystems (ECO) of the Social-Ecological System Framework

ECO1 – Climate Patterns
ECO1.1 – Effects on water
ECO1.1.1 – Increased evapotranspiration (connect this to forest cover decrease evapotranspiration?)
ECO1.1.2 – Snowpack
ECO1.1.2.1 – Less precipitation in the form of snow
ECO1.1.2.2 – Earlier melt of snowpack (connect this to dense forest cover exposing snowpack to earlier melting, and less dense forest cover protecting snowpack for longer duration melt?)
ECO1.2 – Effects on forests
ECO2 – Pollution Patterns
ECO3 – Flows Into and Out of Focal Social-Ecological System

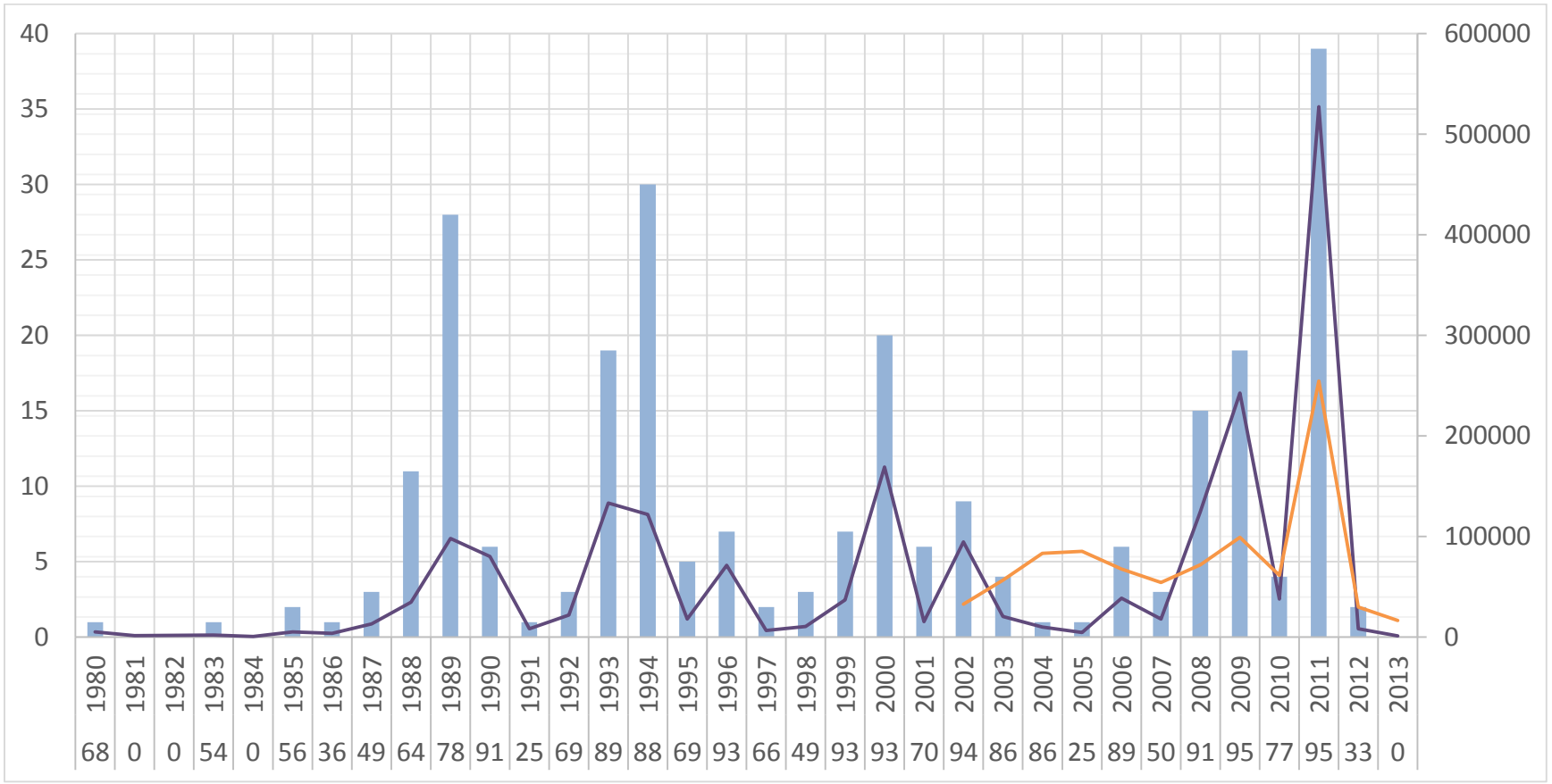


Figure 1. Forest fire in New Mexico. Columns on left y-axis are the number of wildfires in New Mexico greater than 1,000 acres in each year 1980 – 