

**GOVERNANCE OF FEDERALLY PROTECTED RIVERS:
AN INSTITUTIONAL ANALYSIS OF THE PARTNERSHIP
APPROACH TO WILD AND SCENIC RIVER MANAGEMENT
IN THE WHITE CLAY CREEK**

by

Kristen A. Molfetta

A thesis submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Master of Science in Water Science and Policy

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ABSTRACT

For nearly five decades, the National Wild and Scenic Rivers Act has fortified protection of the nation's rivers. The National Park Service's Partnership Wild and Scenic Rivers program represents an innovative attempt by the federal government to share management tasks, administrative duties, and financial responsibilities with all levels of government, local organizations, and neighboring communities. Thirteen officially designated rivers comprise the Partnership Wild and Scenic River cluster, which employs a novel, and increasingly regarded approach to pooling the resources of public and private entities. The Institutional Analysis and Development framework is applied in this research to investigate this partnership arrangement and institutional performance using the White Clay Creek watershed as a case study. The ultimate objective of this study is to understand the partnership's institutional structure, processes, outcomes, and factors that promote success. Descriptive information about the partnership and significant factors that contribute to process and success were gathered from document analysis, key informant interview, and committee member survey. Results of the synthesized data and analysis found that the White Clay Creek Wild and Scenic Program can be characterized by a bi-state, interagency, hybrid governance framework, which binds diverse interests together under a common purpose and within a permanent, democratic, and representative body. The program generates various forms of local environmental and social outputs in the watershed. Factors identified as facilitating program success include human resources, available funding, and communication between partners.

In rivers, the water that you touch is the last of what has passed and the first of that which comes; so with present time.
— Leonardo da Vinci (1452-1519)

Chapter 1

INTRODUCTION

1.1 Introduction to Wild and Scenic River Management

According to the U.S. EPA there are over 3.5 million miles of rivers and streams that extend across the United States, ranging from wetlands and small streams to large rivers. Generally speaking, rivers typically consist of a few major components, including a main channel and all tributaries that flow into it. The beginning of a river is called its headwaters, or source. Tributaries are smaller streams that combine and converge to form larger streams and ultimately rivers. The location at which a tributary joins the main river channel is called the confluence. Upstream denotes a location toward the headwaters of a river or tributary, whereas downstream is toward the direction of a confluence with a larger stream, mouth, or other end point of a river (Cech, 2009). Beyond these fundamental features, no two rivers are alike and each is unique to its proximate landscape features.

While seemingly pervasive, rivers and other surface water contain less than 0.01 percent of all the water on Earth (Cech, 2009). A precious resource, water in rivers irrigate crops, power cities, support fish and other species, provide commercial and recreational opportunities, and supply drinking water to approximately 1 in 3 Americans. In addition to the variety of uses waterways support, the condition of the nation's rivers, streams, and wetlands vary tremendously both spatially and temporally. As such, approaches to management and policy have evolved to address changes and emerging threats to these hydrologic systems.

Effectual management of America's rivers has been no simple endeavor. Academic researchers, river managers, and policymakers have been faced with addressing the convoluted nexus between the biophysical and political forces that interact to make implementing river and watershed management strategies and policy decisions both equivocal and contentious. Passage of the Wild and Scenic Rivers Act (1968) nearly fifty years ago is one example of the increased prominence of river protection on the public policy agenda. With this federal act, it became U.S. policy that certain selected rivers of the nation (and their adjacent environments) that possess outstandingly remarkable values be preserved in free-flowing condition. Many of these rivers have served as integral components of the historical narrative and national identity of the United States.

At present, less than one-quarter of 1 percent of all U.S. rivers are designated Wild and Scenic and protected under the national system. Concomitantly, distinct management approaches to these federally protected rivers have propagated, as a result of the biophysical and political contexts within which they subsist. Rivers may be managed by federal or state administering agencies, or in certain cases, by a combination of federal, state, and municipal governments in collaboration with residents, and other local organizations. The latter management strategy is the focus of this research.

1.2 Research Objectives, Scope, and Limitations

The goal of this research is not to compare the various approaches that have manifested in response to Wild and Scenic River management, but instead to conduct a rigorous analysis of one particular approach in order to understand its functional, operational, and performance attributes. The management approach examined in this

research is characterized by an institutional arrangement of interagency partnerships, coordinated at the federal, state, and local levels. Ongoing research in water policy, governance, and interstate water resource management (Deason et al., 2001, Gerlak, 2005, Kauffman, 2002, Kauffman 2015, Kliot et al., 2001, Mandarano et al., 2008) has proliferated in the last fifteen years, but there has been little to no scholarly literature focusing specifically on Wild and Scenic River governance and approaches to management.

This research identifies the recurring conditions that are endemic to the thirteen rivers that utilize the partnership approach to Wild and Scenic River management; however it does not detail the application of this management regime across all thirteen instances. Instead, this research investigates how this partnership-based management approach works by employing a meticulous case study for one of the rivers. Through the use of an analytical framework, program structure, processes, and outcomes will be analyzed for the case study area.

The focus area for this research is the White Clay Creek, geographically situated in Delaware and Pennsylvania. White Clay is unique to the Partnership Wild and Scenic Rivers because it is the first entire watershed (as opposed to a river segment or corridor) to be designated into the National Wild and Scenic System. Therefore, in addition to implementation of the partnership approach and the significance for Wild and Scenic River management that this case can illustrate, there are also implications for both watershed scale management and interstate water governance that can be uncovered from such an analysis.

Despite the contributions this research hopes to elicit, there are certain limitations that must be broached. Again, due to time and resource constraints, an

exhaustive investigation of each Partnership Wild and Scenic River has not been conducted. With the use of a case study to examine structure, process, and outcomes of an existing institutional arrangement, the acquired findings and conclusions for this specific case may not be applicable in alternative Partnership Wild and Scenic River cases. Hence, the findings for this research will be highly localized, and confined exclusively to management in the White Clay Creek watershed. Further, it should be recognized that there are also temporal limitations associated with the use of the case study for this research, and conclusions drawn at present may not be extrapolated to future conditions within the focus area and the entire lifecycle (including past and future) of the partnership. Nonetheless, this research is still useful to help assist in the identification of groups or actors within those groups that exist, and to differentiate among various functions within a particular Wild and Scenic institutional arrangement.

1.3 Research Questions

The roles and goals of river management have shifted through time, reflecting changes in the priorities of society (Doyle, 2012). The complexities of management focused within the national Wild and Scenic Rivers (WSR) system are intricate and abundant. Appropriation of management duties and processes must therefore be examined from a narrower scope than at the national level. There is considerable interest in better understanding the evolving collaborative management approach, or within the context of Wild and Scenic river management, the subset known as the “Partnership Rivers”. There is much to be learned from a focused evaluation of this management regime, especially in terms of performance, and thus is the focus of this research. This research will attempt to answer the following questions:

1. What is the particular structural arrangement of the partnership management regime?

2. What are some of the institutional processes and outcomes that result from working in this particular forum?

3. What are the factors that promote partnerships in the Wild and Scenic River context and how is success measured?

The objective of this paper is to perform an investigation of the Partnership Wild and Scenic River program as a collaborative model, in the context of the aforementioned questions using the White Clay Creek as the focus area. The fundamental goal is to augment understanding of how well this regime is working, and to better explicate the characteristics and particular system of organization within this interagency management approach.

1.4 Thesis Organization

This thesis is organized as follows:

Chapter 1: Introduces and describes the research goals and objectives.

Chapter 2: Provides a broad overview of water governance, federal water laws, water management agencies and institutions in the United States.

Chapter 3: Summarizes the Wild and Scenic Rivers Act and development of the National Wild and Scenic Rivers System.

Chapter 4: Examines the partnership approach to Wild and Scenic River management for a handful of east coast rivers, and the general corresponding actors, organizational structure, and procedures for management.

Chapter 5: Outlines the physical, political, and societal characteristics of the focus area, the interstate White Clay Creek watershed, in order to provide context for the research and analysis.

Chapter 6: Explains the research methodology, data collection process, and analytical framework used in the analysis.

Chapter 7: Applies the analytical framework and associated variables to the focus area for the analysis of the institutional arrangement.

Chapter 8: Discusses management implications and provides conclusions and recommendations for future research.

Chapter 2

FUNDAMENTALS OF WATER GOVERNANCE AND POLICY

2.1 Defining Water Governance

Water is an essential requirement for sustaining life. The story of how societies have managed the complex resource of water dates back thousands of years (Salzman, 2012). Throughout human history, mankind has had an undeniable dependence on surface and groundwater sources, requisite for supplying water for drinking, agriculture, transport, and power. Many ancient civilizations throughout history organized their societies and civic lives around river basins and watersheds. Moreover, due to the imperative for these uses, and the vital need for human consumption, water has played a critical role in the development and advancement societies as a physical, cultural, social, and economic resource (Salzman, 2012).

Water governance is defined as “the range of political, social, economic, and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society” (Kauffman, 2015, p. 5690). Governing water also includes the formulation, establishment, and implementation of water policies, legislation, and institutions and clarification of the roles and responsibilities of civil society, government, and the private sector in relation water resources and services (UNDP Water Governance Facility, 2016). These definitions encompass both economic and socio-political facets of management.

2.2 Complexities of Water Management

Water is a dauntingly complex resource to manage and embodies a number of features that make the management of the resource extremely muddled and intricate. Characteristics that make the management of water resources extremely arduous include: scarcity, transboundary obstacles, maldistribution, sharing, and over-utilization (Kliot et al., 2001). Water scarcity is a result of both natural circumstances and social pressures (e.g., population growth and demand). The tough realities of competition for scarce water resources in the United States and around the world have led to disagreements over goals and the degree to which goals can be achieved through proper management of water resources (Deason et al., 2001).

Inter-jurisdictional issues also present a major obstacle in water management. Because water is continuously in motion within the hydrologic cycle, issues of control, jurisdiction, and sovereignty are much more complicated than when dealing with static land resources (Kliot et al., 2001). The U.S. Environmental Protection Agency (EPA) defines a watershed as the area that drains to a common waterway such as a stream, lake, estuary, wetland, aquifer, or ocean. EPA runs the largest national initiative to encourage management at the physical watershed level, an approach that involves a broad range of interested parties, and sets goals through deliberative processes (O'Neill, 2005). The notion of the watershed approach has become ubiquitous over the last two decades, and is widely considered to be the most effective method for water resource management. However, because watershed and government boundaries typically do not coincide, watershed managers face complex institutional and governance challenges (Kauffman, 2002). The management of transboundary or interstate water resources is often complicated by multiple overlapping and conflicting

regulatory authorities with divergent functions, priorities, and interests (Mandarano, et al., 2008).

2.3 Chronology of Laws and Regulations

Water and federalism coalesce in complicated ways as water flows through the hydrologic cycle without regard to political boundaries (Mandarano et al., 2008). Through the lens of federalism, and analogous to a river or stream, the relationship of the federal government to other interested parties (especially states) has alternately ebbed, flowed, dried up, and overflowed (Gerlak, 2005). The two main challenges faced by the federal government in managing water resources have been the need to respect state sovereignty and the difficulty in coordinating multiple federal agencies, programs, and constituencies (Mandarano et al., 2008). Extreme fragmentation has characterized the U.S. water policymaking institutions at the federal level. Jurisdiction over water resources policy is fragmented among at least thirteen Congressional committees, twenty-three Congressional subcommittees, eight Cabinet level departments, six independent agencies and two White House offices (Deason et al., 2001). With multiple agencies managing narrow components or constituencies, from river preservation to water quality protection, and from hydropower to flood control, there has been an increasing recognition of the limits of fragmentation and piecemeal approaches to resource management (Gerlak, 2005).

The federal government began to take the lead role in water resources management as early as the mid-1800s (Mandarano et al., 2008). While policy tools adopted by the federal government reveal significant shifts in approach over time, spanning distributive to regulatory procedures, most federal action reveals a reliance on multiple policy tools, often simultaneously (Gerlak, 2005). Despite the

complicating factors of federal fragmentation and state boundaries largely not following watersheds (Kauffman, 2002), several federal laws and regulations evolved to address inter-jurisdictional governance issues (Table 2.1).

Table 2.1 U.S. Federal Water Laws and Regulations

Legislation	Year	Description
Rivers and Harbors Act	1899	Provided authority for U.S. Army Corps of Engineers (ACOE) to exercise control over all construction in navigable waters of the U.S.
Reclamation Act	1902	Authorized the Secretary of the Interior to construct irrigation projects, reservoirs, and canals in western states and territories
Boundary Waters Treaty	1909	Expressed concern over water diversion and pollution in waters that traverse the U.S./Canada border
River Basin Study (308 Act)	1925	Authorized U.S. ACOE to complete comprehensive river basin studies
Federal Water Pollution Control Act	1948	Required states to determine which streams and lakes had become polluted
Water Resources Council	1965	Formed at the executive level and consisted of cabinet members to advise the president on water resource matters (dissolved in 1982)
Wild and Scenic Rivers Act	1968	Administered by the U.S. National Park Service to preserve the free flowing nature of waterways that possess outstandingly remarkable values
National Environmental Policy Act	1969	Required an environmental impact statement for federal actions that affect the quality of the human environment; created the Council on Environmental Quality
Federal Water Pollution Control Act Amendments	1972	Spurred by the first Earth Day in 1970, amendments reflect a new approach, which prohibited point source discharges of pollutants into waterways without a permit
Clean Water Act	1977	Intent was to restore fishable and swimmable status of the nation's waters by 1983
Water Quality Act	1987	Federal effort to control nonpoint sources of pollution
Safe Drinking Water Act Amendments	1986 1996	Set enforceable federal drinking water standards

Adapted from: (Kauffman, 2002)

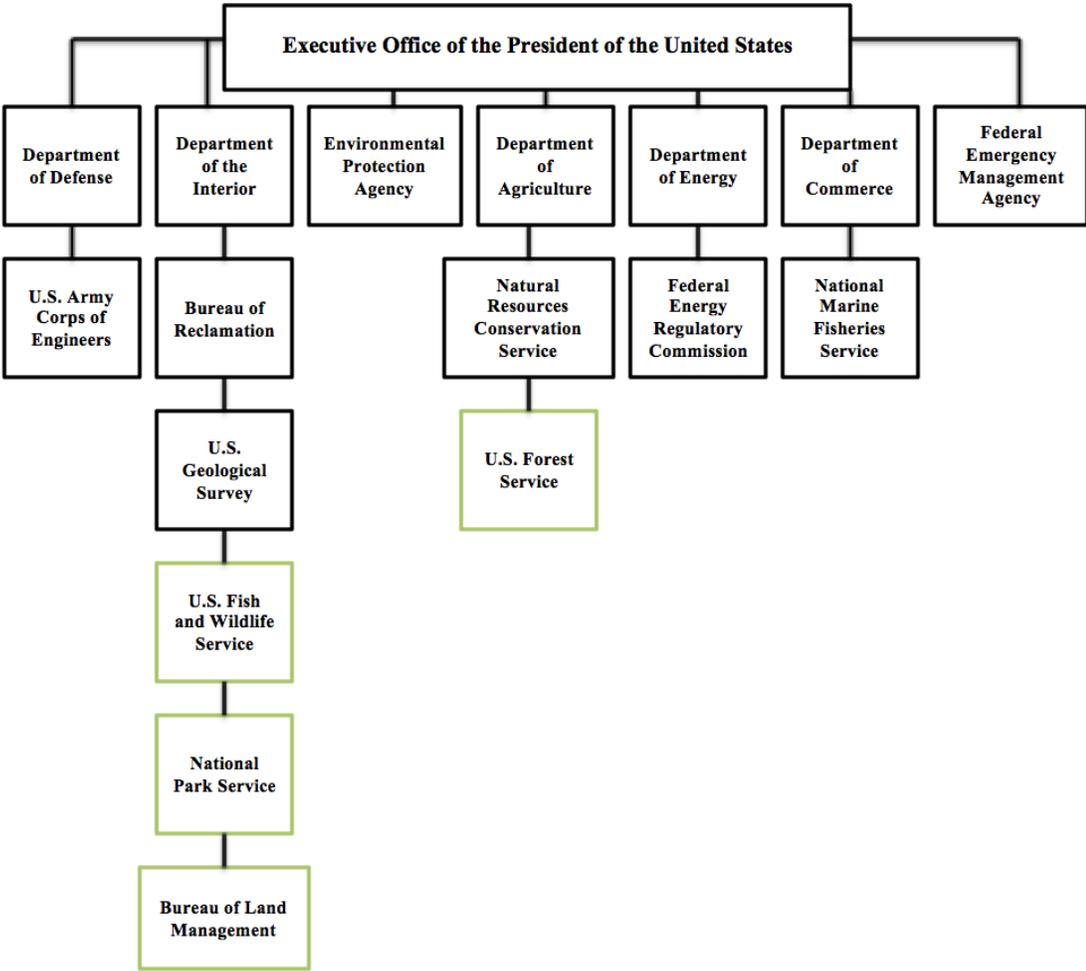
2.4 Water Management Agencies

The path to forging effective and enduring institutional arrangements for management of water resources has demonstrated discernable dissention throughout the United States. River managers must not only understand the interplay of immense geographic variability in geology, soils, climate, and vegetation, but also grapple with the large number of agencies and entities with varying roles and responsibilities for managing the same reaches of a river (Doyle, 2012). This section examines some of these water institutions.

