

Watershed Management in the Federal Government

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ABSTRACT

Watersheds in the United States are very valuable. Their waters support a wide range of purposes, including irrigation, fisheries, industrial operations, recreational pursuits, aquatic habitat, and drinking water. Efficient and effective watershed management must consider all of these purposes and plan accordingly. Watershed management is conducted by many entities, with one of the largest and most important partners being the federal government. Although many federal agencies conduct watershed management, they often act out of concert with one another, even across the same watersheds. This lack of coordination leads to duplications of efforts as well as gaps in services offered. Among federal agencies, the U.S. Forest Service, in particular, has major responsibilities for protecting water resources because of its position as owner of many of the nation's headwaters.

This paper highlights duplications and gaps which occur across the federal government in watershed management, and offers policy recommendations on how to streamline efforts. It details the history of the U.S. Forest Service in watershed management. It argues how a paradigm shift in resource management within the U.S. Forest Service has negatively affected morale in a manner which hinders successful watershed management. A history of forest planning is provided. Finally, there is an analysis of the 2011 Planning Rule with predictions on how implementation of the rule will affect watershed management.

Results indicate that greater coordination of water quality monitoring data collection efforts would be accomplished with the establishment of a central clearinghouse, as well as the designation of a single agency responsible for coordinating efforts. More data are necessary to properly assess and address water quantity concerns in the United States. The U.S. Forest Service has struggled, and will continue to struggle with watershed management due to its many priorities as well as a lack of general employee morale in the agency. The 2011 Planning Rule, although flexible and adaptable, grants unprecedented levels of discretion to officials. It remains to be seen what effect this will have on watershed management in the U.S. Forest Service.

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LIST OF ACRONYMS

APA	Administrative Procedure Act
CWA	Clean Water Act
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FLPMA	Federal Land Policy and Management Act
FRRPA	Forest and Rangeland Renewable Planning Act
FY	Fiscal Year
GAO	United States Government Accountability Office
MUSYA	Multiple Use Sustained Yield Act
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPS	United States National Park Service
NWIS	National Water Information System
SDWA	Safe Drinking Water Act
STORET	Storage and Retrieval System
TMDL	Total Maximum Daily Load
USACOE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
US DOJ	United States Department of Justice
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WQS	Water Quality Standards

INTRODUCTION

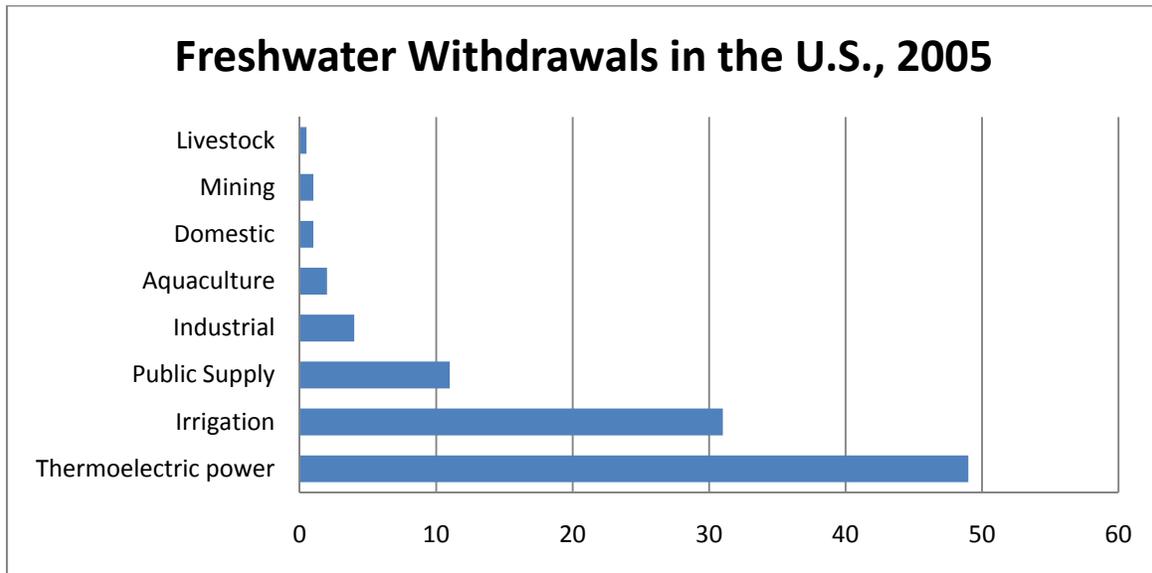


Figure 1. Major freshwater withdrawal purposes in 2005. Values for each category are relative percents of total water withdrawn. From Kenny, et al., 2009.

Freshwater in the United States is used for many purposes. Much of it is for extractive purposes – in 2005, 410,000 million gallons of water ($1.5 \times 10^9 \text{ m}^3$) were withdrawn daily, and freshwater constituted 85% of that total (Kenny, et al., 2009, Figure 1).

In addition to water extraction, there are other consumptive uses of United States' water resources. For example, the total freshwater fish catch in the United States in 2000 was 313,481 metric tons and the total amount of freshwater aquaculture produced in 1997 was 256,345 metric tons (Earth Trends, 2003). Freshwater aquaculture sales in the United States in 2005, alone, totaled \$1.09 billion (NASS, 2006). Water-related tourism and recreation are also economically significant in the United States, with annual revenue in 1996 totaling more than \$450 billion (EPA, 2000). People impart symbolic and aesthetic value to water, as well. This value determines people's relationship with, and attitude toward, water and watershed management (McCool, et al., 2008).

Watersheds can only provide these uses if they are functioning and healthy. Healthy watersheds support diverse flora and fauna populations, provide refugia for migrating animals, protection from erosion, offer flood control and storm protection, and conduct nutrient cycling (Postel and Thompson, 2005). These features of watersheds are referred to as ecosystem services. Though often not included in economic valuations, estimates of their worth worldwide have been estimated at \$33 trillion US dollars (Costanza, et al., 1997).

Water resources in the United States are diverse. There are over 250,000 rivers in the United States, totaling 3.5 million miles (5,632,704 km) (American Rivers, 2011). The United States' lake resources are vast and contain many distinctions, including the largest salt lake in the western hemisphere (Salt Lake) and the largest freshwater system on earth (the Great Lakes).

The freshwater resources of the United States provide drinking water with over 54,000 public water systems serving over 250 million people, while many others get their water supply from private wells (Levin, et al., 2002). These resources, though renewable, are nevertheless threatened across the country due to poor water quality and imbalances between water supply and demand.

Although water resources are relatively plentiful throughout the country, there are frequent regional shortages (Levin, et al., 2002). Population in the United States is projected to increase by 29 percent between 2010 and 2030, with the west alone increasing by 46 percent (U.S. Census Bureau, 2010). Providing clean drinking water to growing populations while meeting other water resource needs is one of the main challenges facing water managers today.

These problems are exacerbated by the sheer amount of different individuals and entities involved in watershed management. Watershed management activities can involve water infrastructure operation, construction and maintenance, water quality and quantity monitoring,

and water resource law administration. The land management agencies are tasked with conducting operations on their properties in ways that will protect and enhance water resources. These agencies frequently partner with local and state agencies as well as nongovernmental organizations and academic institutions. Because of the many individuals and entities involved, gaps and duplications in services offered among federal agencies frequently occur. This paper will investigate these gaps and duplications and offer policy suggestions for streamlining efforts and improving management.

The U.S. Forest Service has a unique role in watershed management in the United States. Approximately 53 percent of America's freshwater supply is on forest lands (Forest Service, 2007). This total includes 14 percent of the United States' surface water supply (Williams, 2007). Water from these lands has been valued at \$3.7 billion per year (Sedell, et al., 2000). Over sixty million people live in 3,336 municipalities that are supported by drinking water from NFS lands (Williams, 2007).

The Forest Service manages 400,000 miles (643,737 km) of streams and 3 million acres (1,214,057 ha) of lakes, administers 90,000 water rights in cooperation with states, protects habitat used by over 550 rare, threatened and endangered species, and provides recreation to more than 130 million visitors per year.¹ These facts make the U.S. Forest Service an important provider and manager of water resources in the United States. The role of the U.S. Forest Service in watershed management will be investigated in this paper. The U.S. Forest Service is also currently completing a new planning rule for its National Forests which will likely have implications for watershed management. The history of planning rule development and the possible implications of this new rule will be analyzed in this paper.

¹ See 76 FR 8480 (2011-02-14)

SECTION 1:

WATERSHED MANAGEMENT IN THE FEDERAL GOVERNMENT

WHAT ARE WATERSHEDS AND WHAT IS WATERSHED MANAGEMENT?

Watersheds are “the area of land where all of the water that is under it or drains off of it goes into the same place” (EPA, 2009a). They are delineated by ridges which separate different watersheds. They frequently cross jurisdictional boundaries due to their large sizes. Hydrological connections in watersheds usually exist between surface and groundwater resources, though mapping these relationships can be complex (Sophocleous, 2002). Management efforts usually recognize the interconnectedness of surface and groundwater resources (and manage accordingly) but this is not always the case. Because water naturally flows downstream and into other bodies of water, it is necessary to consider effects of watershed management across ecosystems.

Watershed management typically means different things to different people. However, the United States Environmental Protection Agency (EPA) recognizes a watershed approach to water resource management as being (EPA, 2011):

“Hydrologically defined, geographically focused, includes all stressors (air and water).”

This approach recognizes that watersheds are spatially explicit and map-able. Although water is a mobile resource, hydrological science is well developed enough to understand, in general, where water will flow and how it is contained in a basin. It also understands that water and air resources are connected, and thus, changes in one of these systems can cause changes in another.

“Involves all stakeholders, [including] public (federal, state, local) and private sector, is community based, includes a coordinating framework.”

There are many demands on watershed resources. Some of these demands are overlapping, and frequently, not complementary. Thus, in order to properly manage resources, it is necessary to coordinate among all stakeholders. This approach understands that agreement and understanding reached through negotiation can lead to more equitable and enforceable arrangements.

“Strategically addresses priority water resource goals (e.g., water quality, habitat), integrates multiple programs (regulatory and voluntary), based on sound science, aided by strategic watershed plans, uses adaptive management.”

Watershed management typically addresses both habitat and human goals, and understands that water has many purposes. Federal and state agencies must meet legal mandates (such as the Clean Water Act) first when managing water. After meeting these mandates, other goals can be met. Nongovernmental organizations have differing goals of watershed management, depending on their missions.

Watershed Management Program Examples

Watershed management usually takes place within a watershed planning framework. The EPA defines a watershed management plan as the following (EPA, 2008):

“A watershed plan is a strategy and a work plan for achieving water resource goals that provides assessment and management information for a geographically defined watershed. It includes the analyses, actions, participants, and resources related to development and implementation of the plan. The watershed planning process uses a series of cooperative, iterative steps to characterize existing conditions, identify and prioritize problems, define management objectives, and develop and implement protection or remediation strategies as necessary.”

Watershed management plans and programs typically differ in their activities based on the particular needs of the watersheds, as well as the resources of the organizations participating. It is hard to generalize on particular commonalities among programs. Here are a few examples of watershed management programs that the U.S. Forest Service is currently participating in.

In Maryland, the U.S. Forest Service Northeastern State and Private Forestry is working cooperatively with the Maryland Department of Natural Resources Forest Service to improve watersheds in Maryland. This program has four main focuses: increasing riparian forest buffers, improving forest management to protect drinking water reservoirs, establishing watershed partnerships, and conducting forest management best management practices' assessments (Hairston-Strang, 2007). As with many collaborations with state agencies, in this partnership the U.S. Forest Service serves primarily as a provider of technical and financial assistance.