2013. The purple line on the right y-axis is the total number of acres burned by wildfire (only fires that were actively suppressed or naturally burned out). Orange line on the right y-axis is the number of acres treated by prescribed burns. Below years on the x-axis are the percentage of total acres burned by individual wildfires that are 1000 or more acres. All values are from fires on only the U.S. Forest Service and U.S. Department of Interior agency lands. Data from "Federal Wildland Fire Occurrence Data, All agencies" GIS shapefile available from United States Geological Survey (USGS) Federal Fire Occurrence Website, 2014, http://wildfire.cr.usgs.gov/firehistory/data.html.

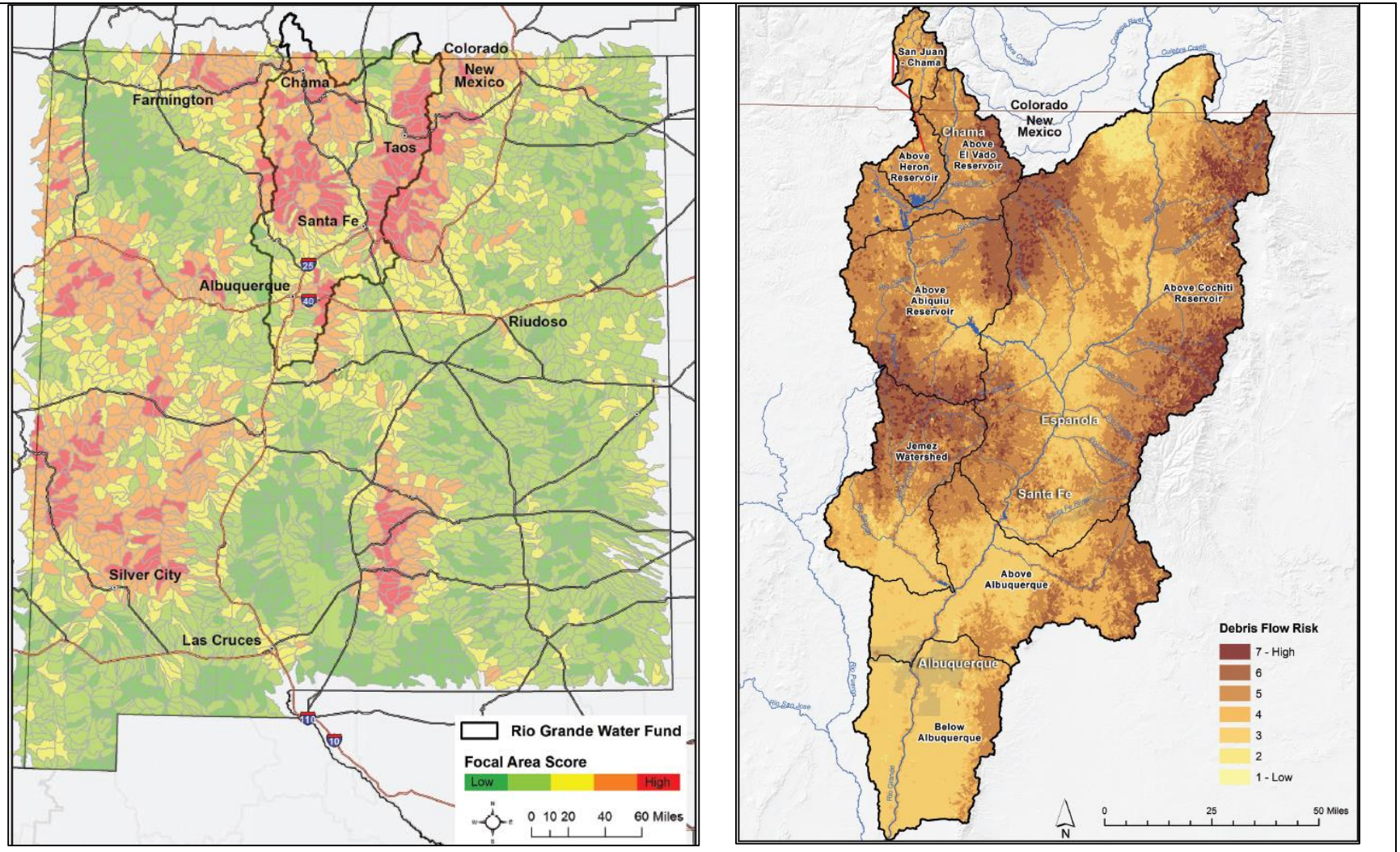
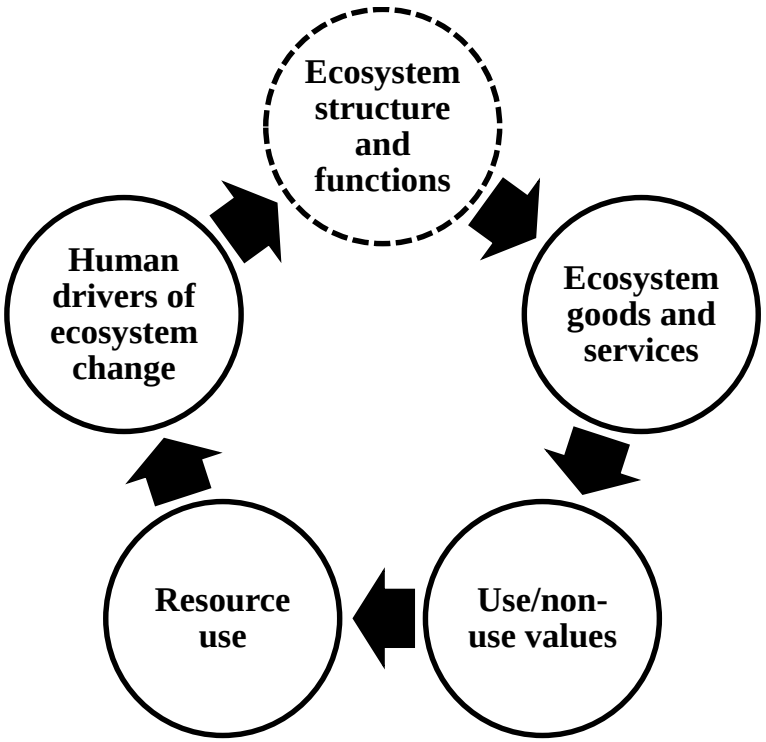