In the U.S., no single federal agency has the authority or assumes responsibility for promoting and facilitating basin-wide planning and management (Loucks, 2003). Indicated in the aforementioned section, it is clear that there are multiple federal government agencies with some riverine or water-related responsibility. These numerous agencies regulate, set standards, operate facilities, monitor, publish and disseminate information, and provide funding for various research and projects (Loucks, 2003). Some federal agencies have very clear roles, while others function in a more ambiguous management capacity. Further, the roles of each particular agency have also not been static, and have shifted through time (Doyle, 2012).

The organization of the primary federal agencies involved in water resources development, management, and protection in the U.S. is illustrated in Figure 2.1. Four U.S. water agencies administer the National Wild and Scenic Rivers program: Fish and Wildlife Service, Bureau of Land Management, National Park Service (Department of the Interior), and the Forest Service (Department of Agriculture).

Figure 2.1 Selected U.S. Federal Water Resources Agencies



Source: (Cech, 2009)

Increasingly, it is the state, local, and nongovernmental organizations that are providing vision and leadership for water resource management and planning (Loucks, 2003). Each state has governmental departments that administer environmental and water resources programs, though the structures of these vary. State water agencies administer water quality programs, flood protection, drought planning, water

allocation, withdrawals, and conservation efforts, all on a statewide basis (Cech, 2009). Multistate, regional, or river basin water management agencies have also emerged to work across state lines. These agencies usually service large watersheds, groundwater aquifers or other hydrologic boundaries; generally they are created through agreements between states and the federal government to promote planning, communication, and coordination of activities between a variety of agencies (Cech, 2009).

Municipal water departments are local agencies that operate within a town or city government that provide drinking water to residents. Municipal water departments typically control or own raw untreated sources of surface or groundwater, water treatment plant(s), and delivery systems (Cech, 2009). Water and sewer districts are similar to municipal water departments, but they also handle wastewater disposal. Conservation districts (interchangeable with conservancy districts, water conservancy districts, water conservation districts) are located in many states. These are governmental agencies that are political subdivisions of the state, formed by local landowners, generally to develop flood-control or water supply projects (Cech, 2009).

Nonprofit watershed organizations are non-regulatory agencies that conduct their missions focused at the watershed scale. These organizations typically emphasize education and stewardship functions, but have more capricious funding sources, often relying on donations and grants, and thus relatively low operating budgets.

Another form of governance organization that operates in the watershed context is a council or committee. Some forms of committees include: policy committees, technical committees, and advisory committees. Any of these may consist of representatives from federal, state, county, local, nonprofit, private (water

purveyors, businesses, and engineering/ environmental consulting firms), or community-based interest groups (watershed or water user associations), and members of the public (landowners, and passionate or concerned citizens).

2.5 Basic Models of Governance Structures

Whether for a small watershed, intrastate basin, interstate basin, or international basins, the outcomes of water governance depend on how the various stakeholders act in relation to the rules and roles that have been delegated or assigned to them. Whatever its size, a successful management structure should define interagency and governmental partnerships and agreements needed for support over the long-term (Center for Watershed Protection USEPA, 1998). Successful riverine and watershed planning requires a strong organizational structure to focus the resources of a diverse group of stakeholders. In the complex political, legal, and social realities of American communities, there are a range of governance models for watershed management which span a continuum, ranging from command and control to more collaborative models (Mehan, 2010). Three basic models are outlined in the USEPA Rapid Watershed Planning Handbook (1998) and fundamental elements of these models are presented in Table 2.2. The primary difference among the three management options concerns the organization ultimately responsible for directing the watershed plan (Center for Watershed Protection USEPA, 1998).

Table 2.2 Typical Components of Watershed Management Structures

	Government-Directed Model	Citizen-Directed Model	Hybrid Model
Formation	Created by legislative authority	Created at “grass-roots” level from citizens or other interested parties	Created with some governmental authority, with support from citizens
Membership	Organization membership is appointed by governmental authority	Stakeholder participation is voluntary	Some members are required to participate, but many are volunteers
Authority	Structure has regulatory authority over land use and other permits	Advisory capacity with no regulatory authority over land use or permits	Some members of the structure have regulatory authority, and others act in a volunteer or advisory capacity
Funding	Funding is through taxes or levied fees	Funding is either by grant, donations, or sometimes by local government contributions	Much of the funding is through a steady source, such as an agreement with a local government, but grants may also comprise a significant portion of the budget
Implementation	Government agencies at the state, local, and federal levels implement the plan	Local governments implement the plan	Local governments implement the plan, with some assistance from state and federal agencies

Source: (Center for Watershed Protection USEPA, 1998)

Government-directed model: The government plays a salient role in all watershed management structures, but contributes most in this model. In this arrangement a federal, state, or regional government leads the watershed planning effort. This top-down model is most advantageous in cases where citizens are not yet motivated, organized, or aware of watershed problems, or where the plan would require extensive regulations and rules to implement. Advantages of this approach include greater structure, legal authority, and more consistent funding, while exclusion of stakeholders, and lack of acceptance by the public are prospective disadvantages.

Citizen-directed model: Public participation in natural resource related issues, and water in particular has been experiencing a paradigm shift from the adversarial, top-down, public meeting approach to a collaborative, bottom-up, citizen-organized approach (Griffin, 1999). In this grassroots approach, citizen groups advocate for watershed planning and protection in their communities. Unlike the government-directed model, the citizen-directed model garners strong community support and ownership in planning activities. This model is best applied in circumstances where the local community has a very strong interest in the water resource, disagreements between interests are not anticipated, and a steady supply of funding from local governments can support the citizen group. Success of such a model may be stymied by the lack of legal authority, lack of professional scientific input, and less stable funding sources.

Hybrid model: A hybrid management structure coalesces the best features of government and citizen models, generally incorporating as many stakeholders as possible ranging from government agencies, the local professional community, citizens, and nonprofit organizations. The organization itself does not have legal authority but instead makes recommendations directly to local government agencies that ensure management strategies are implemented. With proactive involvement from many parties operating in a partnership forum, participation implies that stakeholders will work together to set criteria for management, identify priority constraints, evaluate possible solutions, recommend technologies and policies, and monitor and evaluate impacts (Johnson et al., 2002).

2.6 Why Partnerships?

Top-down and government-directed approaches to watershed management and planning have become increasingly antiquated. Today's water policy is characterized by pragmatic federalism that emphasizes collaborative partnerships, relies on adaptable management strategies, and is problem and process oriented (Gerlak, 2005). This shift is partially attributable to the willingness of federal and state agencies to devolve financial resources and decision-making authority to the local level (Leach and Pelkey, 2001). Partnerships are promoted as a more egalitarian and proactive alternative to agency dominated water resources planning and management (Griffin, 1999). 'Watershed partnership' is an interchangeable term with committees, councils, advisory groups, and task forces, and are assemblies of stakeholders who periodically convene to discuss or negotiate the management of streams, rivers, or watersheds (Leach and Pelkey, 2001). Partnerships typically involve environmental organizations, federal and state regulatory and service agencies, local governments, and local landowners (Leach and Pelkey, 2001). Partnerships can be highly formal processes commissioned by government agencies, but they are also frequently informal organizations without official bylaws or officers.

Partnerships are said to create opportunities for all stakeholders to communicate sometimes before the problems have even been defined; by enhancing communication and building consensus, partnerships may help avert costly delays or litigation while generating more technically sound projects, policies, and plans that draw upon the expertise of multiple segments of society (Leach and Pelkey, 2001). Some factors that influence success in watershed partnerships are summarized below. These factors were synthesized after a review of 37 studies that identified a total of

210 distinct conclusions about what makes watershed partnerships succeed and fail (Leach and Pelkey, 2001).

- Adequate Funding
- Appropriate Membership
- Cooperative, Enthusiastic, Committed Participants
- Effective Leadership
- Local or Bottom-Up Initiation, Leadership and Implementation
- Balanced Local, State, and Federal Participation
- Trust
- Manageable Level of Conflict
- Proper Geographic Scope
- Proper Scope of Activities
- Adequate Time
- Appropriate Decision Rules and Processes
- Consensus Decision-making
- Enforcement Mechanisms
- Training in Collaboration
- Agency Support
- Community Resources and Support

There is no detailed schematic for collaborative watershed management; it is a broad strategy for addressing complex and interconnected problems and can manifest in many forms ranging from informal to formal arrangements with many factors that may facilitate or hinder success. Much of the literature on collaborative watershed planning is dominated by studies of one or two cases that rely on subjective methods of data acquisition and analysis and are usually not well grounded in a body of theory (Leach and Pelkey, 2001). Sabatier et al. (2005) identify a number of limitations within the current body of literature. First, the use of interpretive or subjective methods of data acquisition and analysis may provide intriguing insights, but little way for an outside researcher to corroborate or replicate the results. Next, since

different people within a partnership observe different things, it is crucial to gather data from a variety of participants otherwise a sampling bias may be introduced. In a multivariate world, studies with only a small number of cases can have serious problems with internal validity, and may not yield generalized conclusions that may be applied to cases in different settings.

Chapter 3

NATIONAL WILD AND SCENIC RIVERS: HISTORY, ACTORS, AND GOVERNANCE

3.1 Wild and Scenic Rivers Act Overview

America's rivers signify the arterial network of our nation; an interconnected and prolific system of waterways that meander and flow through changing landscapes, across space and time. The development of the National Wild and Scenic Rivers Act (WSRA) specifically is best understood in contrast to the preceding federal water policy of the United States during the early twentieth century. Initiated by Congress, the Reclamation Act (1902) and the federal Water Power Act (1920) galvanized the proliferation of river development projects in the American west. The augmentation of pro-development policy for the purposes of hydroelectric power, irrigation, flood control, and navigation continued to spread across the nation; in the 1930s, Congress authorized damming and control of many of the great eastern rivers in response to pressure from President Franklin Roosevelt (Hiser, 1988). Roosevelt's New Deal, designed to lift the nation from the Great Depression, also led to numerous vigorous public works programs in many river basins (Kauffman, 2015).

Despite the pervasive pro-development sentiment in federal policy of the first half of the twentieth century, the 1960s saw an increasing preference for river preservation, concurrent with a national mounting environmental awareness. During this decade, the country began to realize the inimical damage being inflicted on wildlife, natural landscapes, and drinking water sources. There was sufficient concern

for the inexorable loss and permanent alteration of many miles of free-flowing rivers and their associated natural values (Haubert, 1998). This trepidation ultimately resulted in the passage of federal legislation in 1968, which enacted a comprehensive and systematic river preservation effort in the national realm.

“An unspoiled river is a very rare thing in this Nation today. Their flow and vitality have been harnessed by dams and too often they have been turned into open sewers by communities and by industries. It makes us all very fearful that all rivers will go this way unless somebody acts now to try to balance our river development.” —President Lyndon Johnson's remarks on signing the Wild and Scenic Rivers Act, 1968

In 1968, Congress cultivated a new intent to emphasize river preservation, balanced with development. To achieve these concurrent goals, Congress resolved to protect certain rivers and river segments that qualify as “outstandingly remarkable” (WSRA, P.L. 90-542; 16 U.S.C. 1271 et seq.). The Wild and Scenic Rivers Act (1968) established a policy of preserving designated free-flowing rivers for the benefit and enjoyment of present and future generations and to compliment the at the time national policy of constructing dams and other structures along numerous rivers (Johnson and Comay, 2015).

Study and Designation Processes: Rivers may enter the national system in either one of two ways, either by congressional designation or by state governor nomination with approval of the Secretary of the Interior (Johnson and Comay, 2015). In most cases, prior to adding a river to the system, Congress first directs in legislation that a study must be conducted to determine whether the river area is suitable for Wild and Scenic status (though there have been instances whereby Congress has designated “instant” rivers without first requiring a study) (Johnson and Comay, 2015). The purpose of the studies is to explore a variety of considerations including: (1)

characteristics that make the area worthy or unworthy of addition to the system; (2) current land ownership and use; (3) potential future uses of the land and water that could be affected by addition into the system; (4) the federal agency that would administer the area; (5) costs of acquiring the land; and (6) the extent to which management costs would be shared by state and local agencies (P.L. 90-542). State-nominated rivers may be added to the national system only if the river is designated for protection under state law, approved by the Secretary of the Interior, and permanently administered by a state agency (P.L. 90-542). Fewer than 10 percent of federal Wild and Scenic River designations have been made in this manner (Johnson and Comay, 2015).

Eligibility: In order to be eligible for designation, a river must be free-flowing and possess one or more Outstanding Resource Values (ORVs); therefore, the eligibility analysis consists of an examination of the river's hydrology (including man-made alterations) and an inventory of its natural, cultural, and recreational resources (Diedrich and Thomas, 1999). Professional judgment is used to determine whether values exist to an outstandingly remarkable degree (Marsh, 2014).

The WSRA distinguishes different rivers within each category exhibiting different scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. These eligibility criteria are offered to provide greater consistency within the federal river-administering agencies, and are intended as a minimum threshold to establish ORVs that are illustrative but not all-inclusive (Diedrich and Thomas, 1999).

Table 3.1 Outstanding Resource Values and Descriptions

ORV	Description	
Scenery (S)	Landscape elements of landform, vegetation, water, color and related factors result in notable or exemplary visual features or attractions. Additional factors include seasonal variations in vegetation, scale of cultural modifications, and length of time negative intrusions are viewed.	
Recreation (R)	Recreational opportunities are popular enough to attract visitors from throughout or beyond the region of comparison or are unique or rare within the region. Visitors are willing to travel long distances to use river resources for recreational purposes; River-related opportunities include: sightseeing, wildlife observation, camping, photography, hiking, fishing, hunting, and boating.	
Geology (G)	River/river corridor area contains one or more geologic features, processes, or phenomenon unique or rare within the region of comparison. Feature(s) may be in an unusually active stage of development, represent an archetypal example, or a unique or rare combination of geologic features including erosional, volcanic, glacial, or others.	
Fish (F)	Fish values may be judged on the relative merits of fish populations, habitat, or a combination.	
	<i>Populations:</i> River is an important producer of resident and/or anadromous fish species; presence of wild stocks, federal or state listed threatened, endangered, or sensitive species of particular significance.	<i>Habitat:</i> River provides high quality habitat for fish species indigenous to the region of comparison; habitat for wild stocks, federal or state listed threatened, endangered, or sensitive species of particular significance.
Wildlife (W)	Wildlife values may be judged on the relative merits of either terrestrial or aquatic wildlife populations or habitat or a combination of these conditions.	
	<i>Populations:</i> The river/river corridor area contains nationally or regionally important populations of indigenous wildlife species; species considered to be unique and/or populations of federal or state listed threatened, endangered, or sensitive species of particular significance.	<i>Habitat:</i> The river/river corridor area provides exceptionally high quality habitat for wildlife of national or regional significance, and/or may provide unique habitat or a critical link in habitat conditions for federal or state listed threatened, endangered, or sensitive species.
Prehistory (P)	River/river corridor area contains a site(s) where there is evidence of occupation or use by Native Americans. Sites must have unique or rare characteristics or exceptional human-interest value(s); sites may possess national or regional importance for interpreting prehistory.	
History (H)	River/river corridor area contains a site(s) or feature(s) associated with a significant event, an important person, or cultural activity of the past that was rare or one-of-a-kind in the region. In most cases, historic sites and features are 50 years or older.	
Cultural (C)	River/river corridor area contains archaeological sites or areas significant to traditional cultures.	
Other Values (O)	No specific national evaluation guidelines developed for category. Assessments of additional values consistent with the foregoing guidance may be developed and could include: hydrology, paleontology, and botany resources.	