In Denver, Colorado, "Forest to Faucet" is an ongoing partnership between the Rocky Mountain Region Office of the U.S. Forest Service and Denver Water, a public water utility agency. This program will expend \$33 million dollars (with \$16.5 million dedicated from each partner) to conduct watershed management activities in the Denver region to protect the city's drinking water supply. Although the work intends to protect high quality watersheds, most of the work conducted will be traditional wildfire management activities, including conducting forest thinning as well as other wildfire fuel reduction activities (Denver Water, 2011).

Interagency cooperation is a major goal for watershed management in the Greater Yellowstone Area. Here, the Forest Service is working with the National Park Service, the U.S. Fish and Wildlife Service, the Bureau of Land Management and state and local partners to protect water resources and manage collaboratively. They have also resolved to investigate

scientific issues of concern together and monitor other important issues such as water quality, water rights, and water supply (Greater Yellowstone Area Hydrology Subcommittee, 2006).

Watershed management is done by many organizations and entities. State governments typically have watershed management programs within their departments of natural resources.² Specific state programs for protecting water resources vary across states but typically include programs that monitor water quality and quantity, delegate water extraction and use rights, permit wastewater and storm water discharge, and promote water conservation. Additionally, there are many nongovernmental organizations which engage in watershed management including nonprofits, academic organizations, watershed planning bodies and individuals.

POLICIES AND MANDATES

There are many statutes that govern federal roles and responsibilities regarding watersheds. Some of the most important are the following.

1. *Administrative Procedure Act (APA)* of 1946 is intended to improve communication and promote openness between federal agencies and the public. It “requires agencies to keep the public informed of their organization, procedures and rules, to provide for public participation in the rulemaking process, to establish uniform standards for the conduct of formal rulemaking and adjudication, [and] to define the scope of judicial review” (Clark, 1947).
2. *Multiple-Use Sustained Yield Act (MUSYA)* of 1960 requires that National Forest System lands be managed for multiple uses (including outdoor recreation, range, timber, watershed, and wildlife and fish purposes). Water is required, at least in part, for all of these purposes,

² Names for these departments vary across states, for example, some are called Department of the Environment, however, programs within them are usually very similar across states.

and therefore water quality must be preserved to serve these purposes. This act applies specifically to the U.S. Forest Service.

3. *Wilderness Act* of 1964 grants Congress the authority to designate lands as “wilderness” which grants them special protections. Wilderness lands must have as little human influence as possible. Motorized and mechanical vehicles are not allowed on these lands. Logging, mining and road development are also prohibited.
4. *Wild and Scenic Rivers Act* of 1968 grants Congress the authority to select particularly high quality rivers that “possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values” and protect them in their free-flowing condition. Dams, impoundments, and other water impoundments are not allowed on designated portions of protected rivers.
5. *National Environmental Policy Act (NEPA)* of 1969 mandates that all federal agency actions must undergo an analysis of whether the action is likely to cause significant effects on the environment. Actions for which no significant effects are likely are referred to as categorical exclusions, and no environmental assessment (EA) or environmental impact statement (EIS) is required. Actions that will cause a significant effect require the development of an EA or EIS. All actions that may adversely affect watersheds must undergo a NEPA analysis.
6. *Clean Water Act (CWA)* of 1972, designed to prevent pollution of water bodies, mandates pollution cleanup plans for impaired water bodies. States are mandated under section 303(d) of the CWA to establish total maximum daily loads (TMDLs) for impaired water bodies as well as a priority list for their creation. The CWA stipulates “an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides

for recreation in and on the water be achieved.” Authority for enforcement of this act is granted to the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers.

7. *Endangered Species Act (ESA)* of 1973 sets rules and guidelines for the protection of threatened and endangered species from extinction. It includes mechanisms for listing potential species, as well as designating critical habitat and recovery plans for these species. Federal agencies must avoid actions which would harm listed species. The main agencies charged with enforcement of this act are the U.S. Fish and Wildlife Service and the National Marine Fisheries Service.
8. *Forest and Rangeland Renewable Resources Planning Act (FRRPA)* of 1974 requires a complete renewable resource assessment on all National Forests. Both ground and surface water are required to be assessed and managed under this act. This act applies exclusively to the U.S. Forest Service.
9. *Safe Drinking Water Act (SDWA)* of 1974 seeks to protect the nation’s drinking water supply. This act protects all sources of drinking water, including rivers, reservoirs, springs, and groundwater (EPA, 2004). The 1996 amendments to this act include source water assessment programs requiring states to document their water resources and identify possible sources of water contamination and threats to these water bodies. The main federal authority for this act is the U.S. Environmental Protection Agency.
10. *Federal Land Policy and Management Act (FLPMA)* of 1976 governs the granting of water rights for nonfederal purposes, such as the construction of water infrastructure, rights-of-way, or easements on public lands. This act mainly applies to the Bureau of Land Management.

11. *National Forest Management Act (NFMA)* of 1976 prohibits timber removals that would irrevocably damage watersheds. Protection must be provided for streams and wildlife during timber harvest. This act applies to the U.S. Forest Service.

There are many state laws as well that deal with watershed management. Because this paper focuses primarily on federal agencies involved with watershed management, their laws have been omitted here. In general, though, state laws tend to deal with most of the same issues as federal laws.

Many federal agencies are tasked with carrying out these laws and statutes. Some have primary regulatory or enforcement responsibilities. Others manage lands, waters, or infrastructure that must comply with these statutes. Nearly every federal agency conducts actions that affect our nation's water resources. However, for the sake of simplicity, only the main agencies which hold regulatory, enforcement, or management authority or responsibility will be discussed in this paper.

FEDERAL AGENCIES

Table 1. Federal agency roles in watershed management. Partially excerpted from GAO, 2003).

Category	Agency	Located within	Legal Authority
Water Infrastructure Operation, Construction, and Maintenance	U.S. Army Corps of Engineers	U.S. Army	
	Bureau of Reclamation	Department of the Interior	
Water Monitoring	U.S. Geological Survey	Department of the Interior	
Water Resource Law Administration	U.S. Environmental Protection Agency		CWA, SDWA
	National Marine Fisheries Service, NOAA	Department of Commerce	ESA
	U.S. Fish and Wildlife Service	Department of the Interior	ESA
	U.S. Army Corps of Engineers	U.S. Army	Section 404 of the CWA
Managing Federal Water Resources	U.S. Forest Service	Department of Agriculture	MUSYA, FRRPA, NFMA
	Bureau of Land Management	Department of the Interior	FLPMA
	Bureau of Indian Affairs	Department of the Interior	
	U.S. Fish and Wildlife Service	Department of the Interior	
	National Parks Service	Department of the Interior	

There are many federal agencies involved in watershed management. The agencies involved tend to fall into four distinctive roles (though some agencies have more than one role)

(Table 1). These agencies have certain legal mandates they must meet. The roles of these agencies are discussed further below.

Water Infrastructure Operation, Construction and Maintenance

The main federal agencies involved in water infrastructure construction, operation, and maintenance are the U.S. Army Corps of Engineers and the Bureau of Reclamation. Their projects include dams, impoundments and ditches. They are not responsible for the allocation of water nor do they own the water in their projects (GAO, 2003). The Bureau of Reclamation, in fact, no longer operates or maintains most of its properties, having transferred most of this responsibility to local irrigation districts (GAO, 2003). Because of complex ownership arrangements, these agencies hold a special responsibility to coordinate with local and state partners to help them manage their resources.

Federal landowners, including the Bureau of Land Management, the Bureau of Indian Affairs, the U.S. Forest Service, the National Park Service, and the U.S. Fish and Wildlife Service also construct, operate and maintain water infrastructure on their lands. These dams and water storage facilities serve a wide range of purposes including irrigation, fisheries and habitat protection, water for livestock, recreation, flood control, and fire suppression (GAO, 2003).

Water Monitoring

There are at least 15 federal agencies which collect water quality data including: the U.S. Geological Survey (USGS), the U.S. Forest Service, the Bureau of Indian Affairs, the National Park Service, the National Oceanic and Atmospheric Administration (NOAA), the National Marine Fisheries Service (NMFS), EPA, the U.S. Fish and Wildlife Service (USFWS), the Tennessee Valley Authority, the U.S. Army Corps of Engineers (USACE), and the Bureau of Reclamation (GAO, 2004). USGS is the main federal agency tasked with conducting and

analyzing water quality and quantity data throughout the United States. They monitor water use and availability through surface water stream gages and groundwater monitoring stations. Other federal agencies conduct water resource monitoring on their properties to supplement USGS data. Besides these agencies, state and local governments collect data to meet requirements under the Clean Water Act (CWA), and nongovernmental organizations, including academic institutions, collect data as well.

Water quantity data monitoring is much more centralized, with only three federal agencies conducting monitoring and reporting (GAO, 2004). The main federal agencies that conduct water quantity monitoring are USGS, the USDA National Resources Conservation Service, and NOAA's National Weather Service. Water quantity data are important to help determine if state, local, and tribal governments are receiving the amount of water they have been allocated under various legal agreements. Water quantity data are also needed to determine whether certain pollutant loads are harmful (as pollutants tend to be more harmful in higher concentrations).

Water Resource Law Administration

The EPA gains its authority from the two main federal mandates that regulate water quality, the CWA and the Safe Drinking Water Act (SDWA). Its programs issue regulations for surface and groundwater resources, identify and prosecute polluters (with the assistance of the U.S. Department of Justice), provide assistance to state governments in planning and management, and conduct environmental education outreach programs.

The USACOE is responsible for carrying out Section 404 of the CWA which permits activities that discharge dredged or fill materials into waters of the U.S., including wetlands. In

this role, USACOE is responsible for approving mitigation for individuals whose activities fill or discharge materials into wetlands.

NMFS and the USFWS are granted authority and responsibility for protecting endangered and threatened species under the ESA. NMFS is responsible for the protection of 72 listed species (NMFS, 2011). Many of these species exist solely in marine waters, though some spend part, or entire portions of their lives in freshwater habitats. The USFWS is responsible for the protection of over 1000 threatened and endangered aquatic and freshwater species in the United States (USFWS, 2010b).

Water Resource Management

The United States owns 671.8 million acres of land (271,867,814 ha or 30% of the United States' land area) and 93% of this land (628.4 million acres or 254,304,458 ha) is collectively managed by the Bureau of Land Management, the U.S. Forest Service, the National Park Service, and the USFWS (Vincent, 2004). These agencies are collectively referred to as the land management agencies. The land management agencies conduct extensive watershed management activities on these lands. All of the agencies have programs for retaining federal reserved water rights as well as gaining new water rights through state adjudications. Their management activities are often done in conjunction with other federal, state, local and nongovernmental partners. The Bureau of Indian Affairs, while not primarily responsible for land management, nevertheless manages tribal water rights.

There are many factors managers must consider when conducting watershed management. These include meeting legal mandates (such as the CWA and the SDWA), working within budget, time, and resource constraints, incorporating concerns of stakeholders into decision-making, working with existing partners, and developing new partnerships and

collaborations. Management must consider water use and extraction rights that limit their actions on water resources on their lands. Most management activities are conducted to either preserve water quality, water quantity, or both.