Figure 2. New Mexico subwatershed focal areas (left) and debris flow risk in the Rio Grande Water Fund area (right). Left map shows subwatershed restoration priorities (Low to High) based on five criteria (described on p XX). Right map shows detail of black outline on left map of the Rio Grande Water Fund area, with output of debris flow risk in the East Mountains area of northern New Mexico.
Left map from "Rio Grande Water Fund Comprehensive Plan," by The Nature Conservancy (TNC), 2014a, p 31. Right map from same, p 16.



Characteristics common to all PES transactions:

- The ecosystem service or land use to deliver that service is well-defined/valued.
- The transaction is voluntary and legally-binding.
- There is a minimum of one donor and one beneficiary.
- There is a minimum of one supplier.
- Payments are conditional on continued provision of the ecosystem service by the supplier.

Figure 3. Valuation of ecosystem goods and services and characteristics of Payment for Ecosystem Services (PES) transactions. The structure and functions of ecosystems in the flowchart provide goods and services that are valuable to humans. Valuation determines how resources are used, resulting in human drivers of change to the natural system, which directly affect ecosystem structures and functions. Dashed circles are part of the natural system. Flowchart adapted from *A New Blue Print for A Green Economy*, by E. B. Barbier and A. Markandya, 2013, Box 4.5, p 63. PES characteristics adapted from *Payments for Ecosystem Services: Legal and Institutional Frameworks*, edited by T. Greiber, 2009 p 7.