Adapted from (Diedrich and Thomas, 1999)

Classification: The Wild and Scenic Rivers Act defines three categories for preservation: wild, scenic, and recreational. These three established classes of rivers reflect the characteristics of the river at the time of designation and affect the type and amount of development that may be permitted thereafter (Johnson and Comay, 2015). Wild river areas are those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America. Scenic river areas are those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but are accessible in places by roads. Recreational river areas are those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past, but still possess one or more ORVs. By having three distinct categories for inclusion, the WSRA allows individual rivers to be administered in such a way that preserves their outstandingly remarkable values, but that also establishes clear and consistent management standards throughout the national system (Burce, 2008).

3.2 The National Wild and Scenic Rivers System

At its conception in 1968, there were eight inaugural components to the system, totaling 789 miles: the Middle Fork of the Clearwater and the Middle Fork of the Salmon (Idaho), the Eleven Point (Missouri), the Feather (California), the Rio Grande (New Mexico), the Rogue (Oregon), the St. Croix (Minnesota and Wisconsin), and the Wolf (Wisconsin) (Haubert, 1998). The majority of these initial rivers were western rivers that flowed through federal lands. In 1972, Congress began expanding

the system, subsequently followed by substantial additions in 1976 and 1978 (Johnson and Comay, 2015). Today there are 208 river units with 12,708.8 miles in 40 states and Puerto Rico, administered by federal agencies, or by state, local, or tribal governments (Johnson and Comay, 2015).



Figure 3.1 National Wild and Scenic River System
Source: National Wild and Scenic Rivers System (rivers.gov)

Table 3.2 depicts values for each state that reflects the total mileage of the river in that state. States that have been excluded from Table 3.2 are omitted because they have no designated Wild and Scenic Rivers; these states include: Hawaii, Indiana, Iowa, Kansas, Maryland, Nevada, North Dakota, Oklahoma, Rhode Island, and Virginia.

Table 3.2 Wild, Scenic, and Recreational River Mileage by State and Territory

State/Territory	Total	Wild	Scenic	Recreational
Alabama	61.4	36.4	25.0	-
Alaska	3,210.0	2,955.0	227.0	28.0
Arizona	57.3	31.5	18.3	7.5
Arkansas	210.0	21.5	147.7	40.8
California	1,999.6	757.2	208.3	1,034.1
Colorado	76.0	30.0	-	46.0
Connecticut	39.3	-	25.3	14.0
Delaware	94.7	N/A	N/A	N/A
Florida	49.2	32.7	7.9	8.6
Georgia	49.2	N/A	N/A	N/A
Idaho	891.0	629.8	37.0	224.2
Illinois	17.1	-	17.1	-
Kentucky	19.4	9.1	-	10.3
Louisiana	19.0	-	19.0	-
Maine	92.5	92.5	-	-
Massachusetts	147.1	2.6	83.8	60.7
Michigan	656.4	82.6	276.4	297.4
Minnesota	226.0	N/A	N/A	N/A
Mississippi	21.0	-	21.0	-
Missouri	44.4	-	44.4	-
Montana	368.0	161.9	66.7	139.4
Nebraska	197.0	-	76.0	121
New Hampshire	38.0	-	13.7	24.3
New Jersey	262.9	-	N/A	N/A
New Mexico	124.3	94.0	20.5	9.8
New York	73.4	-	23.1	50.3
North Carolina	144.5	N/A	N/A	N/A
Ohio	212.9	-	136.9	76.0
Oregon	1,917.1	685.1	400.6	831.4
Pennsylvania	423.3	-	N/A	N/A
Puerto Rico	8.9	2.1	4.9	1.9
South Carolina	41.9	N/A	N/A	N/A
South Dakota	98.0	-	-	98.0
Tennessee	45.3	43.3	-	2.0
Texas	191.2	95.2	96.0	-
Utah	169.3	145.4	11.3	12.6
Vermont	46.1	-	-	46.1
Washington	248.2	26.9	142.0	79.3
West Virginia	10.0	-	10.0	-
Wisconsin	276.0	-	217.0	59.0
Wyoming	408.0	238.4	140.6	29.0
U.S. Total	12,708.8	6,187.9	2,750.9	3,770.0

Source: (Johnson and Comay, 2015)

Through various federal agencies' land management planning processes and initiatives by the public, a number of rivers have been identified for study as potential additions to the National System (Marsh, 2014). The Nationwide Rivers Inventory (NRI), maintained and revised by the National Park Service, catalogs rivers and river segments that appear to meet minimum WSRA eligibility requirements based on preliminary studies. NRI has identified over 3,400 river segments as potential candidates for study and inclusion in the national system (Marsh, 2014). While listing on the NRI does not represent an official determination of eligibility, these river segments may still be afforded some protection from the adverse impacts of federal projects until a time at which they can be studied in further detail (Diedrich and Thomas, 1999).

Federal WSR Administering Agencies and Other Key Federal Agencies:

Land areas along Wild and Scenic Rivers designated by Congress generally are managed by one of the four federal land management agencies: the Bureau of Land Management (BLM), the Forest Service (USFS), the National Park Service (NPS), or the Fish and Wildlife Service (USFWS). In addition to the four principal administering agencies, there are four additional agencies with federal authority to regulate activities on the nation's rivers, which include WSRs. The Environmental Protection Agency (USEPA) has authority to protect water quality; the Army Corp of Engineers (ACOE) has jurisdiction for water resource projects; the U.S. Coast Guard (USCG) has jurisdiction on inland navigable waters, vessel licensing and inspections, safety and boating enforcement, and permitting of bridges; and the Federal Energy Regulatory Commission (FERC) has authority to license the construction of hydroelectric projects

(Marsh, 2014). Descriptions of these federal agencies, and their respective roles and authorities are summarized in Table 3.3.

Table 3.3 Authorities and Roles of Key Federal Water Agencies

Agency	Description	Authorities/Roles
Environmental Protection Agency	EPA administers activities under the CWA and SDWA; EPA has 10 Regional Offices and headquarters in Washington D.C.	EPA can directly affect WSRs through their authorities for grants, subsidized loans, and permits.
Federal Energy Regulatory Commission	FERC is an independent federal commission in the Department of Energy with exclusive authority to license nonfederal waterpower projects on navigable waterways and federal lands.	Section 7(a) of the WSRA prohibits FERC from licensing the construction of hydroelectric facilities “on or direct affecting” rivers included in the National System; Section 7(b) provides the same prohibition for congressionally authorized study rivers.
U.S. Army Corps of Engineers	ACOE is the nation’s oldest water resource agency and is located in the Department of Defense; primary water resource activities are flood control and navigation improvement, wetlands protection and restoration.	ACOE is involved in three program areas related to WSRs: civil works, reimbursable support of other federal agencies, and responding to emergency relief activities by other federal agencies.
U.S. Coast Guard	USCG has multifaceted jurisdictional authority for management activities over all waters subject to jurisdiction of the U.S.; navigable waters for USCG purposes are based on use or susceptibility for use as water traffic highways for substantial interstate or foreign commerce.	USCG regulations that may affect WSRs include: Inland Navigation Rules, boating safety, marine sanitation devices, licensing, and operation requirements for uninspected vessels and bridges.

Rivers assigned by the Secretary of the Interior to be managed by the National Park Service become part of the National Park System, and those managed by the Fish and Wildlife Service become part of the National Wildlife Refuge System (Johnson and Comay, 2015). Rivers included in the National System at the request of a governor, and designated by the Secretary of the Interior, administer management by

the respective state(s) (Marsh, 2014). Effective administration of designated rivers and congressionally authorized study rivers requires knowledge of the authorities of involved federal agencies (Diedrich, 1999). Agency roles in implementing the WSRA may be regulatory, as a direct funding entity, or indirectly by providing federal assistance via the funding of the actions of others (ibid). Where WSR corridor boundaries include state, county, or private land, federal agencies have limited authority to purchase, condemn, exchange, or accept donations of state and private lands within the corridor boundaries (Johnson and Comay, 2015). In addition, federal agencies are directed to cooperate with state and local governments in developing management plans (ibid). Table 3.4 distinguishes the differences in roles of federal, state, and municipal agencies in administering requirements of the WSRA.

Table 3.4 Roles of Wild and Scenic River Administering Agencies

Federal	State	Municipal
<ul style="list-style-type: none"> -Administered by BLM, NPS, USFS, or USFWS under WSRA Section 3(a) -Responsible for implementing WSRA requirements including development of a comprehensive river management plan within 3 fiscal years from the designation date -Protect and enhance a river’s values, through its authority on federal lands and through cooperative strategies -May regulate use and activities occurring on WSR surface waters (exercise of federal authority relies on a connection between regulated conduct and designated purpose) 	<ul style="list-style-type: none"> -Administered by respective state(s) under WSRA Section 2(a)(ii) -Responsible for providing protection (except on federally administered lands) -Regulating and enforcing fishing and/or hunting regulations -Adjudicating water rights and appropriation -Developing and administering water quality standards -Administering state land use regulations on nonfederal lands -Managing state lands and facilities along the river (e.g., forests, parks, state highways) 	<ul style="list-style-type: none"> -Encouraged via federal WSR agencies to provide for protection of values in land use plans (including the use of zoning decisions and other land use restrictions). -Participation in the development of comprehensive river management plans in areas of mixed ownership

Management Plan Development: A comprehensive river management plan (CRMP) is required for all designated WSRs. In order to comply with the National Environmental Policy Act (NEPA), the CRMP identifies the purpose of designating and protecting the river's outstanding values. The CRMP is a non-regulatory document that describes the management direction for meeting this purpose of protection (e.g., goals, objectives, desirable conditions, allowable uses, and standards). The specifics of the process of developing a CRMP vary from river to river. When a river or river segment becomes added to the national system through an amendment to the WSRA, a number of entities (federal, state, local governments) typically coordinate the development the CRMP. Such a plan reflects consensus and local concurrence on actions to be taken by the managing entities to protect the river and its associated values. Entities ensure overall direction for the development of plans, boundaries, interim management, public involvement and coordination (Marsh, 2006). Some CRMPs are developed by one lead agency with input from others, while some are jointly developed by federal and state agencies. Local advisory committees are often formed and may help agencies prepare the CRMPs during the study period (Marsh, 2006). Unless otherwise specified, the CRMP must be developed within three fiscal years of the WSR's designation (Marsh, 2014). A long-term management structure is not only critical to prepare and implement the plan quickly, but also to revisit and update the plan as goals are achieved, or circumstances change (Center for Watershed Protection USEPA, 1998).

Benefits of Designation: Wild and Scenic Rivers deliver a number of social, ecological, and economic benefits to recreational visitors and local communities. The most ostensible benefits of WSR designation are that the status itself provides

managers with a mechanism to mobilize to protect the river's reaches and its associated values. Such protection measures in turn could then elucidate ancillary benefits like enhancement of water quality, tourism, recreational use, and economic development. Increasing visitation may boost local business by drawing in tourists, in turn providing economic benefits to the locality. Current limited studies indicate that property values remain stable or increase on designated rivers (Marsh, 2014). Designation may also result in increases in public awareness, visibility, and community pride (Smith and Moore, 2011).

3.3 Approaches to Wild and Scenic River Management

The top-down or centralized approach to WSR management, has been the traditional methodology whereby one of the four federal land management agencies administer and are exclusively responsible for the designated river corridor. This approach is suitable for river corridors that fall within the confines of federal land ownership. Standards and procedures for the protection of river related resources on nonfederal lands within WSR corridors however, have not been as straightforward as those that fall within federal jurisdiction. Statutory limitations, political hindrances, and institutional realities often limit and discourage the use of federal land acquisition (Thomas, 1996); moreover, there is considerable controversy associated with the use of federal land acquisition as the primary tool for river-related resource management. Land acquisition is not always an appropriate mechanism for conserving resources located beyond federally owned lands. These complicating facets of effective WSR planning and administration on nonfederal lands therefore require a consistent and practical approach to the development of a distinguishable management strategy: one

that carries more of an emphasis on cooperative resource protection strategies with local and private interests.

Rivers that flow entirely or largely through nonfederal lands warrant enduring collaborations with state and local governments to protect values (Marsh, 2014). Particularly in the northeastern region of the U.S., where there is a much larger extent of state, county, municipal or privately owned lands adjacent to rivers, there is a need for the application of a community-based conservation framework. Such a framework necessitates feedback from and coordination between the various stakeholders (which include federal river managers, state and local governments, private landowners, and other river-related organizations) in setting resource protection standards and selecting appropriate protection strategies (Thomas, 1996). This hybrid governance structure or “partnership” approach is well evidenced as a model administered by the NPS. In 2007, Harvard University’s Ash Institute for Democratic Governance and Innovation lauded NPS for its innovative river management, recognizing the Partnership program as one of just six federal programs among the year’s Top 50 government innovations. With respect to these rivers and their management, NPS staff assist communities in overseeing their river-related resources locally, by bringing together state, county, and community or local representatives to preserve the ORVs for which the rivers were designated (Marsh, 2014). Table 3.5 provides a comprehensive list of Wild and Scenic Rivers administered by the National Park Service.

Table 3.5 National Park Service Administered Wild and Scenic Rivers

NPS Rivers	Managed by States or Tribes	Partnership Rivers
Alagnak (AK)	American (lower) (CA)	Delaware (lower) (NJ, PA)
Alatna (AK)	Allagash Wilderness (ME)	Eightmile (CT)
Aniakchak (AK)	Big and Little Darby Creeks (OH)	Farmington (CT)
Bluestone (WV)	Cossatot (AR)	Great Egg Harbor (NJ)
Cache La Poudre (CO)	Eel (CA)	Lamprey (NH)
Charley (AK)	Klamath (CA, OR)	Maurice (NJ)
Chilikadrotna (AK)	Little Beaver (OH)	Missisquoi and Trout (VT)
Delaware (mid) (NJ, PA)	Little Miami (OH)	Musconetcong (NJ)
Delaware (upp) (NY, PA)	Loxahatchee (FL)	Sudbury, Assabet, Concord (MA)
Flathead (MT)	Lumber (NC)	Taunton (MA)
John (AK)	Middle Fork Vermillion (IL)	Wekiva (FL)
Kern (CA)	New (S. Fork) (NC)	Westfield (MA)
Kings (CA)	St. Croix (Lower) (MN, WI)	White Clay Creek (DE, PA)
Klamath (CA)	Smith (CA)	
Kobuk (AK)	Trinity (CA)	
Koyukuk (N. Fork) (AK)	Westfield (MA)	
Merced (CA)	Wolf (WI)	
Missouri (NE, SD)		
Mulchatna (AK)		
Niobrara (NE)		
Noatak (AK)		
Obed (TN)		
Rio Grande (TX)		
River Styx (OR)		
Salmon (AK)		
St. Croix (MN, WI)		
Snake Headwaters (WY)		
Tinayguk (AK)		
Tlikakila (AK)		
Tuolumne (CA)		
Virgin (UT)		

Source: (U.S. Department of the Interior, National Park Service, 2016)

Chapter 4

MANAGEMENT FRAMEWORK: PARTNERSHIP WILD AND SCENIC RIVERS

4.1 Local Involvement in Federally Protected Rivers

The presence of local communities and autonomous governments within river areas slated for protection are distinct from traditional wilderness or park protection (Carroll and Hendrix, 1992). River protection measures often result in changes in the way local people have traditionally used resources and in the actual loss of ownership or control of property; consequently, river planning efforts have provoked bitter and protracted locally based conflict (ibid). Throughout the process, residents and local government officials may grow wary that decisions pertaining to land use, recreational access, and other issues subject to local control will be made by a federal bureaucracy that ignores local wishes. While some would contend that protected rivers are set aside to further national or state interests rather than local values, such an argument relies on a false dichotomy between local and national interests (Carroll and Hendrix, 1992).