WATER USE AND EXTRACTION RIGHTS

One frequent source of conflict for federal land management agencies is water use and extraction rights. The policy and law behind water rights is notoriously complicated, especially in the west, where most federal land is located. In many cases, most of the water that exists on federal lands is allocated to users off federal properties (Pringle, 2000). The complexity of instream flow rights and the differences among states create difficulties in administering watershed management plans. Instream flow rights are poorly defined in states with prior appropriation doctrines. In these states, water rights are granted on a “first in time, first in right” basis, creating senior and junior water rights users. Water is first allocated to senior water users, and once all of the senior rights have been satisfied it can then be allocated to the junior water rights holders in order of decreed priority. Water must be put to a “beneficial use” and it must be used within a certain period of time (Getches, 2006). This system is primarily used in the west.

In the east, many states subscribe to the riparian doctrine. Landowners who have water on their property have the right to “reasonable uses.” In years of shortage, all water users must curb use (Chang, 2006). There are also states that use a hybrid system of both doctrines. Legal action occurs frequently in these states due to the difficulty of courts in determining who holds rights to certain water allocations (Balint, 2010).

Instream flows are crucial, because they provide valuable habitat for wildlife and fisheries. However, instream flows are generally not considered a “primary” purpose on federal

lands and must be asserted in a water adjudication (Balint, 2010; Corless, 2010). These adjudications are authorized under the McCarren Amendment which waives the federal government's sovereign immunity in water rights hearings (Balint, 2010). Thus, federal agencies may hold either federal reserved water rights or state-delegated water rights. As the importance of water for ecological and habitat purposes has been recognized, federal agencies have realized that they often require more water than they are currently allocated to maintain essential habitat functions. It is under these circumstances that they argue for more water rights.

The Forest Service has had varying success in efforts to acquire more water rights. Following the decision in *United States v. New Mexico*, reserved water rights for instream flows have never been granted to the Forest Service (Witte, 2001). Rather, courts have told the Forest Service to gain additional rights through state adjudications. Unfortunately, these efforts have also been unsuccessful, with no instream flows ever granted in a contested proceeding to the Forest Service for recreation, fisheries, or habitat purposes (Witte, 2001).³ The only instream flows ever granted to the Forest Service were granted in basin-wide negotiations and a basin closure in Colorado and Utah (Witte, 2001).

Federal agencies face additional challenges due to their multiple use mandates. The Forest Service operates under the Multiple-Use Sustained Yield Act (MUSYA) of 1960 which requires that National Forest System (NFS) lands be managed for multiple uses (including outdoor recreation, range, timber, watershed, and wildlife and fish purposes). Water is required, at least in part, for all of these purposes, and therefore water quality must be preserved. MUSYA also makes no distinction between the relative importance of any of these purposes, thus, water must be allocated to serve all of these purposes. As all water needs cannot often be met on NFS

³ The only exception to this are permits granted by the State of Arizona.

lands, ideally, water would be allocated to the most important purposes. However, this mandate does not allow triage to be conducted on NFS lands.

No mandate as explicit as MUSYA exists for any other federal land management agencies, however, the National Park Service (NPS) has similar water rights problems. The goal of the NPS as introduced in the National Park Service Organic Act of 1916 states that they must

“conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

The NPS is currently participating in 45 stream rights adjudications in western states (NPS, 2010a). The Department of Justice argues on behalf of the NPS in these proceedings and have been successful in 26 settlement agreements and decrees (NPS, 2010a). These documents recognize reserved federal rights for water resources on NPS lands.

The Water Rights Branch of the Water Resources Division of the NPS is responsible for gaining and maintaining water rights on NPS lands. This office monitors water supply on certain National Parks to determine that flows are satisfactory to sustain essential habitat and recreation requirements. The USGS also provides monitoring capabilities at certain units (NPS, 2010b). Conflicts are cooperatively worked out between the NPS and state environmental agencies.

Similar programs exist within the U.S. Fish and Wildlife Service in each of its regions.⁴ Their programs record and document water levels to properly argue for instream flow rights, ensure that water uses on National Wildlife Refuges are within legal limits, and identify the need for additional rights needed for habitat protection (USFWS, 2010a).

All of the federal agencies mentioned here have similar problems with meeting their water rights program goals. Funds needed to document habitat water requirements are often

⁴ Some of these programs include the Water Rights Acquisition and Protection Program within the Water Resources Division of the Mountain-Prairie region, the Water Rights program of the Alaska region office, and the Water Operations Division of the Pacific Southwest region.

lacking within agencies, and many times, previous allotments of water to other users impede the ability of agencies to gain new water rights (Pringle, 2000). There are also concerns that groundwater withdrawals outside of federal properties might impede ecological systems within properties. Conflicting and inflexible mandates and goals also hinder the ability of agencies to meet water needs on properties.

Watershed management activities typically address how to maintain water quality and water quantity on their lands. There are a number of federal laws that address water quality and water quantity, the most important being the Clean Water Act (CWA). To accomplish goals, managers typically work with other federal agencies which are charged with conducting similar activities. There are a number of difficulties associated with these coordination efforts which will be examined here.

WATER QUALITY AND QUANTITY

Water Quality

Water quality in the United States is regulated under a number of state and federal laws, including the CWA. It is designed to prevent pollution of water bodies, and mandates pollution cleanup plans for impaired water bodies. The CWA stipulates “an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved.” This mandate gives regulation and enforcement authority primarily to the EPA.⁵

⁵ Regulation of wetlands is delegated to the U.S. Army Corps of Engineers. The U.S. Coast Guard is responsible for enforcement of the law along the coast. Prosecution of violators is done by the U.S. Department of Justice.

Since the enactment of the CWA, there have been vast improvements in water quality (Houck, 2002); however, problems still exist. According to a survey conducted by the EPA (2009b) of states:

“States reported that about 44% of assessed stream miles, 64% of assessed lake acres, and 30% of assessed bay and estuarine square miles were not clean enough to support uses such as fishing and swimming. Less than 30% of U.S. waters were assessed by the states for this report. Leading causes of impairment included pathogens, mercury, nutrients, and organic enrichment/low dissolved oxygen. Top sources of impairment included atmospheric deposition, agriculture, hydrologic modifications, and unknown or unspecified sources.”

Water pollution in the United States comes from a wide range of causes, both anthropogenic and natural (Craig, 2009). Watersheds are imperiled by two types of pollution, point source, and nonpoint source pollution. Point source pollution is defined as “any discernable, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, vessel or other floating craft, from which pollutants are or may be discharged” (EPA, 2010). Authority granted to the EPA under Section 301 of the CWA to set technology-based effluent limitations for point source dischargers substantially reduced point source pollution in the United States. Most of the water pollution that still exists in the United States is caused by nonpoint sources (Houck, 2002).

Nonpoint source pollution is “caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters and groundwaters” (EPA, 2010). It has proven exceedingly difficult to regulate and prevent. Whereas there are mandatory obligations for point source polluters, nonpoint source polluters have escaped these obligations for a number of reasons, including the difficulty associated with organizing and

compelling polluters to establish alternative practices and mediate their pollution input (Houck, 2002).

Impaired watersheds are defined and listed under Section 303(d) of the CWA. Water bodies in the U.S. that do not meet water quality standards (WQS) as defined by the states (with powers that are delegated from the federal government) are considered “impaired” and in “non-attainment.” Impaired waterbodies require the establishment of total maximum daily loads (TMDLs). A TMDL is a cleanup plan for a watershed’s pollution. Watersheds impaired for a certain pollutant necessitate the development of a cleanup plan which specifies how much each polluter must reduce their pollutant input in order to reach water quality standards.

TMDLs have been unsuccessful in certain watersheds for a variety of reasons. In some, it is simply a struggle to create a TMDL at all, as it requires extensive coordination and communication among many government offices and a great deal of money and time. With shrinking federal and state budgets, agencies are challenged to meet these demands. Additionally, they require large amounts of data, frequently producing results which are not definite and are easily litigable (Houck 2002). TMDLs are required to be completed by states, but the EPA will step in if not completed by the states.⁶

To establish TMDLs as well as other watershed management programs on properties, federal agencies must understand the water quality of their water resources. To understand this, they frequently conduct water quality monitoring on their lands. Some collaborate and share data with partners. An exhaustive study of the difficulties of coordinating water quality data monitoring and storage of information was completed by the Government Accountability Office

⁶ An example of this is the recently completed TMDL for the Chesapeake Bay. The EPA completed it, with mandatory pollution reductions mandated for surrounding states.

(GAO) in 2004. The following were listed as being the most significant barriers to coordinating efforts (Figure 2).

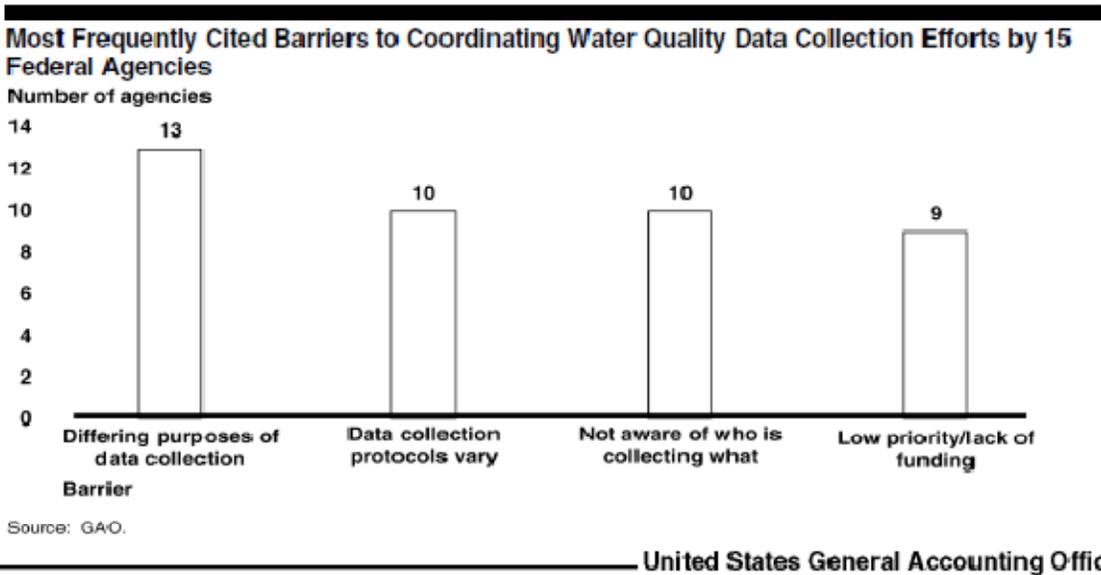


Figure 2. Barriers to coordinating water quality data collection efforts among federal agencies. GAO, 2004.

Managers and policy makers in federal agencies which conduct water monitoring were surveyed for this report. Respondents note that some coordination problems could be solved by a centralized authority which would coordinate collection efforts among agencies. The National Water Quality Monitoring Council, which is co-chaired by USGS and EPA and staffed by many state, federal, and local agencies, was formed with the intention of being a centralized authority. However, their efforts are hampered by funding limitations and lack of authority. Reception was mixed among respondents as to whether this council should take on the centralized role, or whether it was more appropriate to designate an existing federal agency as lead.

Water quality data are stored in two national databases: the Storage and Retrieval System (STORET), which is administered by EPA, and the National Water Information System (NWIS), which is administered by USGS. Although these databases are large and growing, only five of the respondent agencies said that they stored data in STORET, and NWIS only stores data from

USGS scientists or those collected under approved USGS monitoring techniques (GAO, 2004). The public has varying degrees of ease of access to water quality data collected by agencies.