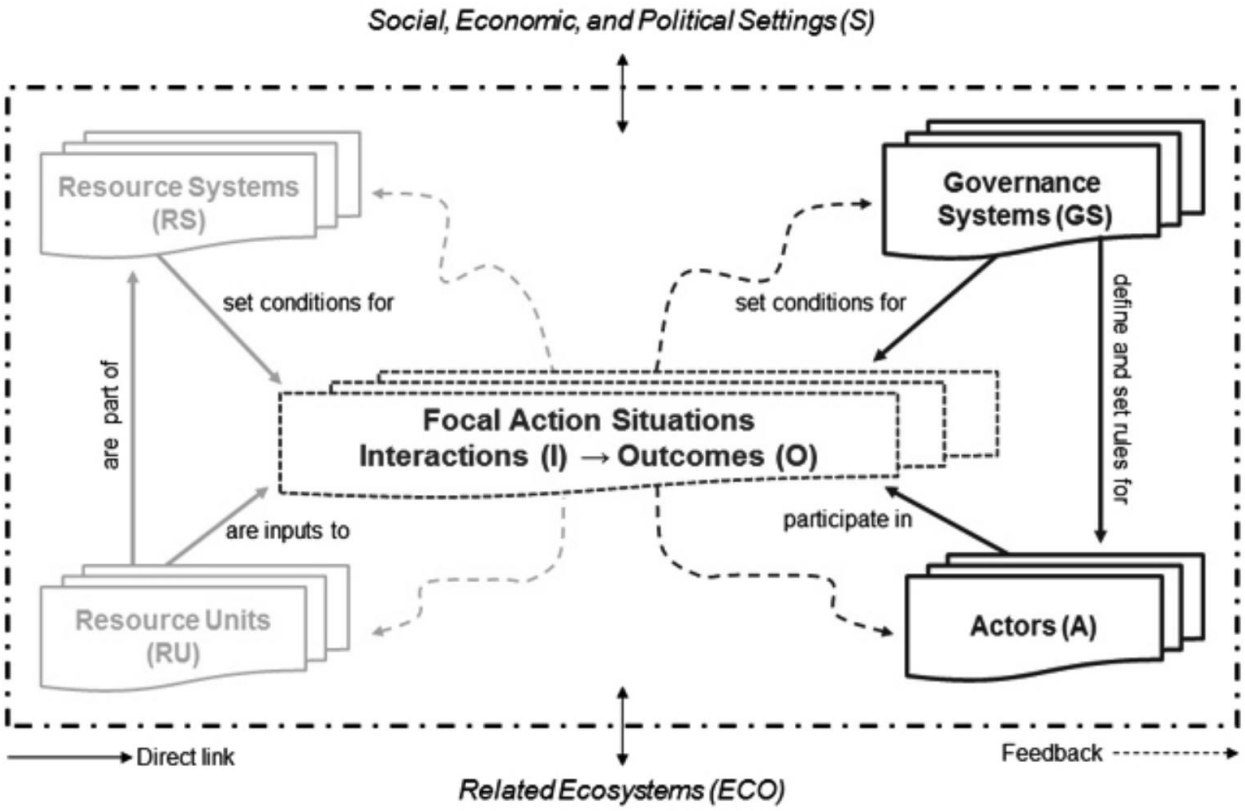


Figure 4. Conceptual model of the Social-Ecological Systems (SES) Framework. Solid boxes denote first-tier categories. Resource Systems, Resource Units, Governance Systems, and Actors are the highest-tier variables that contain multiple variables at the second tier as well as lower tiers (See Table 6, Table 7, Table 8, Table 9, Table 10, Table 11, and Table 12). Dashed arrows denote feedback from action situations to each of the top-tier categories. The dotted-and-dashed line that surrounds the interior elements of the figure indicates that the focal SES can be considered as a logical whole, but that exogenous influences from related ecological systems or social-economic-political settings can affect any component of the SES. From "Social-ecological system framework: initial changes and continuing challenges," by M. D. McGinnis and E. Ostrom, 2014, *Ecology and Society, 19*(2), article 30.

2013 House Memorial 65

A Memorial requesting the United States Forest Service to engage with New Mexico State agencies and local governments in meaningful watershed health planning and management.

- Recognizes diverse land ownerships in New Mexico, primarily by the federal government and private parties.
- Points towards "the purpose of securing favorable conditions for water flows" and "protection against destruction by fire and depredations upon the public forests and national forests" as part of the Organic Act of 1897.
- Resolves to request that state and federal agencies integrate watershed health and local, state, and tribal watershed plans and management with range and forest planning in New Mexico.

2014 House Memorial 80 and 2014 Senate Memorial 95

A Memorial requesting the New Mexico Legislative Council to direct the appropriate interim committee to develop a long-term funding plan for forest and watershed restoration work in New Mexico.

- Recognizes that current "active management of forests is insufficient to address the scope, scale and pace needed to restore" them, and that the scale of wildfires and insect damage is beyond that of current efforts to improve forest health.
- Points towards a need to "leverage" federal dollars with pools of funds from state, local, tribal, and private sources, via a multi-party coordinated approach, to be used for forest and watershed restoration.
- Resolves to request for an interim committee to be formed to develop a long-term funding plan for all stakeholders to cooperate on forest and watershed restoration in New Mexico.