The National Environmental Policy Act of 1969 increased the public's access to natural resource management through public participation requirements of the environmental impact statement process (Griffin, 1999). Formal public involvement procedures, as required by NEPA and other laws, are part of the crucial process of all relevant local and regional interests gaining acceptance of a plan associated with an outside agency. However, while these strategies have been used for decades, they are not always sufficient for some decision processes in natural resource planning in a

local context (Larson and Lach, 2008). Often, local stakeholder groups lack the knowledge, experience, or inclination to present their interests in a formal process (Carroll and Hendrix, 1992).

Local governments identify with particular watersheds, watershed features, and/or watershed functions in ways that other entities lack either in the incentive or institutional capacity (Hirokawa, 2012). However, there has been a substantial amount of reluctance to place diligent control of environmental regulations in the hands of local governments, rationalized by criticisms of failure of local governments to sophisticatedly and persistently enact protection measures (ibid).

Arriving at a commonly shared view of a federal presence and the subsequent evolution of a response, is a complex social process, which involves interactions between local and agency people and communication among locals (Carroll and Hendrix, 1992). It has been illustrated that conflicts between local people and federal agencies are more often about issues of control rather than the substance of proposed actions or regulations (Carroll and Hendrix, 1992). Independent federal actions to solve problems tend to generate greater conflict, while instances characterized by autonomy and negotiations that yield genuine power sharing between federal and local actors can provide mutually satisfactory outcomes (ibid).

4.2 Partnership Wild and Scenic Rivers: Management Principles

Over the past three decades, watershed and river conservation interests at the local, state, and federal levels have worked in collaboration to adapt the National Wild and Scenic Rivers Act into an effective, partnership-based approach to national designations. The Partnership Wild and Scenic River approach has been recognized by the National Park Service and U.S. Congress as a unique, distinct, and consistent

application of the Wild and Scenic Rivers Act. Partnership Wild and Scenic Rivers (PWSR), currently consist of 13 rivers, and are federally designated components of the National Wild and Scenic Rivers System that share certain common principles and criteria in their approach to management. These principles seek to meet the needs of river conservation mandated by the federal designation, while also cogitating local needs and traditional uses.

A Partnership River is a Wild and Scenic River whereby little, if any of the adjacent land is federally (or state) owned, and is concentrated instead in private or local municipal jurisdiction. The Partnership Rivers are more conventional to the northeast, where a much larger portion of lands are privately owned. Because of this factor, these rivers have had to develop and implement a different management approach, distinct from the abundance of WSRs that flow through federally owned lands that dominate the western United States (Figure 4.1). Considering pervasive ownership of private lands, a shared parameter of the PWSRs is the prohibition of land acquisition by the federal government. Further, the Wild and Scenic designation does not automatically establish a federal park or locally undesired federal land ownership. The National Park Service does not procure or intend to acquire lands in the river corridor or watershed, and adjacent land uses to the WSR continue to be governed by municipal ordinances and state statutes as prior to the designation. This policy of no acquisition is an essential condition for harnessing local support for designation.

The restricted role of the federal government therefore promulgates a more local management strategy, based primarily on the actions of municipal governments in cooperation with the county and state. This format seeks to diminish local citizen concerns associated with strong federal government regulation and the potential for

loss of private lands, and also facilitate a more active and participatory citizen role in the management process. The emphasis on local control and self-determination allow existing river uses to continue. Further, this approach recognizes that not all Wild and Scenic Rivers are appropriate additions to the National Park, National Forest, or National Wildlife Refuge Systems. Management strategies are developed and implemented through the locally led study committee and are locally approved prior to designation; responsibilities associated with managing and protecting river resources are shared among all of the partners – local, state, federal, and nongovernmental; and volunteerism is a consistent backbone of success (National Park Service, 2006).

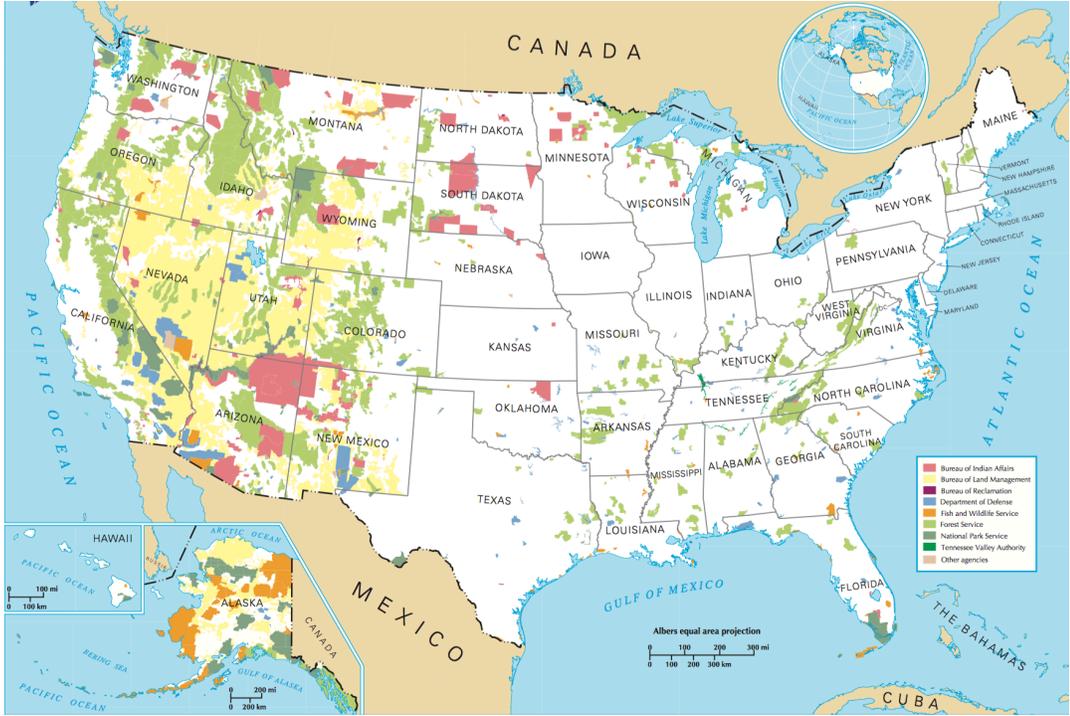


Figure 4.1 Federal Lands and Indian Reservations
Source: U.S. Dept. of the Interior, USGS

The Partnership Rivers: The PWSRs are situated in the following states on the eastern seaboard: Connecticut, Delaware, Florida, Massachusetts, New Hampshire, New Jersey, Pennsylvania, and Vermont. In total, they represent over 752 protected river miles, each with their own individual narrative on achieving Wild and Scenic status. Table 4.1 enumerates these rivers, their original year of designation, and designated river miles and Table 4.2 delineates the ORVs for each of the rivers. The remainder of this section consists of a brief overview of each of these rivers.



Figure 4.2 Map of Northeastern Wild and Scenic Rivers
 Source: National Wild and Scenic Rivers System (rivers.gov)

Table 4.1 Partnership Wild and Scenic Rivers

Partnership WSR	State(s)	River Miles	Designated
Eightmile River	CT	25.3	2008
Farmington River	CT	14	1994
Great Egg Harbor	NJ	129	1992
Lamprey River	NH	23.5	1996
Lower Delaware River	NJ, PA	67.3	2000
Maurice River	NJ	35.4	1993
Missisquoi and Trout Rivers	VT	46.1	2014
Musconetcong River	NJ	24.2	2006
Sudbury, Assabet, Concord Rivers	MA	29	1999
Taunton River	MA	40	2009
Wekiva River	FL	41.6	2000
Westfield River	MA	78.1	1993
White Clay Creek	DE, PA	199	2000

Table 4.2 Outstanding Resource Value Categories

River	ORV Category							
	(C)	(G)	(W)	(R)	(S)	(F)	(H)	(O)
Eightmile	x	x	x		x	x		x
Farmington			x	x	x	x		
Great Egg Harbor			x	x				x
Lamprey						x	x	x
Lower Delaware	x	x		x	x			
Maurice River	x							
Missisquoi and Trout			x					x
Musconetcong	x	x		x	x	x	x	
Sudbury, Assabet, Concord				x		x		
Taunton			x			x	x	x
Wekiva		x	x	x	x	x		
White Clay Creek				x				x
Westfield				x		x		x

Eightmile River: A group of local citizens, supported by the Nature Conservancy and University of Connecticut Cooperative Extension program, began working to protect the Eightmile River and its watershed landscape in 1995. Congressman Rob Simmons and Senator Chris Dodd helped secure authorization and funding from Congress to undertake a Wild & Scenic River study (National Park Service, 2006). The state congressional delegation was met with widespread support, and President Bush signed the Eightmile Wild & Scenic Study Bill into law in November 2001 (P.L. 107-65). In late 2005, the Study Committee released the draft Eightmile River Watershed Management Plan and in early 2006, public meetings were held by the primary towns for comment (East Haddam, Lyme, and Salem). In May 2008, P.L. 110-229 was signed into law, designating the Eightmile River and its tributaries to the national WSR system, on a watershed basis.

The Eightmile River watershed is a mostly undeveloped drainage basin that occupies over 62 square miles of hilly, forested terrain in southeastern Connecticut. The landscape is characterized by rolling low hills and ridges separated by numerous small, narrow drainage corridors and hollows, and in some places broader valleys and basins (Eightmile River Wild and Scenic Study Committee, 2005). The river has a confluence with the Connecticut River approximately 8 miles upstream of the mouth of the Connecticut River at the Long Island Sound, and hence the derivation of its name. Unlike many watersheds in Connecticut, Eightmile is not relied upon as a major source of public or industrial water supply (National Park Service, 2006).

Approximately 90% of the watershed lies in equal portions within the three communities of East Haddam, Lyme and Salem, with the remaining 10% evenly split between Colchester and East Lyme (Eightmile River Wild and Scenic Study

Committee, 2005). In 2004 during the development of the Eightmile CRMP, the combined population of the three main communities was 15,228, with 60% located in East Haddam, 27% in Salem and 13% in Lyme. With just 5,400 people living in the watershed itself, population density is considerably low at 87 people per square mile, as compared to the overall statewide average of 700 people per square mile (Eightmile River Wild and Scenic Study Committee, 2005). Nearly 80% is forest cover, and only 6% of the watershed is developed area (Eightmile River Wild and Scenic Study Committee, 2005). Moreover, over 28% of the land area (11,000 acres) is currently permanently protected, including over 5,000 acres of state forest and parkland, and as significant holdings by municipalities, local land trusts, and The Nature Conservancy (Eightmile River Wild and Scenic Study Committee, 2005).

Table 4.3 Eightmile River Overview

Eightmile River				
State(s)	Connecticut			
Designated	May 8, 2008			
Legal Foundation	<i>Study Act:</i> P.L. 107-65		<i>Designation:</i> P.L. 110-229	
River Miles	<i>Wild</i> -	<i>Scenic</i> 25.3	<i>Recreational</i> -	<i>Total</i> 25.3
Watershed Area	62 mi ² (39,680 acres)			
Watershed Population Est.	5,400			
Outstanding Resource Values	Cultural, Geology, Wildlife, Fish, Other (water quality, watershed hydrology, watershed ecosystem)			
Management Committee	Eightmile River Wild and Scenic Coordinating Committee			
Municipal Level	East Haddam, Lyme, Salem			
County Level	Middlesex County, New London County			
State Level	Connecticut Department of Environmental Protection			
Federal Level	National Park Service			
Other Partners	East Haddam Land Trust, Lyme Land Conservation Trust, Salem Land Trust, The Nature Conservancy, Landowners			
Funding Requested FY2017	\$206,000			

Farmington River: Local interest in a Wild and Scenic River Study of the Farmington River began in the early 1980s, when the Hartford Metropolitan District Commission (MDC) proposed a diversion from the existing reservoirs on the river's West Branch to augment the city's water supply (National Park Service & Farmington River Study Committee, 1995). Local residents, town officials, and the Farmington River Watershed Association (FRWA) expressed concern over the river's resources and increasing rate of development along the river. As a result, the diversion proposal was rejected in a 1981 referendum of the MDC's member towns. In 1982, FRWA requested assistance from the NPS to evaluate the significance of the river's resources and recommend management strategies (National Park Service & Farmington River Study Committee, 1995). In 1984, the Farmington River Study Final Report was completed, which then prompted growing interest in adding federal protection to the river. That same year, Congresswoman Nancy Johnson introduced legislation to have the West Branch of the Farmington River studied for potential inclusion in the National Wild and Scenic Rivers System.

Located in the rolling, forested hills of southwestern New England in close proximity to many major urban areas, the river originates in the Berkshire Hills in southwestern Massachusetts and flows south into northwestern Connecticut. The Farmington River's main stem is 46.7 miles in length and located in northwestern Connecticut. The river is 81 miles long overall and drains an area of some 600 square miles (National Park Service and Farmington River Study Committee, 1995). The watershed provides 100% of the drinking water for over 600,000 people in Greater Hartford and the Farmington Valley (FRWA, nd).

As the river flows, it bypasses towns and villages in Massachusetts and Connecticut and the further downstream, each is successively more developed than the previous. The demographic feel of the Wild and Scenic Farmington River segment is characterized by the proximate small towns and influenced by their proximity to the Hartford urban area. The upper two-thirds of the Wild and Scenic River segment is characterized by mostly forests, with steep slopes and mixed with sparse development and overgrown farmlands. Farther downstream accommodates a greater variety of land uses and is somewhat more developed.

Table 4.4 Farmington River Overview

Upper Farmington River				
State(s)	Connecticut			
Designated	August 26, 1994			
Legal Foundation	<i>Study Act:</i> 99-590		<i>Designation:</i> P.L. 103-313	
River Miles	<i>Wild</i> -	<i>Scenic</i> -	<i>Recreational</i> 14	<i>Total</i> 14
Watershed Area	609 mi ² (384,000 acres)			
Municipal Population Est.	22,870			
Outstanding Resource Values	Recreation, Fish, Wildlife, Scenic, Recreation			
Management Committee	Farmington River Coordinating Committee			
Municipal Level	Colebrook, Hartland, Barkhamstead, New Hartford, Canton			
County Level	Hartford County, Litchfield County			
State Level	Connecticut Department of Environmental Protection			
Federal Level	National Park Service			
Other Partners	Hartford Metropolitan District Commission, Farmington River Watershed Association			
Funding Requested FY2017	\$200,000			

Great Egg Harbor: In the mid 1980s, local landowners, environmental organizations, and public officials in twelve municipalities in four New Jersey counties focused on the future of the Great Egg Harbor River. In October 1992, Public

Law 102-536 was signed, designating segments of the Great Egg Harbor River and its tributaries in the State of New Jersey as components of the National System (Great Egg Harbor River Planning Committee and National Park Service, 2000). The designated segments include approximately 129 miles of the river: three river segments on the main stem totaling 39.5 miles and 89.5 miles of tributaries. Of these 129 miles, 30.6 miles are designated as scenic and 98.4 miles are designated as recreational.

The Comprehensive Management Planning process officially began in 1997, though in prior years, the planning committee had been meeting to preeminently address concerns and identify issues. A series of local public information meetings were held in 1997, 1998, and 1999. A working draft of the CMP was distributed to planning committee members in January 1998, and an initial draft of the CMP and Environmental Assessment was later made available for public comment from May to July 1998 (Great Egg Harbor River Planning Committee & National Park Service, 2000). The CMP was completed in May 2000.