POLICY RECOMMENDATIONS

Water quality monitoring is essential in watershed management. It is necessary to determine whether state water quality standards have been met under the CWA and state laws. Poor water quality can harm aquatic habitat and impair population growth of aquatic species. Frequently, polluted waterbodies are restricted from recreational use as well as commercial activities such as fishing. In these ways, poor water quality impairs many aspects of watershed management.

Despite its importance, water quality monitoring is frequently incomplete or nonexistent in many areas of the country. As illustrated above, the data that have been collected are often not shared between agencies and/or are not easily accessible by the general public. To improve collection and coordination as well as to better inform watershed managers, there are a number of steps that could take place. They are as follows:

Coordinate Data Collection Methods

Currently, water quality data are stored in many different and inconsistent forms. Inconsistencies include different names and definitions for the same water quality parameters, different detection limits, different quality assurance methods and different metadata standards (GAO, 2004). These inconsistencies make it difficult to collect and standardize data across different agencies. Standardizing methods and documentation would help efforts to centralize and exchange data.

Designate one entity responsible for coordinating efforts

The National Water Quality Monitoring Council was established with the intention of coordinating water quality monitoring collection efforts, but their success has been hampered by a lack of authority and funding. Authority could be granted through Congress in the form of a new law or mandate, or could be granted by the President through an Executive Order.

Increasing funding is another obvious solution to increasing their efficiency. Although Congress may designate another agency as lead, it seems wise to keep responsibilities vested in an entity that has already been created. Thus, it is advised to keep the Council as the lead entity, but grant it additional support in carrying out its operations through providing it with some sort of congressional or presidential authority. It may also be possible to redirect funds that other federal agencies are currently receiving for coordination efforts to one central agency, in this case, the Council.

Improve Data Sharing with the General Public

Currently, water quality data are collected by many federal agencies, many of whom only store some of their data in databases such as STORET or NWIS. Most data are stored in databases within specific departments of agencies and thus, for the public to obtain it, they must know who to request it from and wait for the agency to compile it for them. Agencies could assist in dissemination by either posting their data online, or posting it in databases such as STORET or NWIS. Either way, creating easier public access to these data will assist in efforts among non-governmental organizations to participate and cooperate as active partners in water quality monitoring. It would also improve efforts by the current administration to create more transparency in government.

Create a central clearinghouse of water quality data

Many federal officials have remarked that they are simply unaware of the work that is being done in other agencies (GAO, 2004). A clearinghouse would help in the exchange of knowledge, eliminate duplications in efforts, and identify where gaps in monitoring occur. The clearinghouse would likely benefit from being placed in an agency that is already attempting to conduct this work. For instance, it could build off of STORET or NWIS, which are located in the EPA and the USGS, respectively. As the EPA and the USGS are the main federal agencies which are currently conducting water quality monitoring (and thus have the most experience and expertise), one of these agencies is likely the best place to create a central clearinghouse.

Water Quantity

Three federal agencies conduct the majority of water quantity monitoring in the United States: USGS, NOAA's National Weather Service, and the USDA National Resources Conservation Service. The comparatively small number of agencies involved in this means that coordination and cooperation among agencies is relatively simple. There also tends to be standardization of research methods which makes the sharing of information relatively simple. The main concern for water quantity data collection among resource managers is that there is a lack of data available (GAO, 2004). For example, less than 30 percent of the nation's waters have been assessed to determine compliance with water quality standards (EPA, 2009b). This lack of data impairs management efforts.

POLICY RECOMMENDATIONS

Expand monitoring efforts

Currently, coordination for water quantity monitoring data collection agencies is quite good compared to water quality monitoring data collection efforts. The relatively small number of agencies and the uniformity among data collection methods means that coordination among water quantity data collectors is simplified. Efforts are hampered by the lack of water quantity data that is available throughout the United States. Increasing funding and resources to collect more data would aid monitoring efforts.

SECTION 2:

**THE FOREST SERVICE, WATERSHED MANAGEMENT, AND THE NEW
PLANNING RULE**

HISTORY OF THE FOREST SERVICE IN WATERSHED MANAGEMENT

The Forest Service has a long history of managing water resources at the National Forests. The Forest Reserve Act of 1891 gave the federal government the authority to take land from the public domain and create forest reserves. Later, the Organic Administration Act of 1897 gave direction for the management of these reserves, including their “purpose of securing favorable conditions of water flows.” Another competing purpose of these reserves was to secure timber harvests. Early experiments on Rio Grande National Forest at Wagon Wheel Gap from 1910-1926 sought to test the interactions between these purposes by studying the effects of clearcutting forests on water yields (Glasser, 2007).

In 1908, President Theodore Roosevelt convened the Inland Waterways Commission to analyze and document water resource concerns in the United States. This commission convened many federal agencies including the Forest Service, the Bureau of Reclamation, and USGS. Hopes were high that a federal water policy would develop from it, however, none materialized due to concerns of usurping western states’ rights and laws (Glasser, 2007). To this date, there is still no national water policy. This lack of a mandate hampers the ability of the water managers to do their jobs.

The Weeks Act of 1911 authorized the purchase of forests in the major headwaters of the nation’s rivers. This act has been enormously important, adding over 25 million acres to the National Forests (Forest Service, 2004). The Forest Service continued their work in protecting watersheds in the early twentieth century, focusing on purchasing and reforesting forests in abused watersheds (Glasser, 2007). During this time, many of the experimental forests were also established where scientists studied how watersheds in forested lands behave (Glasser, 2007).

The 1960s brought passage of some of the most important federal laws for environmental protection, including NEPA, ESA, MUSYA, CWA, and the Wild and Scenic Rivers Act. These acts set limits and guidelines for federal behavior on the National Forests. These laws have brought both positive and negative developments to the Forest Service. For example, hiring of hydrologists increased following the passage of the CWA, and the passage of NEPA added technical expertise within the Forest Service (Forest Service 1970, 1980, 1989). However, legal challenges filed under NEPA (in addition to other laws) frequently entangle the Forest Service in long and drawn out legal battles and paralyze them from making management decisions. While these laws have been widely praised for creating a healthier environment and increasing public participation in federal actions, they can also hamper management.

The 1970s brought a number of court decisions that had important implications for water management on NFS lands. These decisions clarified *Winters v. United States* (1908) which stated that tribal lands had implied water rights in the amount of the water needed for the purpose that the land had been set aside for.⁷ *Arizona v. California* (1963) extended the Winters' decision to non-tribal lands.⁸ *Cappaert v. United States* (1976) furthered and affirmed the Arizona decision.⁹

However, the most important court decision that dictates water rights on federal lands is *United States v. New Mexico* (1978) which limited water rights to only the primary purposes for which the lands had been set aside.¹⁰ MUSYA had earlier stated that the purposes of the National Forests were for outdoor recreation, range, timber, watershed, and wildlife and fish. However, the Supreme Court decided that the primary purposes of the National Forests were “to

⁷ *Winters v. United States*, 207 U.S. 564 (1908).

⁸ *Arizona v. California*, 373 U.S. 546 (1963).

⁹ *Cappaert v. United States*, 426 U.S. 128 (1976).

¹⁰ *United States v. New Mexico*, 438 U.S. 696 (1978).

preserve the timber in the forest or to secure favorable water flows.” Water rights were reserved for these purposes but not for other purposes (such as for habitat protection in the form of instream flows). The ramifications of this decision are wide as the Forest Service has fought in subsequent years for water rights for habitat protection with little success (Pringle, 2000).

The Forest Service has also recognized the importance of knowledge sharing among different branches and regions of the agency. Agency-wide meetings were held in 1974 and 1978 where agency hydrologists gathered and exchanged knowledge and experience of caring for Forest Service watersheds (Glasser, 2007). These meetings have continued and collaborations have been strengthened because of developments in computer sharing since then.

In the 1990s, Forest Service Chief Dombeck stressed the need for collaborative, interagency cooperation on monitoring and protecting watersheds. These efforts were necessary due to the desire of the Forest Service for a landscape level approach to resource management with a particular focus on the importance of watersheds (Williams, 2007). In 1999, an exciting time began in the Forest Service for watersheds, as fifteen watersheds across the United States were chosen to be restored using a collaborative approach. The Forest Service offered \$24 million for this effort, with \$22 million in matching funds from state, federal, tribal, and private partners (Williams, 2007). Many short-term gains were seen including restoration of riparian buffers, regrowth of native grasses, and economic development in many neighboring communities. These projects have been considered a great success (Williams, 2007).

Despite the many advances the Forest Service has made in managing and protecting water resources on its lands, they still face challenges. Desires by the Forest Service to provide continued monitoring of watershed conditions is impaired by current staffing conditions in the Forest Service. Ranks of Forest Service hydrologists decreased by 15 percent and fish biologists

by 11 percent between 2002 and 2008 (Forest Service, 2007 and 2008). Also hindering efforts to restore and protect watersheds on Forest Service lands is the increased emphasis that the Forest Service places on fire management activities.

Federal appropriations for fire management have more than doubled to the Forest Service and Department of the Interior land management agencies between 1996 and 2007, and to cover rising costs for suppression efforts, funds have been transferred from other agency departments and programs (GAO, 2009). Preventing, controlling, and managing fire activity on NFS lands dominates many rangers' budgets and time, with congressional appropriations for fire management rising dramatically between 1996 and 2005 from \$1.3 to \$3.1 billion (GAO, 2007). This, coupled with growing interest in recreational activities on the National Forests, has stressed the ability of rangers to manage and protect watersheds.

A SHIFT IN THE PARADIGM OF MANAGEMENT AT THE FOREST SERVICE

The Forest Service is in a transition period. For years, the main focus of the agency was on timber production (Figure 2). Following World War II, the rapid demand of wood for homes launched an extensive period of lumber harvest on the National Forests (Burch, 2005, Figure 3). During this time period when the Forest Service's main priority was lumber production, the Forest Service's employee satisfaction levels were among the highest for any federal agency. As time passed, the importance of ecosystem services of forests began to be understood. At this point, forests were recognized as having a more important function than just for timber.



Figure 3. Annual Timber Harvest from National Forest System Lands. From Burch, 2005.

The criticism of the Forest Service’s timber operations grew to a head with the spotted owl controversy in the late 1980s and early 1990s (Forest History Society, 2008a). Environmentalists were concerned that logging in old growth forests in the Pacific Northwest in both Forest Service and Interior land was harming the habitat and survival of the northern spotted owl (Andre and Velasquez, 1991). Although it was not clear that the logging was the only (or most important) cause of the owls’ decline, it was clear that numbers were declining and action had to be taken (Forest History Society, 2008a).

In 1989, the U.S. Fish and Wildlife Service decided to list the northern spotted owl as threatened under the ESA.¹¹ Already growing frustrations were inflamed, and the timber industry responded with outrage, and loggers with frustration that their jobs would be lost with the listing (Forest History Society, 2008b). Judgment for the Audubon Society against the Forest Service in

¹¹ See 54 Fed. Reg. 26,666 (1989).

1991 stated that the Forest Service had failed to comply with the National Forest Management Act in its operations by not planning for the viability of the species.¹² This decision enjoined further timber sales in spotted owl regions until a recovery and management plan for the species was developed (US DOJ, 2010).