Figure 5. Overview of House Memorial 65, House Memorial 80, and Senate Memorial 95. House Memorial 65 from Watershed Health Planning & Management, HM 65: Final Version, 51st NM Legis. (2013a). House Memorial 80 from Long-Term Forest & Watershed Plan, HM 80: Final Version, 51st NM Legis. (2014a). Senate Memorial 95 from Long-Term Forest & Watershed Plan, SM 95: Final Version, 51st NM Legis. (2014a).

House Bill 38

An Act relating to natural resources; enacting the Forest and Watershed Restoration Act; providing for forest and watershed restoration and wildlife habitat conservation; creating a fund; establishing a board; providing criteria for the evaluation and funding of projects.

Talking Points of Bill Sponsors

- Forest and watershed restoration will increase runoff, reduce fire risk, create economic opportunity for the use of smaller diameter trees, and lower property insurance premiums.
- Current forest and watershed efforts are not sufficient to affect high wildfire risk. While current efforts use temporary or one-time funding, a long-term approach is necessary.
- The Forest and Watershed Restoration Board, with sustained funding, will allow the State to leverage funding from federal sources. The Board will be in the best position to coordinate current and future funding and projects that take place at local, state, and federal scales.
- The bill is the culmination of collaboration by many stakeholders, including conservation, ranchers, hunters, fishers, the forest products industry, and land managers.

Major Concerns with the Bill

- Executive agencies, committees, and funding are already in place to carry out forest and watershed restoration, with current projects. The Board will slow down current efforts.
- The anti-donation clause of the New Mexico Constitution (art. IX, § 14) prevents funds from being used on private land. Since most high wildfire risk lands are private or federal, it is unclear how these funds will be spent.
- The bill is not tied to permanent funding.
- The prioritization of restoration projects is unclear or incomplete.

Bill Changes in Response to Major Concerns

- Inclusion of "wildlife conservation and habitat improvement" project criteria and the Director of Department of Game and Fish on the Board in order to expand funding sources.
- Inclusion of the Director of the Interstate Stream Commission, a member of the Acequia Commission, and non-voting, advisory members from the U.S. Forest Service and Bureau of Land Management on the Board.
- Removed funding coming directly from the Insurance Department Suspense Fund.
- Allowed projects to be prioritized if they have matching contributions, have potential commercial or traditional forest product uses, or create incentives for investment by other entities, including downstream water users.
- Clarified that the Board would be advisory to the State Forestry in carrying out the Act.

Figure 6. Overview of House Bill 38, "Forest & Watershed Restoration Act." Summarized by the author from testimony, committee records, legislation drafts, and public comment: Forest and Watershed Restoration Act, HB 38, 52d NM Legis. (2015a - d); and, *HB 38: Forest and Watershed Restoration Act* (2015a - e).