The river begins in suburban towns and meanders generally southeast for 59 miles on its way to the Atlantic Ocean. Over 99 percent of the waterways and adjacent lands are within the boundary of the Pinelands National Reserve (Great Egg Harbor River Planning Committee and National Park Service, 2000). Remaining acreage outside of the National Reserve, within the designated river corridor is predominantly wetlands and is either publically owned or regulated by federal/state agencies (Great Egg Harbor River Planning Committee and National Park Service, 2000).

Table 4.5 Great Egg Harbor Overview

Great Egg Harbor				
State(s)	New Jersey			
Designated	October 27, 1992			
Legal Foundation	<i>Designation:</i> P.L. 102-536			
River Miles	<i>Wild</i>	<i>Scenic</i>	<i>Recreational</i>	<i>Total</i>
	-	30.6	98.4	129
Watershed Area	304 mi ² (194,560 acres)			
Municipal Population Est.	262,774			
Outstanding Resource Values	Wildlife, Recreation, Other			
Management Committee	Great Egg Harbor River Council			
Municipal Level	Buena Vista, Corbin, Egg Harbor, Estell Manor, Folsom, Hamilton, Hammonton, Monroe, Somers Point, Upper, Weymouth, Winslow			
County Level	Atlantic County, Gloucester County, Camden County, and Cape May County			
State Level	New Jersey Department of Environmental Protection			
Federal Level	National Park Service, Environmental Protection Agency, U.S. Congress, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers			
Other Partners	Great Egg Harbor Watershed Association (GEHWA), Pinelands Commission, NJ Conservation Foundation, American Littoral Society, Local schools, Citizens to protect the Maurice River			
Funding Request FY2017	\$255,000			

Lamprey River: In 1979, the Strafford Regional Planning Commission mapped the entire Lamprey River and discovered an impressive number of significant resources of considerable value (Lamprey River Advisory Committee, 1995). As a result of this study, the Lamprey River Watershed Association was founded to carry out cooperative advocacy for the river. In 1982, the National Park Service awarded the Lamprey a place their Nationwide Rivers Inventory for those that qualify for Wild and Scenic designation. In 1988, New Hampshire enacted the State Rivers Management and Protection Program (RMPP) to protect its most important rivers, and in 1990 the Lamprey was included as a rural river in the RMPP (Lamprey River Advisory

Committee, 1995). The Lamprey River Management Plan was completed in 1995 as a requirement of the RMPP.

During this time, the granting of a license for development of a hydroelectric plant brought attention for the need for better protection (Lamprey River Advisory Committee, 1995). In 1991, after the towns of Lee and Durham requested Congress enact a Wild and Scenic study for the river, P.L. 102-214 was signed. In 1996, the river through Lee, Durham and Newmarket was federally designated as Wild and Scenic (P.L. 104-333). In 2000, the river segment in Epping, from the West Epping Dam to Lee, was added (P.L. 106-192). Updates to the river management plan were completed in 2007 and 2013.

The Lamprey River originates in the Saddleback Mountains, Northwood, New Hampshire and flows in a generally southeasterly direction for 47.3 miles (45.4 freshwater, 1.9 tidal) to Great Bay (Lamprey River Advisory Committee, 1995). The size of the Lamprey's watershed is greater than the other watersheds that drain into Great Bay, thus, Great Bay's health is intimately tied to the health of the Lamprey (Lamprey River Advisory Committee, 2016). Lamprey has five major tributaries: Little, North, North Branch, Pawtuckaway, and Piscassic Rivers.

Lands in the headwaters are largely forested and undeveloped, with Pawtuckaway State Park and Pawtuckaway Lake as the dominant features. Between 1990 and 2000, the amount of paved surface in the watershed increased by 56%; however as of 2010, the watershed is still 68% forested (Lamprey River Advisory Committee, 2016). Overall population density in 2000 for the watershed was 53 people per km² and this number is expected to increase to 85 people per km² in 2020 (Lamprey River Advisory Committee, 2016).

Table 4.6 Lamprey River Overview

Lamprey River				
State(s)	New Hampshire			
Designated	November 12, 1996			
Legal Foundation	<i>Study Act:</i> P.L. 102-214	<i>Designation:</i> P.L. 104-333	<i>Revision:</i> P.L. 106-192	
River Miles	<i>Wild</i> -	<i>Scenic</i> -	<i>Recreational</i> 23.5	<i>Total</i> 23.5
Watershed Area	212 mi ² (135,680 acres)			
Municipal Population Est.	28,255			
Outstanding Resource Values	Fish, History, Other (Hydrologic)			
Management Committee	Lamprey River Advisory Committee			
Municipal Level	Barrington, Brentwood, Candia, Deerfield, Durham, Epping, Exeter, Fremont, Lee, Newfields, Newmarket, Northwood, Nottingham, Raymond			
County Level	Rockingham County			
State Level	New Hampshire Department of Environmental Services			
Federal Level	National Park Service			
Other Partners	Lamprey River Watershed Association			
Funding Request FY2017	\$226,000			

Lower Delaware River: The study process to determine eligibility of the river for the National Wild and Scenic Rivers System resulted in part from a proposal to pump 100 million gallons per day out of the Delaware River at Point Pleasant, PA, and the fear that river flows would be negatively impacted as a result (National Park Service, 2015). In 1992, Congress passed a bill (P.L. 102-460) authorizing NPS to study the Lower Delaware main stem from the southern end of the Delaware Water Gap National Recreational Area south to Washington Crossing State Park, NJ (National Park Service, 2015). The NPS and Lower Delaware Wild & Scenic River Study Task Force formed to implement the Lower Delaware River Management Plan in 1997. After several years of study, P.L. 106-418 was signed into law in 2000.

The designated 67-mile reach includes several segments of the Delaware and its tributaries: 1) from river mile 193.8 to the northern border of the city of Easton, PA 2) from just south of the Gilbert Generating Station to just north of the Point Pleasant

Pumping Station 3) from just south of the Point Pleasant Pumping Station to a point 1,000 feet north of the Route 202 Bridge 4) from 1,750 feet south of the Route 202 Bridge to the southern boundary of the town of New Hope, Pennsylvania, to the town of Washington Crossing, Pennsylvania 5) all of Tinicum Creek 6) Tohickon Creek from the Lake Nockamixon Dam to the Delaware River and 7) Paunacussing Creek in Solebury Township.

The Delaware River Basin (12,800 square miles in total) covers parts of New York, Pennsylvania, New Jersey and Delaware (NYSDEC, 2016). The headwaters originate in the Catskill Mountains in New York, and eventually flow into Delaware Bay and ultimately the Atlantic Ocean. The Delaware is the longest un-dammed river east of the Mississippi, and serves as a major source of water for big cities and industry; nearly 15 million people rely on the Delaware River Basin for water. Overall, the Delaware Basin is covered by 14% urban and suburban land, 26% agriculture, 54% forest, and 4% water and wetlands (Kauffman, 2014). The U.S. Census (2010) recorded the Delaware Basin population as exceeding 8.2 million including 704,000 in Delaware (9% of the basin population), 6,000 in Maryland, 1,946,000 in New Jersey (24%), 121,000 in New York (2%), and 5,479,000 in Pennsylvania (66%) (Kauffman, 2014).

Table 4.7 Lower Delaware River Overview

Lower Delaware River				
State(s)	New Jersey and Pennsylvania			
Designated	November 1, 2000			
Legal Foundation	<i>Study Act:</i> P.L. 102-460		<i>Designation:</i> P.L. 106-418	
River Miles	<i>Wild</i> -	<i>Scenic</i> 25.4	<i>Recreational</i> 41.9	<i>Total</i> 67.3
Watershed Area	Delaware River Basin: 12,800 mi ² (8,192,000 acres)			
Watershed Population	Delaware River Basin: 8,200,000			
Outstanding Resource Values	Cultural, Geological, Recreational, Scenic			
Management Committee	Lower Delaware Management Committee			
Municipal Level	Lower Mount Bethel, Forks, Portland, Upper Mount Bethel, Easton, Williams, Riegelsville, Nockamixon, Bridgeton, Tinicum, Plumstead, Solebury, New Hope, Upper Makefield, Bedminster, Durham, Springfield, Harmony, Knowlton, Lopatcong, Belvidere, Phillipsburg, White, Pohatcong, Holland, Milford, Alexandria, Frenchtown, Kingwood, Delaware, Stockton, Lambertville, West Amwell, Hopewell			
County Level	Warren County, Hunterdon County, Mercer County, Burlington County, Northampton County, Bucks County			
State Level	New Jersey Department of Environmental Protection (NJDEP), Commonwealth of Pennsylvania (PA DCNR, PADEP, Fish and Boat Commission)			
Federal Level	National Park Service			
Other Partners	Delaware River Greenway Partnership (DRG), Delaware River Basin Commission (DRBC), Delaware and Lehigh Canal National Heritage Corridor Commission			
Funding Request FY2017	\$350,000			

Maurice River: In 1986 controversial development proposals along the Maurice River corridor created vehement debate about appropriate land uses along the river. Threat of a hazardous waste facility adjacent to the river prompted local landowners, environmental organizations, and public officials in five municipalities and two counties to focus their efforts and mobilize to secure long-term protection. That same year, the Citizens United to Protect the Maurice River and Its Tributaries, a

nonprofit regional watershed organization originally founded in 1979, became incorporated.

In the fall of 1987, U.S. Congress authorized a study (P.L. 100-33) of the Maurice River and its tributaries to determine the eligibility for inclusion in the National Wild and Scenic Rivers system (Cumberland County Department of Planning and Development, 1991). The Local Management Plan for the Maurice River and its Tributaries was completed in 1991. Subsequently, President Clinton signed Public Law 103-162 in December 1993, designating 35.4 miles of the Maurice River and its tributaries as components of the national system. Of the 35.4 designated miles, 10.5 are on the main stem of the Maurice River, 7.9 on the Menantico Creek, 14.3 of the Manumuskin River, and 2.7 of Muskee Creek (National Park Service, 2001).

The Maurice River is a tributary of Delaware Bay in Atlantic County and Cumberland County, New Jersey. The Maurice River corridor is an unusually pristine Atlantic Coastal river with important resources, and serves as a critical link between the Pinelands National Reserve and the Delaware Estuary. The river is approximately 50 miles long with a drainage area of 386 square miles and is the second longest tributary to the Delaware Bay. As part of the Atlantic flyway, waters and related habitats support the migration of shorebirds, songbirds, waterfowl, and fish. The river also supports New Jersey's largest stand of wild rice (National Park Service, 2001). Over 50% of the designated corridor is located within the boundaries of the Pinelands National Reserve; there are seven NJ Wildlife Management Areas located within the Maurice River corridor and a total of fifteen in the Maurice River watershed (National Park Service, 2001).

Table 4.8 Maurice River Overview

Maurice River				
State(s)	New Jersey			
Designated	December 1, 1993			
Legal Foundation	<i>Study Act:</i> P.L. 100-33		<i>Designation:</i> P.L. 103-162	
River Miles	<i>Wild</i> -	<i>Scenic</i> 28.9	<i>Recreational</i> 6.5	<i>Total</i> 35.4
Watershed Area	386 mi ² (247,040 acres)			
Municipal Population Est.	109,848			
Outstanding Resource Values	Cultural			
Management Committee	Citizens United to Protect the Maurice River and its Tributaries			
Municipal Level	Buena Vista, Commercial, Maurice River, Millville, Vineland			
County Level	Atlantic County, Cumberland County			
State Level	New Jersey Department of Environmental Protection (NJDEP)			
Federal Level	National Park Service, U.S. Army Corp of Engineers, U.S. Fish and Wildlife Service			
Other Partners	NJ Pinelands Commission			
Funding Request FY2017	\$210,000			

Upper Missisquoi and Trout Rivers: In 2004 interest emerged from the Missisquoi River Basin Association (MRBC) to explore the potential for a Wild and Scenic River designation. A five-year effort by MRBC board members eventually garnered enough support for a study investigation. The Wild and Scenic Study of the Upper Missisquoi and Trout Rivers was initiated in 2009, following passage of a bill introduced by the Vermont Congressional delegation at the request of local advocates (Upper Missisquoi and Trout Rivers Wild and Scenic Study Committee, 2013). The Upper Missisquoi and Trout Rivers Study Act (P.L. 111-11) was signed into law by President Obama on March 30, 2009. Subsequently, a locally appointed study committee was convened in 2009 to investigate eligibility and suitability of inclusion of the Missisquoi and Trout Rivers into the National Wild and Scenic River System. The study area included the Missisquoi River from Enosburg Falls upstream to its headwaters in Lowell; and the Trout River, a major tributary predominantly in

Montgomery, which joins the Missisquoi in East Berkshire (Upper Missisquoi and Trout Rivers Wild and Scenic Study Committee, 2013). The study lasted about three years and designation legislation was introduced in the U.S. Senate and U.S. House which each passed the legislation in September 2014 and December 2014, respectively. President Obama signed the designation bill for the upper Missisquoi and Trout National Wild and Scenic Rivers (P.L.113-291) into law on December 19, 2014. The Upper Missisquoi and Trout Rivers are the most recent addition to the Partnership Wild and Scenic Rivers group.

The Missisquoi and Trout Rivers drain the rural area of the green mountains, some of Vermont's highest peaks, along the U.S.-Canada border. The rivers mainly traverse mixed forests, working landscapes, and small villages in Northern Vermont. The Missisquoi River totals about 88 miles in length and is the primary tributary of the Missisquoi Bay in Lake Champlain. The Missisquoi Bay drains 1,200 square miles of northwestern Vermont and southern Quebec, and also contains the Missisquoi National Wildlife Refuge, an important wetland and forest habitat (Missisquoi River Basin Association, n.d.). The Trout River is one of five major subwatersheds that drain into the Missisquoi River (along with Hungerford Brook, Black Creek, Tyler Branch, and Mud Creek) (Missisquoi River Basin Association, n.d.). The land use in the Missisquoi River watershed is 66% forested, 25% agricultural, and 6% urbanized; the Trout River watershed is 84% forested, 7% agricultural, and 3% urbanized (National Park Service, 2014).

Table 4.9 Upper Missisquoi and Trout Rivers Overview

Upper Missisquoi and Trout Rivers				
State(s)	Vermont			
Designated	December 19, 2014			
Legal Foundation	<i>Study Act:</i> P.L.111-11		<i>Designation:</i> P.L.113-291	
River Miles	<i>Wild</i> -	<i>Scenic</i> -	<i>Recreational</i> 46.1	<i>Total</i> 46.1
Watershed Area	Missisquoi Bay: 1,200 mi ² (768,000 acres)			
Municipal Population Est.	13,250			
Outstanding Resource Values	Wildlife, Other (Botanic)			
Management Committee	Upper Missisquoi and Trout Rivers Wild and Scenic Committee			
Municipal Level	Berkshire, Enosburgh, Enosburg Falls, Jay, Lowell, Montgomery, North Troy, Richford, Westfield			
County Level	Franklin County, Orleans County			
State Level	Vermont Agency of Agriculture, Food, and Markets (VAAF), Vermont Department of Environmental Conservation (VTDEC)			
Federal Level	National Park Service			
Other Partners	Missisquoi River Basin Association, Northwest Regional Planning Commission (NRPC), Vermont Federation of Sportsmen's Club, Vermont Traditions Coalition			
Funding Request FY2017	\$175,000			

Musconetcong River: In 1991, petitions began circulating calling for the protection of the Musconetcong River under both the National Wild and Scenic Rivers System and the New Jersey Wild and Scenic Rivers program. In 1992, Congress passed legislation authorizing the National Park Service to study the eligibility and potential suitability. That same year, the Musconetcong Watershed Association (MWA) formed by local residents, who were concerned about preserving the watershed and its resources; this group saw the need for a locally based organization. In 1993, MWA and the National Park Service organized two Roundtable Meeting to discuss problems, amenities, and opportunities associated with the Musconetcong River (Musconetcong River Management Council et al., 2011). In 1997, eighteen municipalities along the river voted to request the NPS to study the Musconetcong

River to determine its eligibility for inclusion in the National System. The Musconetcong Advisory Committee, consisting of municipal representatives was formed in 1998 to work with the NPS and MWA to complete the National Wild and Scenic Study. In December 2006, President George W. Bush officially signed into law the Musconetcong Wild and Scenic Rivers Act (P.L. 109-452). With the passage of the Musconetcong Wild and Scenic Rivers Act, the Musconetcong Advisory Committee, which guided the designation process, was replaced by the Musconetcong River Management Council (MRMC), which began meeting in early 2008 (Musconetcong Watershed Association, 2013). The original River Management Plan, which was completed by the MRMC in April 2003, was updated in June 2011.