The federal government responded with the Northwest Forest Plan, which, despite some legal action, was in general seen to be successful.¹³ It stipulated extremely limited timber harvest in old growth forests (the primary habitat of the spotted owl) and continued, though substantially decreased, levels of harvest in remaining lands. The completion of the Northwest Forest Plan and the resolution of ensuing lawsuits was the de facto end of the spotted owl controversy which had embroiled the Forest Service in a continued, messy, public saga for over ten years.

Although this was technically a success for the Forest Service, the implications of the controversy had long ranging consequences far beyond the Pacific Northwest. It forced the Forest Service to reconsider its purpose. In the late 1980s, in the midst of the spotted owl controversy, a shift was occurring in the dominant paradigm of the agency. The paradigm was shifting from a Forest Service, whose primary purpose was to produce commodities for the purpose of humans (primarily timber), to an agency which valued nature for its own worth, and sought to uphold a standard of itself as a land stewardship agency (Brown and Harris, 1992). In 1966, a survey of district rangers showed that most of the individuals surveyed held viewpoints in line with their industrial (i.e., timber) stakeholders (Bultena and Hendee, 1972). By the late 1980s/early 1990s, however, surveys showed that a growing number of Forest Service employees embraced the new resource management paradigm (Brown and Harris, 1992). Clearly

¹² See *Seattle Audubon Society v. Evans*, 1991 WL 180099 (W.D. Wash. 1991).

¹³ See *Seattle Audubon Society v. Moseley*, 80 F.3d 1401, 1404 (9th Cir. 1996) and <http://www.justice.gov/enrd/3258.htm>.

changing viewpoints held implications for the future of resource management in the Forest Service.

THE CULTURE OF THE FOREST SERVICE AND WHAT IT MEANS FOR WATERSHED MANAGEMENT

So what does this mean for watershed management in the Forest Service? Although there are commodities associated with watershed management (extending water use rights to entities off Forest Service land, for example), the primary purposes of water on the National Forests are for ecosystem purposes. This includes providing habitat to aquatic species, providing water for trees and other vegetation, and providing recreational, spiritual, and aesthetic pleasures to visitors. Management activities on the National Forests do not exist in independent bubbles. For example, erosion and sediment loading from roads (primarily built to transport timber) can cause impairments in water bodies on the National Forests (Vuxton, 2010). Timber production and watershed management are not mutually exclusive activities; each one must be managed with the other in mind.

Complications arise when line officers and senior leadership at the Forest Service treat one of these activities as more important than the other. Although the Forest Service may hope to move from a commodity-producing agency to a land stewardship agency there are significant barriers to reaching this goal. One of these barriers is the previously mentioned focus of congressional appropriations on fighting wildfires to the exclusion of other agency programs and missions, such as watershed management. Another barrier is the culture of the Forest Service.

During the years when timber production was the highest, the Forest Service enjoyed some of the highest levels of employee satisfaction in the federal government (Apple, 2000, and Kaufman, 1960). Following the spotted owl controversy and the resulting paradigm shift in the

Forest Service, employee morale plummeted. In “Surveys of Best Places to Work in the Federal Government,” the Forest Service ranked 203 out of 224 federal agencies in employee satisfaction (Partnership for Public Service, 2010).¹⁴ Since 2003 when this survey was first initiated, the ranking score for employee satisfaction has steadily declined from 60.6/100 in 2003 to 56.3/100 in 2010.

The blame for this plummet can be attributed to a number of factors. One of these was the centralization of human resources management in Albuquerque, New Mexico. This change has resulted in employees who have extensive trouble getting paid, booking travel, and completing other administrative tasks (Davidson, 2009). The computer system designed to handle these actions has been referred to as a “black hole” (Paskus, 2008). The Forest Service also suffers from an extreme lack of confidence that employees have in senior leadership.¹⁵

Although it is irresponsible and improper to blame the low levels of morale for the success or failure of any one particular program within the Forest Service, it is important to consider the atmosphere in which employees are working. In an agency where employees do not feel as if their ideas and actions are supported by senior leadership, it is not difficult to imagine that if the research objectives of employees do not match those of the leadership, they will simply not occur. Thus, although evidence exists that a new paradigm of resource management has come to the Forest Service, the actual day-to-day actions of the Forest Service are still dictated by senior leadership not by the contribution of ideas from all employees.

Some blame can also be laid at the feet of the public and the media. The only time that the Forest Service is portrayed in the media is when there is a wildfire. There is little public

¹⁴ It is worth noting that employee morale problems are not unique to the Forest Service, other federal land management agencies face similar challenges. The National Park Service ranked 139 out of 224 in employee satisfaction and the Bureau of Land Management ranked 149 out of 224.

¹⁵ The Forest Service ranked 217 of 223 among federal agencies in 2010 in the level of respect that employees have for senior leadership.

knowledge of the many programs that the Forest Service engages in besides wildfire management. Additionally, the threats of uncontrolled and large wildfires are clear to the general public, especially when their homes are located within the wildland-urban interface where wildfires can destroy homes and threaten lives. Make no mistake, mismanaged watersheds can have grave consequences for wildlife and humans. But these consequences are not easily seen or worried about by the general public. In this way, public opinion governs congressional appropriations and because the public is not calling for increased funding for watershed management, it simply is not funded to the level that wildfire management is.

An example of the Forest Service's priorities is apparent in the fiscal year (FY) 2011 and 2012 budgets. "Enhancing Water Resources" is listed as one of the four agency funding priorities (Forest Service, 2011). In practical terms, what this will consist of includes targeting high priority, imperiled watersheds, including the Mississippi River, the Great Lakes, the Chesapeake Bay and the California Bay Delta, for restoration based on implementing conservation-based forest practices on private and public lands (Forest Service, 2011). This project will work with the USDA NRCS to measure the effectiveness of this program, and seems to be a progressive step in the right direction of restoring damaged watersheds.

The other major change in the FY 2011 budget is the consolidation of Forest Products, Vegetation and Watershed Management and Wildlife and Fisheries Management programs into a new program called "Integrated Resource Restoration." This move seems to be in line with the desire of the Forest Service to implement landscape scale restoration that recognizes the connection between different management activities. However, there is also concern that this consolidation will lead to less accountability and transparency of spending. Senator Dianne Feinstein of California stated in a hearing on March 17th, 2010 before Tom Tidwell, U.S. Forest

Service Chief and the Senate Committee on Appropriations, Subcommittee on the Interior, Environment and Related Agencies:

“An even more significant change in this budget is the proposal to merge three National Forest System programs to create a new, \$694 million dollar line item called the ‘Integrated Resource Restoration’ program. I understand that the Administration has proposed this initiative to provide flexibility to fund restoration work it plans to do on the ground. However, I’m concerned that the budget request leaves a lot of questions unanswered. First, I would like to talk about why the Administration feels such a significant restructuring of the budget is necessary to accomplish your restoration goals. I am concerned that collapsing three programs into one huge new account would reduce transparency and accountability regarding how program dollars are spent” (Feinstein, 2010).

Tom Tidwell, in his remarks to the Subcommittee, did not directly address the concerns of Senator Feinstein, but did clarify that the purpose of the Integrated Resource Restoration program was

“to assess the health of all of its watersheds, carry out forest restoration in national priority watersheds, and then focus on job creation by utilizing stewardship contracts and putting youth to work in rural areas” (Tidwell, 2010).

It is true that responsible land management activities have the possibility to protect watersheds, even if watershed protection is not the main reason for conducting these activities. However, it is also likely that by consolidating these programs into one program, money that was once delegated specifically for watershed specific protection and restoration, will instead be used for other programs that may or may not protect watersheds. This consolidation may lead to more dynamic and flexible management or it could result in even less of a focus on watershed protection and restoration than is currently taking place.

A commitment to flexible and adaptive management and greater discretion for officials is also apparent in the newest planning rule. Like there, it remains to be seen whether this change will lead to better or worse watershed protections.

THE PLANNING RULE AND WATERSHEDS

In carrying out the National Forest Management Act (NFMA), the Forest Service is obliged to develop management plans for each of the National Forests. These plans specify how the land and resources of the National Forests are to be managed to achieve compliance with the Forest Service's multiple use mandate (MUSYA). The first forest plans were completed in 1983 (Forest Service, 2010a). Since then, periodic revisions have occurred following planning rule directions. These directions are intended to guide revision of the forest plans. They specify how to ensure public participation in the revision process as well as specifying how to meet ecological sustainability goals while utilizing forest resources, such as timber and recreation.

The planning rules have not been without controversy. The first planning rule revisions (after 1982) occurred in 2000.¹⁶ The U.S. Court of Appeals for the 9th Circuit found that this planning rule violated portions of NEPA.¹⁷ In response, the Forest Service conducted a review of the planning rule and concluded that the rule was "seriously flawed" and began the process of creating a new planning rule (Forest Service, 2010a). The 2005 planning rule elicited similar criticism and in 2007 the U.S. District Court for the Northern District of California decided that the 2005 rule violated the APA, NEPA and the ESA.¹⁸ The Forest Service then developed the 2008 Planning Rule which was overturned by the U.S. District Court for the Northern District of California, again, for violations to the ESA and NEPA.¹⁹ Because the 2005 and 2008 rules faced legal challenges, the current rule in effect is the 2000 rule. However, the 2000 rule specifies that forests can choose to continue to use the 1982 rule until a new rule is developed. Thus, despite many advances in science and management since 1982, the 1982 rule is the rule that National

¹⁶ See 65 Fed. Reg. 67514 (Nov. 9, 2000).

¹⁷ *Center for Biological Diversity v. United States Forest Service*, 349 F.3d 1157 (9th Cir. 2003).

¹⁸ *Citizens for Better Forestry v. USDA*, 481 F. Supp.2d 1059 (N.D. Cal. 2007).

¹⁹ *Citizens for Better Forestry v. USDA*, 632 F. Supp. 2d 968 (N.D. Cal. 2009).

Forests are using to amend their plans. A new planning rule was released on February 10th, 2011 which may avoid many of these legal challenges.

A New Planning Rule in the Forest Service

The draft Environmental Impact Statement (EIS) and the newest proposed rule for the Forest Service were published on February 10th, 2011, with the final rule and record of decision expected to be released in late 2011. Because of the many legal challenges that the Forest Service has faced in creating and implementing rules, it attempted to create a more open and collaborative process in developing the newest rule. Included in this process were public meetings, nine regional roundtables soliciting comments from Forest Service employees, three national roundtables, as well as Webcasts of some of these events (Forest Service, 2010b). There were 26,000 comments made on the Notice of Intent (NOI) and over 300 comments made on the planning blog.²⁰ Comments were also solicited on the Forest Service's planning rule Web site and blog.

²⁰ See 76 FR 8482 (2011-02-14).