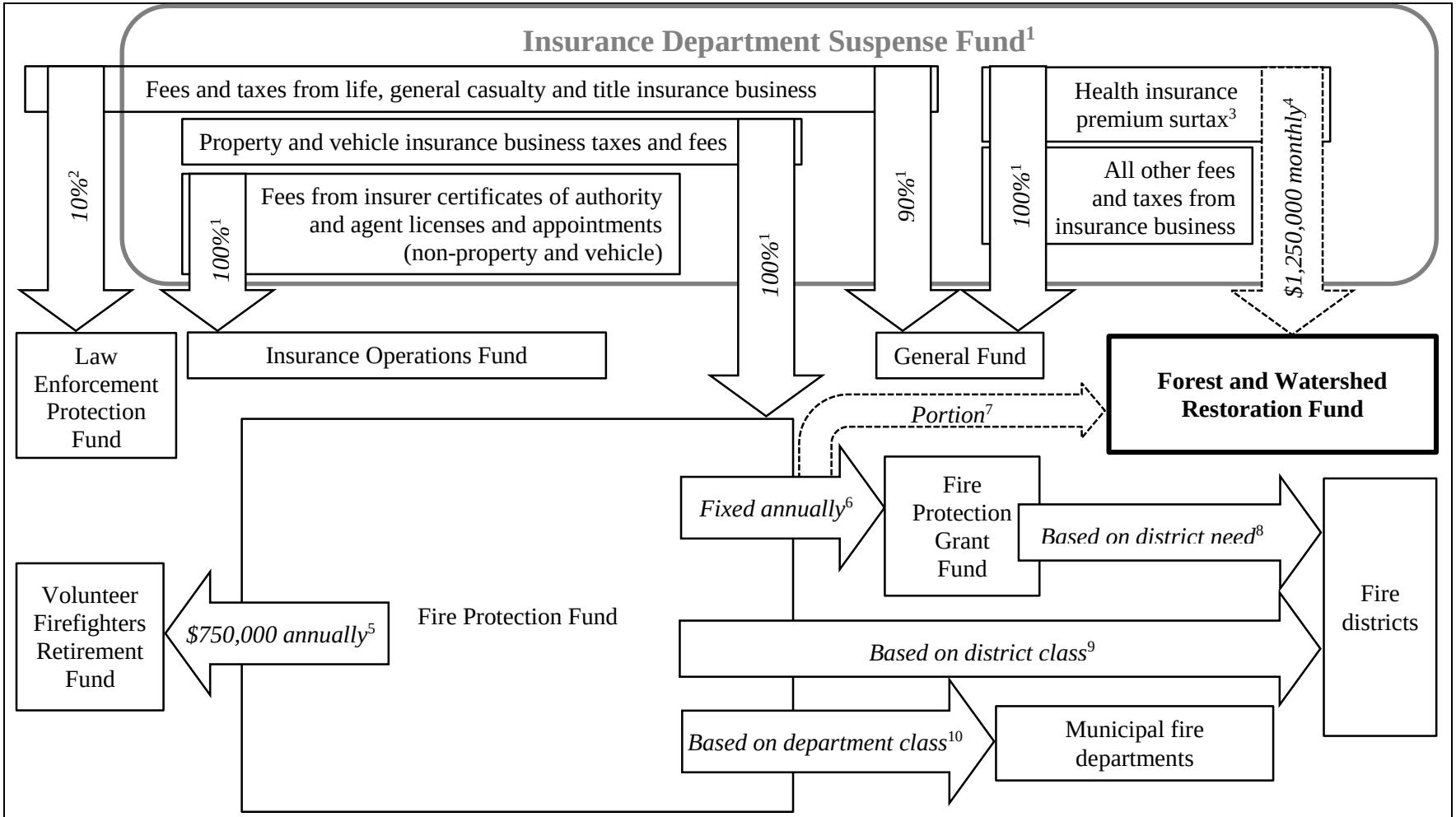


Figure 7. Insurance Department Suspense Fund distributions and Fire Protection Fund distributions (solid arrows), including those proposed for the Forest & Watershed Restoration Fund (dashed arrows).
[1] 59A NM Stat. § 6-5. [2] 29 NM Stat. § 13-3. [3] 59A NM Stat. § 6-2. [4] Fire Protection Fund to Watershed Restoration, HB 474, 52d NM Legis. (2015). [5] 10 NM Stat. § 11A-3. [6] 59A NM Stat. § 53-5.2. [7] Forest and Watershed Restoration Act, HB 38, 52d NM Legis., (2015a). [8] 59A NM Stat. § 53-19. [9] 59A NM Stat. § 53-4. [10] 59A NM Stat. § 53-5.

House Bill 474

An Act relating to public finance; providing for an annual transfer from the Fire Protection Fund to the Forest and Watershed Restoration Fund; changing the current transfer schedule; making an appropriation.

Talking Points of Bill Sponsors

- The transfer of funds is equal to a portion of the increase going to the Fire Protection Fund each year. Therefore, the amount in the Fund will continue to increase.
- Property insurance collectors support the bill. There is an obvious nexus between wildfire prevention and the protection of property from wildfire.

Major Concerns with the Bill

- The purpose of the Forest and Watershed Restoration Fund does not align with the purpose of the Fire Protection Fund.
- Impacts to rural and small fire departments that request funding from the Fire Protection Fund for maintenance, improvement, or construction of fire stations or equipment, and fire fighter training.

Bill Changes in Response to Major Concerns

- House Committee members suggested that bill sponsors meet with bill opponents to come to an agreement. This meeting did not happen.

Figure 8. Overview of House Bill 474, "Fire Protection Fund to Watershed Restoration." Summarized by the author from testimony, committee records, legislation drafts, and public comment: Fire Protection Fund to Watershed Restoration, HB 474, 52d NM Legis. (2015); and, *HB 474: Fire Protection Fund to Watershed Restoration* (2015a - b).

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HB 38: Forest and Watershed Restoration Act: Hearing before the House Appropriations & Finance Committee (HB 38, 2015c), 52d NM Legis. (February 24, 2015) (oral testimony by bill sponsors and experts, and public comment).

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