The Musconetcong River watershed encompasses the 157.6 square mile land area that drains to the 44-mile long Musconetcong River, which begins at Lake Hopatcong and joins the Delaware River in Riegelsville. The Musconetcong River is nestled in the heart of the New Jersey Highlands region and flows through the rural mountainous area of northwestern New Jersey in a general southwest direction.

All or portions of 26 municipalities lie within the natural boundaries of the Musconetcong watershed. Fourteen municipalities fall within the Wild and Scenic River designated segments. The river does not flow through any large population center and has seen relatively little development throughout its history. The Musconetcong watershed contains two distinct regions. The Upper Musconetcong watershed is mostly forested with significant residential development along the shores of many lakes. The Lower Musconetcong watershed is mostly agricultural land with several villages and forested areas concentrated along the ridges (Musconetcong Watershed Association, 2013).

Table 4.10 Musconetcong River Overview

Musconetcong River				
State(s)	New Jersey			
Designated	December 22, 2006			
Legal Foundation	<i>Designation:</i> P.L.109-452			
River Miles	<i>Wild</i> -	<i>Scenic</i> 3.5	<i>Recreational</i> 20.7	<i>Total</i> 24.2
Watershed Area	157.6 mi ² (100,864 acres)			
Municipal Population Est.	164,048			
Outstanding Resource Values	Scenic, Recreational, Fish, Historic, Cultural, Geological			
Management Committee	Musconetcong River Management Council			
Municipal Level	Allamuchy, Bethlehem, Bloomsbury, Byram, Franklin, Greenwich, Hackettstown, Hampton, Independence, Lebanon, Mansfield, Mount Olive, Washington (Morris), Washington (Warren)			
County Level	Morris County, Warren County, Hunterdon County, Sussex County			
State Level	NJ Department of Environmental Protection (Divisions of Watershed Management, Fish and Wildlife, Parks, and Forestry)			
Federal Level	National Park Service			
Other Partners	Musconetcong Watershed Association (MWA), Heritage Conservancy, NJ State Council Trout Unlimited			
Funding Request FY2017	\$400,000			

Sudbury, Assabet, and Concord Rivers: Local and state interest in a national Wild and Scenic River study was originally precipitated in the mid-1980s, by proposals to reactivate the Sudbury Reservoir, upstream of the Sudbury River study segment, in order to supply water to the Boston metropolitan area. In the late 1980s, an informal study group was organized which included the Sudbury Valley Trustees (SVT), the Organization for the Assabet River (OAR), and other local interests (Rivers Program, 1996). The group requested technical assistance from the NPS to evaluate the potential for a Wild and Scenic study of certain portions of the rivers. The resulting study area encompassed three contiguous segments along the Sudbury, Assabet, and Concord rivers (SuAsCo). The Sudbury, Assabet and Concord Wild and Scenic River Study Act (P.L. 101-628) was authorized by Congress in 1990, and

directed the NPS to study the 29-mile segment of the three rivers in eastern Massachusetts. The Study Act also authorized the establishment of a federal advisory committee, the SuAsCo Study Committee, to work with the NPS in conducting the study and determining whether the rivers were suitable for designation (SuAsCo Wild and Scenic Study Committee et al., 1995). The completed study and consensus building within the communities bordering the rivers ultimately resulted in the federal designation of the SuAsCo rivers in 1999 (P.L. 106-20).

Twenty-nine miles of the Sudbury, Assabet, and Concord rivers in eastern Massachusetts are included in the National System: 16.6 miles of the Sudbury River, 4.4 miles of the Assabet River, and 8 miles of the Concord River. The designated area includes eight municipalities in Middlesex Massachusetts, extending from Framingham northward to Billerica along the Concord River and its tributaries, the Sudbury and Assabet rivers.

Ten of the river miles along the Sudbury and Concord rivers lie within the boundaries of Great Meadows National Wildlife Refuge (SuAsCo Wild and Scenic Study Committee et al., 1995). Residential uses dominate the towns or portions of towns in the watershed. The rivers are situated about 20 to 30 miles west of Boston and Framingham is the most urban town within the watershed. Wayland, Sudbury, Lincoln, and Carlisle are rural in many areas and are among the wealthiest communities in the county. Land uses in Bedford and Billerica range from small farms to high tech industry. Intensive development along many stream segments has been limited due to extensive wetlands and floodplains, and strong state and local wetlands protection and zoning laws.

Table 4.11 Sudbury, Assabet, and Concord Rivers Overview

Sudbury, Assabet, Concord Rivers				
State(s)	Massachusetts			
Designated	April 9, 1999			
Legal Foundation	<i>Study Act:</i> P.L. 101-628		<i>Designation:</i> P.L.106-20	
River Miles	<i>Wild</i> -	<i>Scenic</i> 14.9	<i>Recreational</i> 14.1	<i>Total</i> 29
Watershed Area	Sudbury (162mi ²); Assabet (177mi ²); Concord (59mi ²) Total: 405 mi ² (259,200 acres)			
Watershed Population	Sudbury (180,000); Assabet (170,000); Concord (110,000) Total: 460,000			
Outstanding Resource Values	Recreational, Fish			
Management Committee	Sudbury, Assabet, Concord Rivers Stewardship Council			
Municipal Level	Bedford, Billerica, Carlisle, Concord, Framingham, Lincoln, Sudbury, Wayland			
County Level	Middlesex County, Worcester County			
State Level	Commonwealth of Massachusetts			
Federal Level	National Park Service, Fish and Wildlife Service			
Other Partners	OARS (Organization for the Assabet River), Sudbury Valley of Trustees, SuAsCo Watershed Community Council			
Funding Request FY2017	\$200,000			

Taunton River: The Taunton Wild and Scenic River designation was the result of the culmination of over seventeen years of local planning, stewardship, and advocacy efforts from local citizens, and the Southeastern Regional Planning and Economic Development District, a group that eventually evolved to become Taunton River Watershed Alliance. In the mid-1990s, the Taunton River Stewardship Program (TRSP), an alliance of conservation agents and planners, was formally organized after months of meetings. The TRSP played a pivotal role in developing legislation to undertake a study of the Taunton River for federal designation. In October of 2000, President Clinton signed P.L. 106-318 into law, authorizing funding to undertake the Taunton River Wild and Scenic River Study, and in 2002, the study area was subsequently extended to include all of the Lower Taunton River (Taunton Wild &

Scenic River Study Committee et al., 2005). After five years of study for possible inclusion, in 2009, P.L. 111-11 designated the main stem of the Taunton River from its headwaters at the confluence of the Town and Matfield Rivers downstream 40 miles to the confluence with the Quequechan River.

The total length of the Taunton River is 37 miles and the watershed is situated in southeastern Massachusetts, mainly in Bristol County and western Plymouth County, with some portions extending into southern Norfolk County. The river drops only 20 feet in elevation over its entire course and is the longest undammed coastal river in New England (Taunton Wild and Scenic River Study Committee et al., 2005). It is also the largest freshwater contributor to the Narragansett Bay estuary in Rhode Island, part of the National Estuary Program. The landscape of the watershed is a result of the glacial deposition as shown in flat outwash plains, numerous wetland and kettle ponds. The Taunton River travels through 10 communities and is tidal for 18 miles from Hope Bay, with saltwater intrusion ending at about the Dighton-Taunton line, 12 miles from the mouth (Taunton Wild and Scenic River Study Committee et al., 2005).

Table 4.12 Taunton River Overview

Taunton River				
State(s)	Massachusetts			
Designated	March 30, 2009			
Legal Foundation	<i>Study Act:</i> P.L.106-318		<i>Designation:</i> P.L.111-11	
River Miles	<i>Wild</i> -	<i>Scenic</i> 26	<i>Recreational</i> 14	<i>Total</i> 40
Watershed Area	562 mi ² (359,680 acres)			
Municipal Population Est.	255,843			
Outstanding Resource Values	Wildlife, Fish, History, Other (Agriculture, Ecology, Estuary)			
Management Committee	Taunton River Stewardship Council			
Municipal Level	Bridgewater, Halifax, Middleborough, Raynham, Taunton, Berkley, Freetown, Dighton, Somerset, Fall River			
State Level	Commonwealth of Massachusetts			
Federal Level	National Park Service			
Other Partners	Southeastern Regional Planning and Economic Development District, Wildlands Trust of Southeastern Massachusetts, Natural Resources Trust of Bridgewater, Taunton River Watershed Alliance, Save the Bay, The Nature Conservancy, The Council Oak Wampanoags,			
Funding Request FY2017	\$200,000			

Wekiva River: The Wekiva River Protection Act, adopted by the Florida legislature in 1988, was an initial step toward achieving comprehensive protection of the Wekiva River System. The legislation required that three counties within the Wekiva Basin adopt comprehensive plan policies and land development regulations (National Park Service, 2011). In 1996, Congress passed Public Law 104-311, which authorized the study of the Wekiva River and certain tributaries as potential additions to the National Wild and Scenic Rivers System. The Wekiva River Study was completed and published in 1999 and the following year, the Wekiva River along with Rock Springs Run, Wekiva Springs Run, and Black Water Creek achieved federal designation by act of the U.S. Congress on October 13, 2000 (Wekiva River System

Advisory Management Committee, 2012). An Environmental Assessment was completed in 2011 and the Comprehensive Management Plan was completed in 2012.

The Wekiva River System is located in northern central Florida, and encompasses the federally designated river segments including the Wekiva River, Rock Springs Run, Wekiva Springs Run, and Black Water Creek. There are two separate boundaries that influence hydrology of the river system. First, the Wekiva basin encompasses the entire surface water drainage basin and is approximately 242 square miles (130 square miles of watershed in north Orange County and northwest Seminole county, and 112 square miles of watershed in Lake County). Second, the Wekiva springshed is the aquifer recharge-capture area, where surface water percolates and travels through undergrad strata to eventually emerge at the springs. There are currently 31 named springs within the Wekiva basin; Six of these feed directly or indirectly into the Wekiva River, four feed into Rock Springs Run, five feed into the Little Wekiva River and sixteen feed into the Black Water Creek and Seminole Creek drainage basin (Wekiva River System Advisory Management Committee, 2012). Much of the land adjacent to the Wekiva River System is in public ownership by the state of Florida, St. Johns River Water Management District, or Lake County Water Authority with smaller public recreational parks owned by various local governments. Private lands within the Wekiva basin and springshed include a mix of residential, commercial, and agricultural properties, mostly within Seminole and Lake counties (Wekiva River System Advisory Management Committee, 2012). All counties in the basin have experienced considerable population growth and urban expansion in recent decades, and at present over two million people reside within 30 miles of the Wekiva River System.

Table 4.13 Wekiva River Overview

Wekiva River				
State(s)	Florida			
Designated	October 13, 2000			
Legal Foundation	<i>Study Act:</i> P.L.104-311		<i>Designation:</i> P.L.106-299	
River Miles	<i>Wild</i> 31.4	<i>Scenic</i> 2.1	<i>Recreational</i> 8.1	<i>Total</i> 41.6
Watershed Area	Wekiva Basin: 242 mi ² (154,880 acres)			
County Population Est.	1,790,898			
Outstanding Resource Values	Scenic, Recreation, Geology, Fish, Wildlife			
Management Committee	Wekiva River System Advisory Management Committee			
Municipal Level	Altamonte Springs, Longwood, Apopka			
County Level	Seminole County, Orange County, Lake County			
State Level	Florida Department of Agriculture and Consumer Services, Florida Department of Environmental Protection			
Federal Level	National Park Service			
Other Partners	The Nature Conservancy, Florida Fish and Wildlife Conservation Commission, St. Johns River Water Management District, Lake County Water Authority, Friends of the Wekiva River Inc. (FOWR Inc.), Audubon of Florida, East Central Florida Regional Planning Council			
Funding Request FY2017	\$150,000			

Westfield River: Protection of the Westfield River dates back to a conventional grassroots effort for river conservation in 1984. Promulgated by the Pioneer Valley Planning Commission and the Westfield River Watershed Association, the formation of the Westfield River Advisory Committee was the first step in the planning process (National Park Service, 1993). In 1986 the Draft Westfield Greenway Plan was released to the public, and after a comment period, a revised plan was completed in 1988. One of the recommended management goals of the 1988 plan was to seek Wild and Scenic River designation (National Park Service, 1993). In 1991, Governor William Weld of Massachusetts petitioned the Secretary of the Interior to designate three branches of the Westfield River under Section 2(a)(ii) of the Wild and Scenic Rivers Act (National Park Service, 1993). In November 1993, 43

miles across the East, Middle, and West branches were designated under the Wild and Scenic River system, making the Westfield River the first with that designation in the state of Massachusetts. In 2001, an additional 35 miles were added to the designation (Pioneer Valley Planning Commission, 2006). In total, the designation encompasses over 78 miles of the Westfield River's three major tributaries and headwater streams (Wild & Scenic Westfield River Committee, n.d.).

The Westfield River watershed is approximately 48 miles long and 20 miles wide, extending from the Berkshire Mountains in the west, to the Connecticut River in the east (Pioneer Valley Planning Commission, 2006). The Westfield River is a major tributary to the Connecticut River and made up of three branches: East, Middle, and West Branches. The Westfield watershed is considered an eco-regional priority within the Lower New England Northern Piedmont region, and has been classified as a recovered and recovering landscape after being nearly completely cleared in the early 1800s (Wild and Scenic Westfield River Committee, n.d.).

The Westfield basin is home to nearly 100,000 residents with a relatively low population density of 193 persons per square mile (Pioneer Valley Planning Commission, 2006). The Westfield River watershed is divided into distinctly rural and urban communities. Upper reaches are primarily rural communities, and communities in the lower basin (including, Westfield, Agawam, West Springfield, and Holyoke), are more urbanized (Pioneer Valley Planning Commission, 2006). Overall, the watershed has land use characterized by 7 percent agricultural, 12 percent developed and 82 percent undeveloped, with roughly 27 percent of all land permanently protected as open space (Wild and Scenic Westfield River Committee, n.d.).

Table 4.14 Westfield River Overview

Westfield River				
State(s)	Massachusetts			
Designated	(Secretarial Designation—November 2, 1993) (Secretarial Designation—October 29, 2004)			
Legal Foundation	WSRA Section 2(a)(ii)			
River Miles	<i>Wild</i> 2.6	<i>Scenic</i> 42.9	<i>Recreational</i> 32.6	<i>Total</i> 78.1
Watershed Area	517 mi ² (330,880 acres)			
Watershed Population Est.	100,000			
Outstanding Resource Values	Fish, Recreational, Other (Hydrologic)			
Management Committee	Westfield River Wild and Scenic Advisory Committee			
Municipal Level	Becket, Chester, Chesterfield, Cummington, Huntington, Middlefield, Savoy, Washington, Windsor, Worthington			
County Level	Berkshire County, Hampden County, Hampshire County, Franklin County			
State Level	Commonwealth of Massachusetts			
Federal Level	National Park Service			
Other Partners	Westfield River Watershed Association, The Trustees of Reservations, Pioneer Valley Planning Commission, Berkshire Regional Planning Commission, Westfield River Environmental Center, Westfield State University			
Funding Request FY2017	\$200,000			

White Clay Creek: Located in the Piedmont region of southeastern Pennsylvania and northwestern Delaware, stream waters flow southeastward, from the uplands region in the north, down to the Christina River. Flow conditions vary widely among drought, normal, and flood periods, though typically range between 30 to 100 cubic feet per second (cfs); normal rainfall in the area on average measures about 44 inches per year (White Clay Creek Wild and Scenic River Study Task Force, 2001). The White Clay Creek is a major drinking water source for 120,000 people in New Castle and Chester counties (Narvaez and Homsey, 2016). Urban, suburban, and rural uses characterize the watershed as a whole. Patterns such as residential, commercial, office, agricultural, institutional and other land use types make up White Clay Creek watershed (White Clay Creek Wild and Scenic River Study Task Force, 2001). The

Pennsylvania portion of the watershed is largely rural with a few small towns and suburban clusters, while the Delaware portion is characterized by rampant suburbanization associated with the City of Newark (White Clay Creek Wild and Scenic River Study Task Force, 2001).