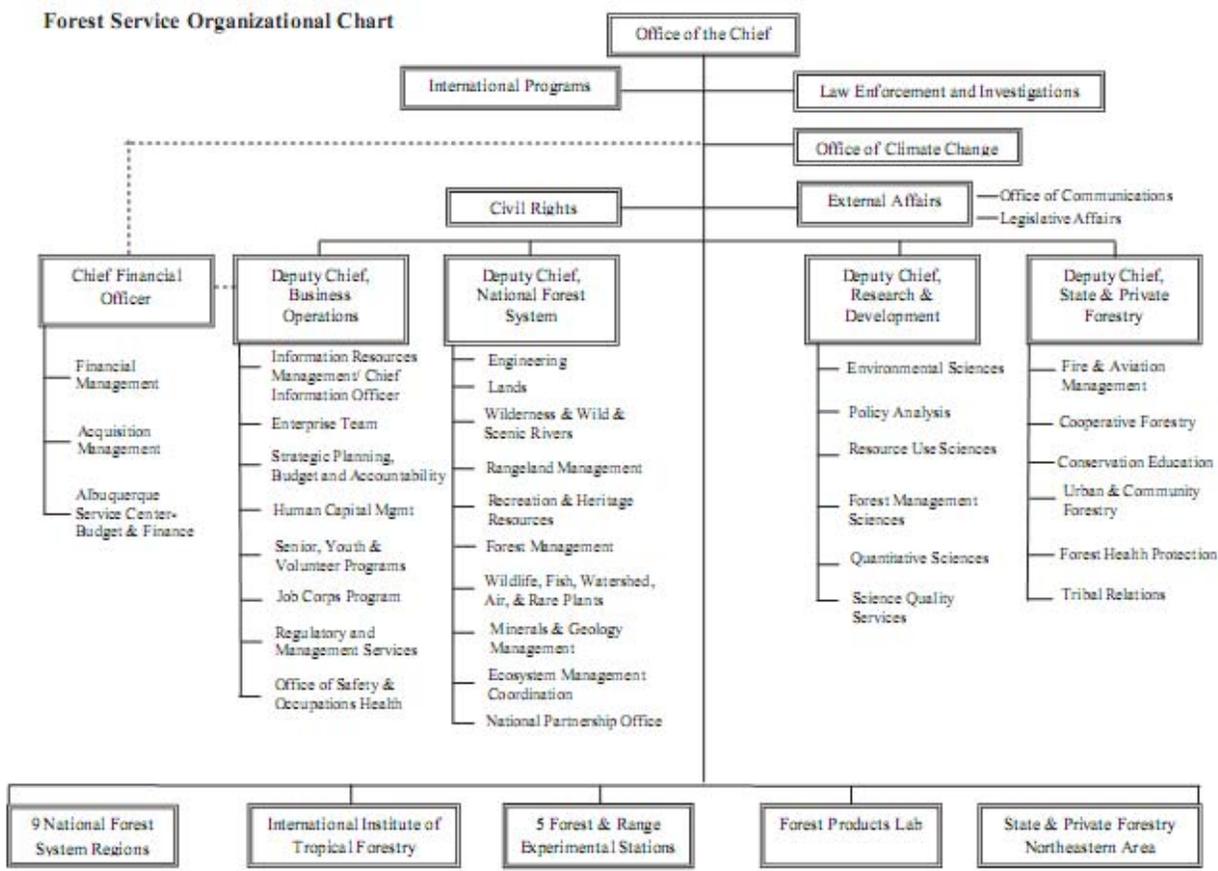


Figure 4. Organizational chart of the U.S. Forest Service. From Forest Service, 2011.

Planning in the Forest Service occurs at three levels (Figure 4). There is national strategic planning (which the Chief of the Forest Service is in charge of) which requires the creation of strategic plans for the management of the entire Forest Service. There is National Forest System unit planning which results in the development of a land management plan. This is the level which the new planning rule will address. The last level of planning is at the project and activity planning level. The Forest Service Directive System provides directions for planning at this level.

This new rule has important implications for watershed management in the Forest Service. The planning rule specifies that resources on the National Forests should be assessed,

developed/revised/amended, and monitored.²¹ In the context of watersheds, this means that the status of water resources would be assessed by compiling data that partners already possess to assess water conditions and identify where more work is needed to protect water resources.²²

This plan intends to create a process where more adaptive management can occur. This would consist of more frequent plan amendments and revisions that would account for rapidly changing conditions on forests. Of particular importance is providing for watershed health and resilience. Positively, the summary of the new plan states that “the proposed rule emphasizes integrated resource management so that all the relevant interdependent elements of sustainability are considered as a whole, instead of as separate resources or uses.”²³ In the case of watersheds, this direction should lead to plans which consider cumulative impacts of stressors and activities on watersheds. For example, instead of managing recreation, timber permits, and watershed monitoring in separate “sectors,” this direction should examine how all of these activities affect a watershed.

However, there are elements of the plan where adaptive management has the potential to fall short of necessary watershed protections. For example, in §219.8, there is considerable leeway in establishing riparian widths around lakes, streams and wetlands. It gives the responsible official significant discretion in setting riparian widths around water bodies. There are no minimum standards in this new plan. This is a departure from the 1982 Planning Rule which stated that areas within 100 ft. from water bodies had to be given special attention. This change seems in tune with intentions to make this plan creation more adaptive and let plan developers have discretion in setting goals that adapt to local conditions. However, this discretion may allow less protection to be given to water bodies. Monitoring is an important

²¹ See 76 FR 8480 (2011-02-14).

²² *Id.*

²³ *Id.*

component of developing plans. The proposed planning rule addresses watershed monitoring in §219.12 where it states that planners must consider the status of watershed conditions when developing monitoring programs. The rule suggests that the responsible official consider existing monitoring programs within and outside of the agency when developing monitoring programs. As this paper has documented, there are many state and federal agencies already involved in watershed monitoring efforts, many of which are already located on Forest Service lands. For a variety of reasons already mentioned, there is poor coordination among these entities. Thus, I suggest that the planning rule stress the importance of collecting monitoring data that are standardized and easily compatible among entities which conduct watershed monitoring.

Evaluation of monitoring techniques will occur on a biennial basis which seems reasonable. Complete plan revisions will be required every 15 years. The planning rule will require revisions to the plan, amendments, or plan revisions to “be required to be maintained and available to the public at the office that developed that plan, plan revision, or amendment.”²⁴ Currently, individual forest Web sites can be hard to find, as well as the specific information on them. Thus, it is suggested that all plan revisions, amendments and plan changes go on a centralized Web site that is easily accessible from the main Forest Service Web site. Additionally, it should be encouraged that officials set benchmarks for completion of goals to ensure that officials are on track of meeting their goals.

The new rule would also “create a pre-decisional administrative review process to provide individuals and groups with an opportunity to resolve issues before the approval of a plan, plan amendment, or plan revision.”²⁵ This new measure hopes to avoid legal challenges that often occur at the end of a plan which usually threaten the plan’s implementation. It is also a

²⁴ See 76 FR 8501 (2011-02-14).

²⁵ See 76 FR 8503 (2011-02-14).

positive step in the Forest Service incorporating more public participation in its decision-making process.

A possible negative stipulation within the planning rule is that plan developers would not be required to engage in new studies or develop new information to make decisions. They are only required to use existing information to make watershed assessments. The planning Web site for watersheds stresses that “the goal of an assessment would **not** be to conduct an exhaustive review or take on a huge new research and assessment agenda” (Forest Service, 2010c). However, the completion of a comprehensive national water resources assessment is sorely needed. The last assessment was completed in 1978 by the Water Resources Council (GAO, 2003). This lack of information on water use and availability patterns across the United States threatens the successful management of water resources (Sun, et al., 2008). The National Resource Council has also warned that not knowing the true state of water resources could have widespread ecological consequences (National Research Council, 2002).

The planning rule and consequent revisions of National Forest Plans could serve as a prime and opportune time for completion of comprehensive water resource assessments on the National Forests. However, the Forest Service has indicated that it has no plan to complete these assessments. Instead, data on water resources tend to be highly variable across National Forests. Groundwater assessments have never been completed on Forest Service lands (Sedell, et al., 2000). Completing these assessments would also aid the Forest Service in claiming federal reserved water rights in water adjudications.

In addition to complete water assessments that would assess the amount and quality of water resources on National Forest System lands, calls have come for inventories of water use on

the National Forests.²⁶ Water use is defined as the amount and location of water diversion from streams and the impacts of these diversions. Water infrastructure includes water diversions, reservoirs, and water conveyance facilities, such as groundwater pumping sites. Although no resource currently contains this information, a centralized database has been suggested that would include this data and allow managers to make informed decisions regarding water use (Potyondy, personal communication).

Overall, attempts by the Forest Service to create an open and collaborative process on its newest planning rule development have been widely successful. The newest planning rule attempts to give forest managers a level of adaptiveness and flexibility not seen in previous rules. However, this flexibility has the potential of allowing managers to establish lesser protections for watersheds than are currently in place under the 1982 and 2000 planning rules. The rule also suggests, but does not force managers, to work across borders and agency divides to collaboratively manage watersheds. As documented throughout this paper, poor collaboration and coordination is often what causes gaps and duplications in watershed management efforts. Although this new rule positively incorporates more public participation into management efforts, it does not adequately address increased interagency participation in efforts. At this point, it remains to be seen how this planning rule will be publicly received and executed.²⁷

²⁶ NLC Task Force Report on Water, Focus Group Input, August 2009.

²⁷ I, personally, am hopeful that the flexibility and adaptiveness that this rule offers will be used by managers to respond quickly and efficiently to changing conditions on their lands. As the completion of this MP coincides with the open public comment period on the released proposed rule, I will be submitting comments on the rule. The text of these comments is enclosed in the appendix.

CONCLUSIONS

This paper has attempted to provide a comprehensive analysis and summary of watershed management in the federal government with a particular focus on the role of the U.S. Forest Service. In Section 1, the roles of federal agencies engaged in watershed management were documented, along with the laws and statutes that dictate their operations. Section 2 provided an in-depth case study of the history of watershed management in the Forest Service, as well as an analysis of how historic events have affected present watershed management. Finally, the newest planning rule in the U.S. Forest Service was analyzed and comments were submitted during the public comment period.

This analysis has portrayed how incredibly complicated watershed management can be and how many different activities it consists of. As Section 1 illustrated, there are many federal agencies which conduct watershed management, and many times their operations are poorly coordinated and sometimes, operations are duplicated. Water resources' law is incredibly complicated which results, many times, in federal agencies unsure of ownership and management rights.

There are several suggestions I would make to simplify operations. Water quality data collection occurs in many different agencies using different techniques and these data are not always shared among agencies. To facilitate the exchange of data, standardizing methods and documentation of water quality data collection across agencies is recommended. This data could then be stored in a central clearinghouse. This clearinghouse, recommended to be stored in either EPA or USGS, would ensure that duplications in efforts would not occur, and identify gaps in monitoring. A central clearinghouse would also enable the public to more easily access water quality data. Finally, it is important to designate one entity responsible for coordinating efforts.

The National Water Quality Monitoring Council was tasked with this role, but its efficacy has been hampered by a lack of funds and authority. Providing it with a congressional or presidential authority, and possibly increasing or redirecting funds for its efforts, would help it carry out its efforts to facilitate coordination among agencies. Water quantity data collection efforts are better organized because only three federal agencies collect most of the data and data are standardized across agencies. Efforts suffer due to a lack of available data. Increased funds and resources are needed to conduct more effective management.

The second section focused on the U.S. Forest Service's watershed management activities and its history. The U.S. Forest Service was once a federal agency with high levels of employee morale and a clear purpose as a timber provider. In the last 20 years, it has decreased its timber harvesting activities and shifted its goals to become an agency supporting and preserving ecosystems and their natural functions. The U.S. Forest Service has struggled to redefine itself in the light of this paradigm shift. The effects of this struggle are seen in efforts of the U.S. Forest Service to conduct watershed management on its properties.

Although results and activities vary widely across forest units, in general, on most National Forests, active and/or passive watershed management efforts are occurring. Despite these efforts, watershed management is simply not a priority. At the national level, the Forest Service has failed to accomplish meaningful action on watershed management. This is reflected in the lack of appropriations for programs, declining staff numbers, and lack of interest in conducting sorely needed water inventories and assessments. Thus, although many guiding documents for the Forest Service proclaim the importance of protecting water resources and managing them properly, the momentum to create coordinated efforts with corresponding needed

funding is lacking. As a result, watershed restoration projects go unfunded, watershed monitoring does not occur on all water bodies, and staffing decreases.