Table 4.15 White Clay Creek Overview

White Clay Creek				
State(s)	Delaware and Pennsylvania			
Designated	October 24, 2000			
Legal Foundation	<i>Study Act:</i> P.L. 102-215	<i>Designation:</i> P.L. 106-357	<i>Revision:</i> P.L. 113-291	
River Miles	<i>Wild</i> -	<i>Scenic</i> 31.4	<i>Recreational</i> 167.6	<i>Total</i> 199
Watershed Area	108 mi ² (69,000 acres)			
Watershed Population Est.	124,000			
Outstanding Resource Values	Recreational, Other (Botanic)			
Management Committee	White Clay Creek Watershed Management Committee			
Municipal Level	Newark, Avondale, East Marlborough, Franklin, Kennett, London Britain, Londonderry, London Grove, New Garden, New London, Penn, West Grove, West Marlborough			
County Level	Chester County, New Castle County, Cecil County			
State Level	DNREC, PADEP, PADCNR			
Federal Level	National Park Service			
Other Partners	Delaware River Basin Commission, landowners, Brandywine Conservancy, Chester and New Castle County Conservation Districts, Delaware Nature Society, Friends of White Clay Creek Preserve, Friends of White Clay Creek State Park, Natural Lands Trust, Stroud Water Research Center, SUEZ, University of Delaware, White Clay Watershed Association			
Funding Request FY2017	\$200,000			

4.3 Organizational Structure and Membership

Across the 13 PWSRs, the National Park Service serves as the federal government agency responsible for administering the WSRA, providing legislative direction for designation of specific tributaries or river segments into the National System. The structure for administration of the PWSRs is based on the underlying principle that existing institutions and authorities provide the foundation for the long-term protection of the river (Farmington River Coordinating Committee, 2013). Administration of the designation and implementation of the Management Plan is accomplished through a broadly participatory assemblage with interchangeable nomenclature such as “Advisory Council” or “Coordinating/Management Committee” (hereafter referred to as “committee”) convened for each river specifically for this purpose. The specific names of the management committees for the Partnership Wild and Scenic Rivers are:

- Eightmile River Wild & Scenic Coordinating Committee
- Farmington River Coordinating Committee
- Great Egg Harbor River Council
- Lamprey River Advisory Committee
- Lower Delaware Management Committee
- Citizens United to Protect the Maurice River & Its Tributaries
- Upper Missisquoi & Trout Rivers Wild & Scenic Committee
- Musconetcong River Management Council
- Sudbury, Assabet, Concord Rivers Stewardship Council
- Taunton River Stewardship Council
- Wekiva River System Advisory Management Committee
- Westfield River Wild & Scenic Advisory Committee
- White Clay Creek Watershed Management Committee

The primary members within PWSR committees include a consortium of all government units including local municipalities, state, county, and the National Park Service. Members from NPS and state government include staff or personnel, and individuals appointed by city councils or boards of supervisors represent municipal governments. Some PWSRs work closely with other organizations including nonprofits, nongovernmental organizations, educational and research institutions, business and industry, private landowners and residents, as well as recreationists and historians.

Table 4.16 Examples of Partnership Wild and Scenic Committee Members

Entities	Committee Members
Federal	National Park Service
State	State Departments or Divisions: -Environmental Protection/Conservation -Food/Agriculture -Fish and Wildlife -Parks and Recreation
County	-Conservation Districts -Water Resource Authorities -Health Departments
Municipal/Local	-Villages -Townships -Boroughs -Cities -Landowners -Schools
Other Organizations	-Regional Authorities (e.g., DRBC) -Planning Commissions -Land Trusts -Universities and Research Institutions -Water Purveyors -Nonprofit organizations (e.g., The Nature Conservancy, Audubon, Watershed Associations) -Historians and Recreationalists (e.g., Trout Unlimited)

Table 4.16 typifies the common composition of committee members from various entities and organizations. Certain entities will constitute core-voting members, and others will be appointed to act as representatives and alternatives under certain conditions. Additional partner members may also be engaged but not be sitting committee members, and are considered non-voting and participatory.

This structure is aimed at binding diverse interests together under a common purpose and within a permanent and representative body, which carries forward the work of the management plan (Figure 4.3). No one entity can assume sole management responsibility or alone provides the necessary protection. Moreover, management decisions by any one entity are likely to affect a number of other interests, and this forum ensures communication among all parties and the equal representation of all viewpoints (Farmington River Coordinating Committee, 2013).



Figure 4.3 Schematic of Wild and Scenic River Committee Entities

4.4 Roles and Functions

River and watershed management responsibilities form a complex web of overlapping, sometimes conflicting jurisdictions and authorities involving municipal, county, state, and federal entities (White Clay Creek Wild and Scenic River Study Task Force, 2001). Roles and level of participation vary depending on the specific context, but in a general sense the responsibilities associated with managing and protecting river resources are shared among all the partners (local, state, federal, nongovernmental, and volunteers).

National Park Service Functions: As the federal administering agency, NPS is responsible for implementing the legislative mandates set by the WSRA. These requirements include (1) preparation of comprehensive river management plans under Section 3; (2) establishment of boundaries and river classification for all designated segments; (3) serving in a regulatory capacity under Section 7(a) and 10(a) by evaluating and approving or denying proposed federally assisted water resource projects that could affect designated segments ORVs; and (4) assisting, advising, and cooperating with states and other partners in the designation and management of rivers. The National Park Service does not have a direct visible management presence within the river corridor or watershed. Instead, these NPS responsibilities are generally coordinated with each river's council or committee through strategies developed with state/local governments and landowners (Marsh, 2014). Additional NPS responsibilities include the following:

- Technical review of Section 7(a) permits
- Develop appropriate resource management plans with other federal and state organizations
- Develop informational and promotional brochures about the river corridor/watershed
- Review local river management plans and prepare a report to Congress every two years
- Answer public inquiries
- Assist in educating the public
- Provide financial and technical assistance to the committee

Individual PWSR committees are supported by a National Park Service employee, who serves as coordinator and as liaison among the committee and the state and local organizations that participate in its activities. The NPS employee acts as staff to the Management Committee and may provide contact between the committee and the public, acting as a clearinghouse for distributing information and answering questions (White Clay Creek Wild and Scenic River Study Task Force, 2001).

Committee Functions: Committees have advisory roles only, and do not have regulatory or land acquisition authority. Committees may provide advice to entities that have management or regulatory authority affecting the river, but they do not have the power to dictate the actions or decisions they take. Committees do not have additional authority for the following reasons: (1) the major emphasis is on working with existing authorities (2) there is no need to create an additional layer of regulatory bureaucracy (3) since no federal land acquisition is proposed, there is no need for committees to be empowered to oversee an acquisition program and (4) committees are intended to complement and support the roles and activities of existing interests, not compete with them. General committee responsibilities and descriptions are listed in Table 4.17.

Table 4.17 Partnership Wild and Scenic River Committee Responsibilities

Responsibility	Description
Promote management plan implementation	Assists appropriate entities in understanding the purpose, intent, and implications of the plan, and actions.
Monitor activities that may affect the river/watershed	Evaluates specific proposals that could affect the segment and as it deems necessary, provide comments to appropriate authorities.
Stimulate public involvement, education, and outreach	Supports efforts of other entities in conducting watershed or river stewardship, education, and outreach; when resources permit it may initiate its own education projects.
Promote river/watershed enhancement initiatives	Upon consensus of members, may support river/watershed enhancement projects initiated by members or other organizations; the committee may initiate its own efforts.
Review and update the management plan	New statutes, regulations, programs, technological advances, and emerging concerns may warrant review and recommend changes to the CMP and submit to NPS.
Prepare periodic status reports	Committee briefs reports on the status of protection and the implementation of the management plan.

Limitations of Designation: The WSRA confers no authority to the National Park Service to manage, regulate, zone or otherwise restrict the use of nonfederal lands. Management and use of lands adjacent to the river remain the responsibility of landowners subject to existing state and local regulations. Designation of river segments does not result in any re-zoning of private land or change property rights. NPS does not support acquisition or condemnation of lands along the river. Federal funds may be made available to land trusts and local communities through designation for the purchase of lands or conservation easements that advance purposes for which the river was designated. Funds are only distributed in circumstances where (1) acquisition be from willing sellers only, (2) the acquisition is approved by local municipal authorities, and (3) an appropriate local, state or nonprofit entity holds title and management responsibility for any purchased lands or easements (Lamprey River Advisory Committee, 1995).

4.5 Procedural Processes

Procedural processes describe various element used by partnership to make policy decisions and typically include effective leadership, decision processes, and rules (Borisova et al., 2012).

Memorandum of Understanding: All partners enter into a Memorandum of Understanding (MoU), an intergovernmental compact used as a tool for organizational purposes. MoUs express convergence of will between parties, indicating an intended common line of action. These documents are most often used in cases where parties either do not imply a legal commitment, or in situations where the parties cannot create a legally enforceable agreement. In the PWSR context, the MoU is a multilateral agreement between the involved parties within the committee. It establishes the cooperative commitment among members to participate in the long-term management of the river, and to implement those parts of the management plan under their existing traditional jurisdiction or to which they have been assigned. Several of the standard components incorporated in MoUs are:

- List of parties involved
- Vision statement
- Issues to be addressed
- Commitment to support efforts
- Signatures of all partners
- Agreement to use plan as guide to decision-making
- Funding and timeframe
- How to address new partners

Bylaws: In addition to the Memorandum of Understanding, signed by each voting member acknowledging their endorsement of the provisions contained in the legislation designating the river, committees are governed by a set of bylaws enacted for all procedural issues. Bylaws provide details on guidance for conduct of business,

schedule of meetings, duties of chairs or other officers, membership appointments, formation of subcommittees, and quorum, among other matters.

Decision-making: Committees are designed to be democratically oriented (e.g., one person, one vote) and each voting member is entitled to vote on each issue or motion that requires a formal decision by the committee. Depending on the PWSR, committees have different compositions of elected chairs (e.g., Chair, Vice-Chair, Co-Chairs, Secretary, Treasurer). Committee members are encouraged to share views with other members, and the views from the committee during discussions generally constitute meeting minutes. Votes are conducted for election of officers, changes in bylaws, and on other matters as requested by any committee member. Members typically may abstain from voting on any issue that is, or may be perceived as, a conflict of interest. The preferred method of decision-making and actions is through consensus; when consensus cannot be reached, the decision usually falls to the elected Chair(s) of the committee.

4.6 Program Financing

Federal Assistance: The National Park Service develops a budget each February for the next fiscal year, which begins on October 1. The budget is published in the NPS Green Book, which defines agency goals and objectives and the funding necessary to accomplish them. The NPS budget is rolled up into the budget for the Department of the Interior, and then with the rest of the Executive Branch, is submitted to Congress for its review and approval. The National Park Service has funds available for Wild and Scenic River management. These funds are distributed annually on a competitive basis. A portion of the funds available are allotted to each NPS region and then disbursed to eligible rivers within each region based on need.

Congressional funding levels for particular rivers are therefore not static and subject to change. There are additional sources available to fund actions on a Wild and Scenic River although they may not be specifically allocated to this purpose. These funds are typically applied for on a case-by-case basis and may need matching monies to be awarded (Wekiva River System Advisory Management Committee, 2012).

There are also funds available for the Partnership Wild and Scenic River program including allocations for individual rivers and National partnership program coordination. Federal funds may be directed to hire staff, coordinate committee activities, undertake specific implementation projects, and to cover general operating expenses related to specific activities or responsibilities (Musconetcong River Management Council et al., 2011). Figure 4.4 graphically illustrates the total annual NPS funding appropriations for Partnership Wild and Scenic Rivers from FY 2001-2014; this data was obtained from the NPS Green Books (FY 2003-2016) and adjusted for inflation using the Bureau of Labor Statistics Consumer Price Index conversion for the base year 2015.

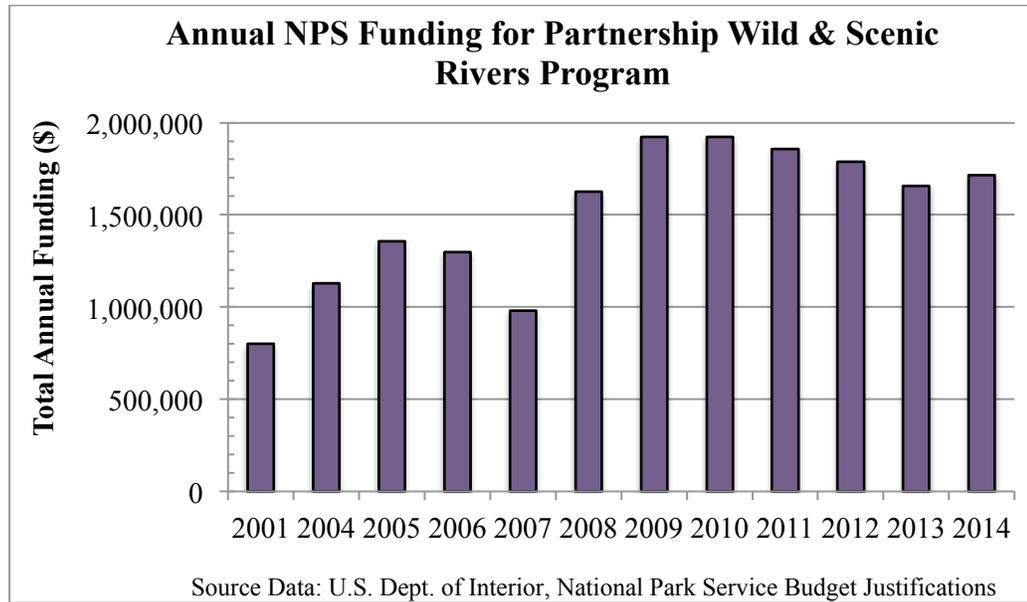


Figure 4.4 NPS Funding for Partnership Wild & Scenic Rivers (2001-2014)

In recent years, there has been some criticism over the program being underfunded and federal appropriation levels not keeping pace with the addition of new rivers to the system. There was a 24% drop in the program’s funding from 2006 to 2007 from \$1.3 million to \$980,000, respectively. From 2007 to 2008 a substantial increase in federal funding is evident; it could be surmised that this increase was related to the national political transition occurring at that time and associated congressional changes. 2008–2010 saw a slight increase in program funding but from 2011 onwards, there has been stagnation despite the newest PWSR, Upper Missisquoi and Trout Rivers, being added to the system in 2014. When broken down by individual rivers (Figure 4.5), there is some variation in federal appropriations. About half of the rivers received equal quantities of federal funding in FY 2014 (\$173,000) while others received substantially less funding (e.g., Taunton and Eightmile).