The Forest Service will struggle with many issues in the upcoming years. Some of these include wildfire and recreation management, protecting fish and wildlife and increasing public participation in management decisions (Williams, 2007). Watershed management is only one of these many issues. The agency prioritizes its actions based on a number of factors such as meeting legal mandates, addressing the concerns of Congress, the general public, and senior leadership, working under limited budgets and in diverse partnerships. If the Forest Service truly wishes to get serious on watershed management, they will make it a top priority and allocate needed funds towards increasing watershed restoration projects, conducting much needed water inventories, and maintaining aging infrastructure.

In the absence of increased funds, the Forest Service could better coordinate and collaborate with partners to share funds and staff and meet jointly held goals. Directives from the national office of the Forest Service on how to share information and establish partnerships would be helpful in achieving these goals. Ultimately, action on watershed management must come from the national office. Public pressure on congressional officials would help to increase funding for efforts.

The Forest Service is currently creating a new planning rule to direct the creation of management plans on the National Forests. In the past, the planning rules have been subject to extensive legal action, and as a result, the 2005 and the 2008 rules were thrown out. The current rule in effect is either the 2000 rule or the 1982 rule. The 2011 rule hopes to incorporate scientific and management findings that have occurred in the last eleven years since the development of the last rule. Since that time, the agency has recognized the importance of

managing across landscapes and conducting integrated resource management. The new rule seeks to provide direction that will encourage officials to conduct integrated management on the National Forests.

At the same time, the Forest Service hopes to provide direction that allows for flexible and adaptive management. This direction gives unprecedented levels of discretion to officials. This discretion will likely lead to highly variable qualities of management across the National Forests. It may also mean that needed watershed protections are ignored. For example, the new planning rule gets rid of protections of land within 100 ft. from water bodies, instead allowing officials to use their discretion in establishing riparian buffers. Protection is likely to vary across watersheds.

There are many suggestions for amendments to the planning rule that I would suggest to improve watershed management. I suggest that the rule stress the importance of creating monitoring and data systems that are compatible among entities that conduct watershed management. Water assessments are sorely needed across the United States. The planning rule process would provide an excellent opportunity to stipulate the creation of these assessments. Inventories of water use on the National Forests are also needed, and could be completed in new plan development.

The agency has struggled in the past with public participation in decisionmaking. The newest planning rule process has created abundant opportunities for public participation, a positive step in the creation of transparent operations. The planning process has, so far, been open and collaborative. It is hoped that this commitment to public participation will continue in the development of the final rule and its implementation.

Our nation's water resources are valuable and should be managed accordingly. As this paper has illustrated, watershed management in the federal government is complicated and conducted by a wide range of agencies. The U.S. Forest Service, one of the largest managers of water resources in the United States, despite efforts to treat watershed health as a priority, struggles to meet all of its watershed objectives. Suggestions advanced herein could help streamline efforts, save time, and money. Our watersheds are extremely important and should be protected.

BIBLIOGRAPHY

- American Rivers. 2011. River Facts. Available at <http://www.americanrivers.org/library/river-facts/river-facts.html>, last accessed February 2011.
- Andre, C. and Velasquez, M. 1991. Ethics and the spotted owl controversy. Issues in Ethics, Markkula Center for Applied Ethics, Santa Clara University, 4(1).
- Apple, D. 2000. Evolution of the Forest Service toward a learning organization. Issue brief on file with the Policy Analysis staff, USDA Forest Service, Washington, DC.
- Balint, S. 2010. Water rights on National Forest System lands. Issue brief on file with the Policy Analysis staff, USDA Forest Service, Washington, DC.
- Brown, G.; Harris, C. 1992. The U.S. Forest Service: Toward the New Resource Management Paradigm. Society and Natural Resources, 5: 231-245.
- Bultena, G. and Hendee, J. 1972. Forester views of interest group positions on forest policy. Journal of Forestry, 70:337-342.
- Burch, F. 2005. Twenty Years of Nursery History- A Forest Service Perspective. In: Dumroese, R. K.; Riley, L. E.; Landis, T. D., tech. coords. 2005. National proceedings: Forest and Conservation Nursery Associations—2004; 2004 July 12–15; Charleston, NC; and 2004 July 26–29; Medford, OR. Proc. RMRS-P-35. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Chang, M. 2006. Forest Hydrology: An Introduction to Water and Forests. 2nd ed. Boca Raton, FL: Taylor & Francis.
- Clark, T. 1947. Attorney General's Manual on the Administrative Procedures Act. Available at <http://www.law.fsu.edu/library/admin/1947cover.html>, last accessed January 2011.
- Costanza, R.; d'Arge, R.; deGroot, R.; Farberk, S.; Grasso, M.; Hannon, B.; Limburg, K.; Naeem, S.; O'Neill, R.V.; Paruelo, J.; Raskin, R.G.; Sutton, P.; and vandenBelt, M. 1997. The Value of the World's Ecosystem Services and Natural Capital. Nature, 387: 253-260.
- Craig, R. 2009. The Clean Water Act and the Constitution. 2nd ed. Washington, D.C. ELI Press.
- Davidson, J. 2009. Struggling to Boost Forest Service Morale. Available at <http://www.washingtonpost.com/wp-dyn/content/article/2009/06/09/AR2009060903294.html>, last accessed February 2011.
- Denver Water. 2011. Frequently Asked Questions: Partnership with U.S. Forest Service for Watershed Management. Available at <http://www.denverwater.org/SupplyPlanning/WaterSupply/PartnershipUSFS/FAQs>, last accessed January 2011.

- Earth Trends. 2003. Water Resources and Freshwater Ecosystems- United States. World Resources Institute. Available at http://earthtrends.wri.org/pdf_library/country_profiles/wat_cou_840.pdf, last accessed January 2010.
- EPA (U.S. Environmental Protection Agency). 2000. Liquid Assets 2000: The Business of Clean Water. Office of Water, EPA, Washington, D.C. Available at <http://water.epa.gov/lawsregs/lawsguidance/cwa/economics/liquidassets/business.cfm>, last accessed January 2011.
- EPA (U.S. Environmental Protection Agency). 2004. Understanding the Safe Drinking Water Act. Office of Water, EPA, Washington, D.C. Available at http://www.epa.gov/safewater/sdwa/pdfs/fs_30ann_sdwa_web.pdf, last accessed June 2010.
- EPA (U.S. Environmental Protection Agency). 2008. Handbook for Developing Watershed Plans to Restore and Protect our Waters. Office of Water, EPA, Washington, D.C. Available at <http://water.epa.gov/polwaste/nps/factsheet.cfm>, last accessed January 2011.
- EPA (U.S. Environmental Protection Agency). 2009a. What is a Watershed? Office of Water, EPA, Washington, D.C. Available at <http://water.epa.gov/type/watersheds/whatis.cfm>, last accessed November 2010.
- EPA (U.S. Environmental Protection Agency). 2009b. National Water Quality Inventory: Report to Congress, 2004 Reporting Cycle. Office of Water, EPA, Washington, D.C. EPA 841-R-08-001.
- EPA (U.S. Environmental Protection Agency). 2010. Polluted Runoff: Nonpoint Source Pollution. Office of Water, EPA, Washington, D.C. Available at http://www.epa.gov/owow_keep/nps/whatis.html, last accessed November 2010.
- EPA (U.S. Environmental Protection Agency). 2011. A Watershed Approach. Office of Water, EPA, Washington, D.C. Available at <http://water.epa.gov/type/watersheds/approach.cfm>, last accessed April 2011.
- Feinstein, Diane. Statement to the Senate, Committee on Appropriations, Subcommittee on Interior, Environment, and Related Agencies. *The President's Budget Request for the USDA Forest Service in Fiscal Year 2011*, Hearing, March, 17, 2010.
- Forest History Society. 2008a. U.S. Forest Service History, 1987: Newspaper Articles and Events. Available at http://foresthistor.org/ASPNET/Policy/northern_spotted_owl/1987owlnews.aspx, last accessed February 2011.
- Forest History Society. 2008b. U.S. Forest Service History, 1989: Fish and Wildlife Service Proposal to List the Spotted Owl as Threatened. Available at

http://foresthistor.org/ASPNET/Policy/northern_spotted_owl/1989owl.aspx, last accessed February 2011.

Forest Service. 1970, 1980, 1989. Workforce status databases. Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office.

Forest Service. 2004. Land areas of the National Forest System as of September 2003. FS-383. Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office. 153 p.

Forest Service. 2007. Assessment of the Status and Trends of Natural Resources From U.S. Forest and Range Lands 15 Key Findings. FS-875. Washington, D.C. 11 p.

Forest Service. 2008. Forest Service workforce analysis. Available at http://fswb.asc.fs.fed.us/HRM/workforce_planning/WFA%205-31-08.pdf, last accessed August 2010.

Forest Service, 2010a. Planning Rule – History of Forest Planning. Available at http://www.fs.usda.gov/wps/portal/fsinternet!/ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gjAwhwtDDw9_AI8zPwhQoY6BdkOyoCAPkATIA!/?ss=119987&navtype=BROWSEBYSUBJECT&cid=null&navid=101000000000000&pnavid=null&position=BROWSEBYSUBJECT&ttype=main&pname=Planning%20Rule-%20History%20of%20Forest%20Planning, last accessed March 2011.

Forest Service. 2010b, February 24th. *USDA Forest Service will host public events on development of the new planning rule* [Press release]. Available at <http://www.fs.fed.us/news/2010/releases/02/development.shtml>, last accessed March 2011.

Forest Service. 2010c. Watershed Health – July 2010 concepts: Forest Service Planning Rule Dev Blog. Available at <http://planningrule.blogs.usda.gov/2010/07/29/watershed-health/>, last accessed March 2011.

Forest Service. 2011. Fiscal Year 2012 Budget Overview. Available at <http://www.fs.fed.us/aboutus/budget/2012/justification/FY2012-USDA-Forest-Service-overview.pdf>, last accessed April 2011.

GAO (Government Accountability Office). 2003. Freshwater supply: States' views of how federal agencies could help them meet the challenges of expected shortages. GAO-03-514. Washington, DC: GAO.

GAO (Government Accountability Office). 2004. Watershed Management: Better Coordination of Data Collection Efforts Needed to Support Key Decisions. GAO-04-382. Washington, DC: GAO.

GAO (Government Accountability Office). 2007. Wildland fire management: Lack of clear goals or a strategy hinders federal agencies' efforts to contain the costs of fighting fires. GAO-07-655. Washington, DC: GAO.

- GAO (Government Accountability Office). 2009. Wildland fire management: Federal agencies have taken important steps forward, but additional, strategic action is needed to capitalize on those steps. GAO-09-877. Washington, DC: GAO.
- Glasser, S. 2007. Short History of Watershed Management in the Forest Service: 1897 to 2100. In: Furniss, M.; Clifton, C.; Ronnenberg, K., eds. *Advancing the fundamental sciences: Proceedings of the Forest Service National Earth Sciences Conference; 18–22 October 2004; San Diego, CA*. Gen. Tech. Rep. PNW–GTR–689. Portland, OR: U.S. Forest Service, Pacific Northwest Research Station.
- Greater Yellowstone Area Hydrology Subcommittee. 2006. *Watershed Management in the Greater Yellowstone Area: An Interagency Strategy*. Available at http://fedgycc.org/documents/GYA_water_strategy-06update_000.pdf, last accessed March 2011.
- Hairston-Strang, A. 2007. *Cooperative Forest Watershed Management in Maryland: Watershed Restoration Across Land Ownerships*. In: Furniss, M.; Clifton, C.; Ronnenberg, K., eds. *Advancing the fundamental sciences: Proceedings of the Forest Service National Earth Sciences Conference; 18–22 October 2004; San Diego, CA*. Gen. Tech. Rep. PNW–GTR–689. Portland, OR: U.S. Forest Service, Pacific Northwest Research Station.
- Houck, O. 2002. *The Clean Water Act TMDL Program: Law, Policy, and Implementation*. 2nd ed. Washington, DC: ELI Press.
- Kaufman, H. 1960. *The Forest Ranger: A Study in Administrative Behavior*. Johns Hopkins University Press, Baltimore.
- Kenny, J.F.; Barber, N.L.; Hutson, S.S.; Linsey, K.S.; Lovelace, J.K.; and Maupin, M.A. 2009. *Estimated use of water in the United States in 2005: U.S. Geological Survey Circular 1344*, 52 p.
- Levin, R.; Epstein, P.; Ford, T; Harrington, W.; Olson, E.; Reichard, E. 2002. *U.S. Drinking Water Challenges in the Twenty-First Century*. *Environmental Health Perspectives*, February 2002: 43-52.
- McCool, S.F.; Clark, R.N.; Stankey, G.H., eds. 2008. *Water and people: challenges at the interface of symbolic and utilitarian values*. Gen. Tech. Rep. PNW-GTR-729. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 246 p.
- NASS (National Agricultural Statistics Service) 2006. *Census of aquaculture (2005)*. NASS, United States Department of Agriculture, Volume 3, Special Studies, Part 2, AC-02-SP-2, Washington, D.C.
- NMFS (National Marine Fisheries Service). 2011. *Species under the Endangered Species Act*. Available at <http://www.nmfs.noaa.gov/pr/species/esa>, last accessed January 2011.

- NPS (National Park Service). 2010a. General Stream Adjudications. Available at http://www.nature.nps.gov/water/Water_Rights/adjudications.cfm, last accessed January 2011.
- NPS (National Park Service). 2010b. Water Rights Protection. Available at http://www.nature.nps.gov/water/Water_Rights/WrProtection.cfm, last accessed January 2011.
- National Research Council. 2002. Estimating Water Use in the United States—A New Paradigm for the National Water Use Information Program. National Academy Press, Washington, D.C.
- Paskus, L. 2008. Forest Service morale sinks to a new low. *High Country News*. Available at <http://hcn.org/wotr/forest-service-morale-sinks-to-a-new-low>, last accessed February 2011.
- Partnership for Public Service. 2010. Best Places to Work: Forest Service (USDA). Available at <http://bestplacestowork.org/BPTW/rankings/detail/AG11>, last accessed February 2011.
- Postel, S. and Thompson, B. 2005. Watershed protection: Capturing the benefits of nature's water supply services. *Natural Resources Forum*, 29: 98-108.
- Potyondy, John. *Personal communication*. August 2010.
- Pringle, C. 2000. Threats to U.S. public lands from cumulative hydrologic alterations outside of their boundaries. *Ecological Applications*, 10(4): 971-989.
- Sedell, J.; Sharpe, M.; Apple, D.D.; Copenhagen, M. 2000. Water and the Forest Service. FS-660. Washington, DC: USDA Forest Service.
- Sophocleous, M. 2002. Interactions between groundwater and surface water: the state of the science. *Hydrogeology*, 10: 52-67.
- Sun, G.; McNulty, S.; Moore Myers, J.; Cohen, E. 2008. Impacts of Multiple Stressors on Water Demand and Supply across the Southeastern United States. *Journal of the American Water Resources Association*. December 2008, 1441-1457.
- Tidwell, Tom. Statement to the Senate, Committee on Appropriations, Subcommittee on Interior, Environment, and Related Agencies. *The President's Budget Request for the USDA Forest Service in Fiscal Year 2011*, Hearing, March, 17, 2010.
- U.S. Census Bureau. 2010. U.S. population projections. Available at <http://www.census.gov/population/www/projections/regdivpyramid.html>, last accessed August 2010.

- US DOJ (United States Department of Justice). 2010. The Spotted Owl Litigation. Available at <http://www.justice.gov/enrd/3258.htm>, last accessed February 2011.
- USFWS (United States Fish and Wildlife Service). 2010a. Water Rights Acquisition and Protection. Available at http://www.fws.gov/mountain-prairie/wtr/water_rights_activities.htm, last accessed January 2011.
- USFWS (United States Fish and Wildlife Service). 2010b. Summary of Listed Species, Listed Populations and Recovery Plans. Available at http://ecos.fws.gov/tess_public/pub/boxScore.jsp, last accessed March 2011.
- Vincent, C.H. 2004. Federal Land Management Agencies: Background on Land and Resources Management. CRS Report to Congress. Congressional Research Service.
- Vuxton, E. 2010. Barriers to Effective Watershed Management. Issue brief on file with the Policy Analysis staff, USDA Forest Service, Washington, DC.
- Williams, G. 2007. The Forest Service: Fighting for Public Lands. Westport, CT. Greenwood Press.
- Witte, L. 2001. Still No Water for the Woods, ALI-ABA Federal Lands Conference, October 19, 2001, available at http://www.fs.fed.us/publications/PDFs/Still_no-water-for-the-woods.pdf.

APPENDIX - PUBLIC COMMENTS TO THE FOREST SERVICE

April 11th, 2011

Emily Vuxton
135 Duke Marine Lab Road
Beaufort, NC 28516

To whom it may concern,

I am writing in response to the U.S. Forest Service's request for public comments on its proposed planning rule. My master's thesis is entitled "Watershed Management in the Federal Government." Last summer, I served as an intern in Policy Analysis within Research and Development in the U.S. Forest Service. This experience informs my understanding and opinion of the proposed rule.

I am very impressed by the degree of public participation that the Forest Service has solicited in the development of its proposed rule. The commitment shown in soliciting public participation through all parts of the decision-making process should also be commended. I believe that this investment in public participation will prove to create more accepted and defensible plans.

In regards to watershed management, specifically, I commend the Forest Service for their "three-part learning and planning cycle" of assessment, development/revision/amendment, and monitoring. If this cycle is executed efficiently, it should facilitate effective watershed management. However, I am concerned with the amount of discretion afforded to officials in conducting assessments. Section 219.6 states that "the responsible official has the discretion to determine the scope, scale, and timing of an assessment." Watersheds are frequently interconnected across groundwater and surface water. They also frequently cross jurisdictional boundaries. I am concerned that the discretion offered to officials in the proposed rule will cause them to avoid coordinating across jurisdictions if it is ruled to be too difficult, time consuming, or costly. Instead of working across entire watersheds, officials may decide to work only on portions of watersheds that exist on their properties.

Instream flow rights are important in providing valuable habitat for wildlife and fisheries. However, instream flow rights cannot be asserted in a state adjudication unless they are properly documented. Water quantity, as well as the need for the water being requested, should be documented. The proposed rule should stress the importance of using assessment and monitoring resources to record water quantity and needs data to assist in water adjudications. This could be accomplished by adding "water quantity" (in addition to water quality) to § 219.10 (Multiple uses) number 1.

The planning Web site for watersheds stresses that “the goal of an assessment would **not** be to conduct an exhaustive review or take on a huge new research and assessment agenda.” However, the completion of a comprehensive national water resources assessment is sorely needed. The last assessment was completed in 1978 by the Water Resources Council. Nationwide, less than 30 percent of the nation’s waters have been assessed to determine compliance with water quality standards. Groundwater assessments have never been completed on Forest Service lands. This lack of information on water use and availability patterns across the United States threatens the successful management of water resources. The National Resources Council has also warned that not knowing the true state of water resources could have widespread ecological consequences.

Watershed management at the Forest Service suffers due to the lack of a mandate to complete its operations, which hinders the ability of funds and staff to be devoted to efforts. The proposed planning rule could serve as a prime opportunity for a mandate to be granted to officials. By specifying the importance of complete and thorough water quantity and quality monitoring in the proposed rule, water managers would be provided with a strong mandate for completing their operations.

The proposed rule, in my opinion, gives officials a level of adaptiveness and flexibility not seen in previous rules. However, this flexibility has the potential to allow officials to establish lesser protections for watersheds than are currently in place under the 1982 and 2000 planning rules. Specifically, I am concerned with § 219.8 where officials are given discretion to choose a default width for “riparian areas around all lakes, perennial or intermittent streams, and open water wetlands.” This direction gives no consideration for the status of the water body and as such, it is possible that adequate protections would not be given for threatened water bodies. I suggest that the Forest Service revert to protections offered under the 1982 rule where special attention is given to land within 100 ft of water bodies. The planning rule should also provide clear direction on identifying threatened or critical water bodies. As the planning rule currently exists, there is no specificity provided on determining which water bodies need special protection, which will likely lead to vastly different management and restoration efforts across National Forests.

The rule also suggests, but does not force managers, to work across borders and agency divides to collaboratively manage watersheds. My master’s thesis exhaustively documents that lacking collaboration and coordination is often what causes gaps and duplications in watershed management efforts. Although the proposed rule positively incorporates more public participation into management efforts, it does not adequately address increased interagency participation in efforts.

Atmospheric deposition to water bodies is becoming an increasing concern, and in some areas, pollution from atmospheric deposition is the sole source of impairment of water bodies. Officials should be directed to properly consider the interactions between air and water bodies. To that end, I suggest that § 219.8, Section (a)(1)(i) be amended to read “landscape-scale integration of terrestrial and aquatic ecosystems, with special consideration given to interactions between air, land, and water resources.”

In reference to § 219.9 (Diversity of plant and animal communities), I would like to stress that the most crucial role of the Forest Service in regards to the diversity of plant and animal communities is providing adequate habitat for species of special concern. Providing “adequate habitat” can consist of a number of actions. Specifically, officials should be given direction within the proposed rule to avoid fragmentation of land within Forest Service boundaries. In terms of water bodies, this is embodied in discouraging the modification of water bodies through dams, culverts, ditches, and other water impoundments. In regards to providing adequate water quality for aquatic habitat, the proposed rule should provide direction on how to avoid point and nonpoint source pollution on Forest Service lands. On the National Forests, water bodies are frequently imperiled by pollution from roads. The rule should provide direction on how to properly maintain and decommission roads to avoid pollution loading to water bodies.

Overall, I am very impressed with the proposed planning rule. I admire the intention of the Forest Service to create more flexible guidelines for creating plans. However, the proposed rule as is grants too much discretion to officials in properly determining and protecting critical and threatened water bodies. The rule should offer more direction on how to properly identify and protect critical water bodies. I also believe that the proposed rule has neglected to consider the consequences to water bodies from atmospheric deposition. I encourage the Forest Service to use this opportunity to give a mandate to water managers in the Forest Service to conduct sorely needed water assessments on Forest Service lands. I commend the efforts of the Forest Service to solicit public involvement and participation in all steps of the planning process. I believe that this will lead to plans that are more enforceable and accepted, and as such, is the greatest triumph of the Forest Service in creating this proposed rule.

Please do not hesitate to contact me if you have any questions regarding my comments.

Sincerely,

Emily Vuxton
Master of Environmental Management, 2011
Duke University
Nicholas School of the Environment