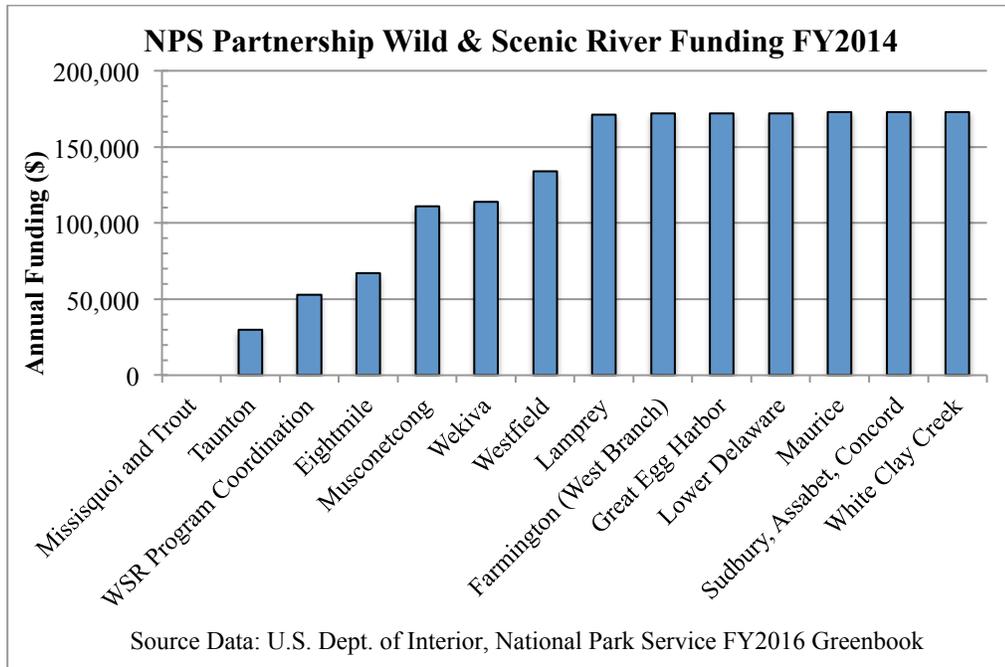


Figure 4.5 NPS Funding for Partnership Wild and Scenic Rivers (FY2014)

Leveraged Funds and In Kind Assistance: Securing necessary funding to implement the management plan is an important task of management committees. In order to implement the specific actions identified in the management plan, committees require both direct funding and in-kind assistance. In addition to federal dollars, and especially for long-term funding needs and for specific implementation projects, management committees may pursue financial assistance and in-kind contributions from individuals, foundations, corporations, and local, state, and non-NPS federal government sources. By leveraging funds from local, state, and other federal governments, as well as the private sector, a level of river management is attainable that would not be possible with NPS-only support (Wekiva River System Advisory Management Committee, 2012). In-kind assistance may include volunteer hours or the

donation of professional and other requisite services and resources. Leveraging this type of support is facilitated by general awareness of funding opportunities as well as individual committee members encouraging inclusion of important Wild and Scenic Rivers projects in the annual budgeting processes of their own organizations.

Chapter 5

PARTNERSHIP WILD AND SCENIC RIVER STUDY AREA: THE INTERSTATE WHITE CLAY CREEK WATERSHED

5.1 White Clay Creek as a Case Study

This chapter addresses the physical, societal, and political conditions of the watershed in order to provide context for this research. The White Clay Creek is one of only a few relatively intact, unspoiled, and ecologically functioning river systems remaining in the highly congested and developed corridor linking Philadelphia, Pennsylvania, with Newark, Delaware (Narvaez and Homsey, 2016). The White Clay watershed embodies a number of distinctive characteristics making it worthy of investigation as a Partnership Wild and Scenic River. It is a significant source of drinking water and recreation for local citizens. In 2014, the first obsolete dam removal in the State of Delaware was completed, restoring approximately 3.5 miles for domestic and anadromous fish passage on the creek. The water, natural resources, and ecosystems in the White Clay Creek watershed also contribute to an estimated economic value of \$55 million to \$500 million annually to the Delaware and Pennsylvania economies (Cruz-Oriz and Miller, 2014).

White Clay was the first entire watershed (rather than just a corridor or section of a river) designated into the National Wild and Scenic System. This “beyond-the-riverbank” approach takes into consideration the myriad of influences that affect river habitat and water quality (White Clay Creek Wild and Scenic Management Program, 2016). As a bi-state watershed, this approach to Wild and Scenic river management at

the watershed scale provides an alternative governance mechanism for addressing the complications of interstate management of water resources. While this chapter summarizes the White Clay Creek, its background, physical, and social elements, subsequent chapters will examine the institutional approach to coordinating water resource management for this Wild and Scenic River at the watershed scale and an interpretation of the corresponding implications.



Figure 5.1 White Clay Creek Watershed
Source: (White Clay Creek Wild and Scenic Management Program, 2016)

5.2 Background

Watershed History: A great deal of sediment from the rolling hills of Chester County, Pennsylvania, is eroded by water and other forces and is carried into the White Clay, likely accounting for the creek's name (White Clay Creek Wild and Scenic River Study Task Force, 2001). Various peoples have inhabited the White Clay Creek watershed for over 10,000 years. The Lenni Lenape or Delaware Indians were indigenous to the banks of White Clay Creek, where there were an abundance of resources to support village settlements. Between 1680-1705, land grants from the King of England were made to William Penn, who chartered the states of Delaware and Pennsylvania (White Clay Creek Wild and Scenic River Study Task Force, 2001). From the late 17th century and well into the 20th century, there were more than 70 grist and sawmills in operation that utilized waterpower (White Clay Creek Wild and Scenic River Study Task Force, 2001). Early mills were a major influence on watershed development, as roads were built to reach them and small towns grew around some of them (White Clay Creek Wild and Scenic River Study Task Force, 2001). Into the 19th and 20th centuries, and with the advent of the railroad, automobile, and major highways, settlement patterns began to change. Avondale, Landenberg and Newark emerged as important commercial and residential areas, while a considerable portion of the watershed remained rural.

Role of the White Clay Watershed Association: The White Clay Watershed Association formed in 1965 by a group of local citizens who had organized with the purpose of opposing plans to build a dam and reservoir on the White Clay Creek during that time. The dam was to have been constructed north of Newark, and the reservoir would have backed up into Pennsylvania, flooding a large portion of the

present White Clay Creek Park and Preserve in order to supply water for New Castle County.

Proposals for expanding surface water supply and reservoir construction were advocated for by water supply planners and especially the DuPont Company, a prominent corporation that had its operations based in the area. In the 1950s and 60s, DuPont purchased many of the adjacent lands to the creek in an effort to prevent residential development from interfering with plans to expand their industrial plants (White Clay Creek Wild and Scenic Management Program, 2016).

Local citizens who would have been displaced by the reservoir formed the majority of the growing opposition. In 1965 the group of people working to oppose the reservoir formally incorporated the organization as the White Clay Watershed Association, obtaining 501(C)(3) tax-exempt status (White Clay Creek Wild and Scenic Management Program, 2016). By the mid-1970s the efforts of local citizens and the White Clay Watershed Association were succeeding in thwarting the massive White Clay dam and reservoir construction, and garnering public opposition to the projects. Finally, in 1984, DuPont retreated and donated the accumulated streamside lands to the States of Delaware and Commonwealth of Pennsylvania to establish the White Clay Creek Preserve (White Clay Creek Wild and Scenic Management Program, 2016).

After the group's initial victory of preserving the free-flowing condition of the creek and the adjacent lands, the organization continued to strive for protection from development, and ultimately this history laid the groundwork for achieving the first watershed-wide Wild and Scenic designation. As of 2014, a total of 199 stream miles of White Clay Creek watershed and its tributaries are designated and afforded Wild

and Scenic protection. This includes the streams' riparian corridor area; The White Clay Creek Wild and Scenic Rivers System Act (P.L. 106-357) defines the lateral boundaries as 250 feet from the ordinary high-water mark on both sides of all segments designated by the act (Figure 5.2).

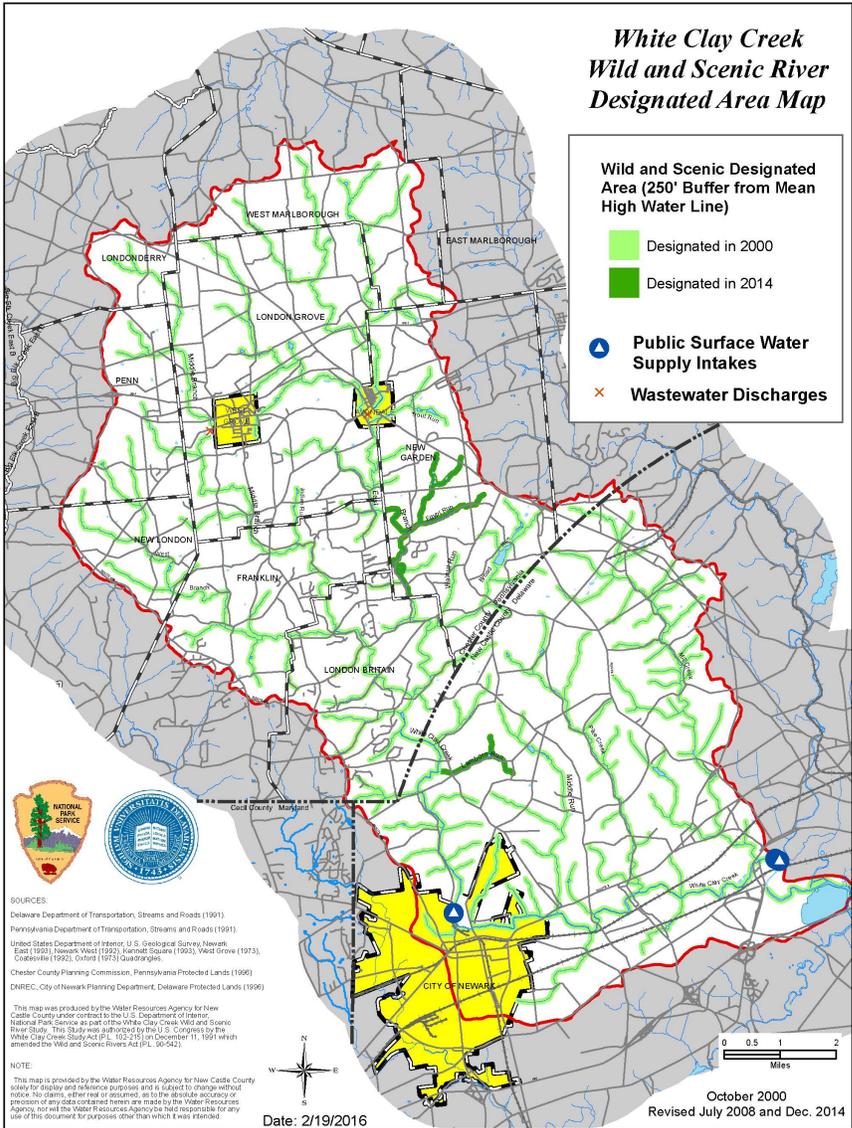


Figure 5.2 White Clay Creek Wild and Scenic River Designated Area

5.3 Geographic Context

The White Clay Creek drains roughly 108 square miles (69,000 acres) from southeastern Pennsylvania to northwestern Delaware, and is one of the four major watersheds in the 565 square mile Christina River Basin. Fifty-five percent of the watershed lies in Pennsylvania, while forty-five percent lies in Delaware (and less than 1 percent lies in Maryland). The watershed is perched along the geologically unique Fall Line, which separates the hilly, rocky Piedmont from the flat, sandy Coastal Plain province. For most of its course, the White Clay Creek runs through the rolling Piedmont region, dropping over the Fall Line to the Atlantic Coastal Plain near Newark before veering eastward to empty into the Christina River (White Clay Creek Wild and Scenic River Study Task Force, 2001). Lower portions of the White Clay Creek are under tidal influence. Generally, the stream waters flow southeastward, with the northern portion of the watershed in Chester County, PA (including the East, Middle, and West Branches of the White Clay Creek) meandering towards New Castle County, DE (where the creek is joined by Middle Run, Pike and Mill Creeks) before ultimately flowing into the Christina River. The primary White Clay subwatersheds and their drainage areas are defined in Table 5.1.

Table 5.1 White Clay Creek Watershed Area by Subwatershed

Stream	Drainage Area (mi²)
East Branch White Clay Creek	33
Middle Branch White Clay Creek	16
West Branch White Clay Creek	10
Main Stem White Clay Creek	25
Middle Run	4
Pike Creek	7
Mill Creek	13
Total Area	108

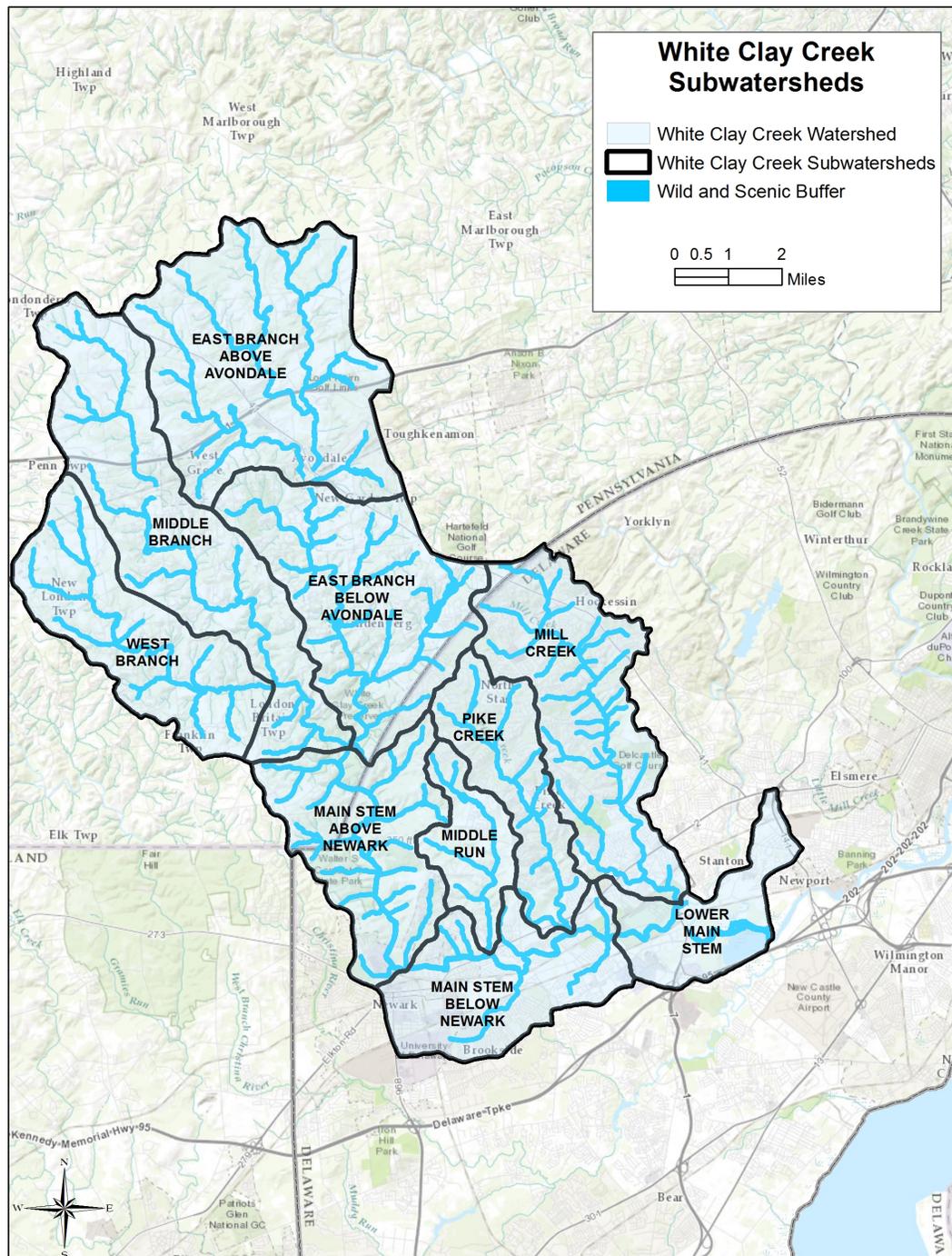


Figure 5.3 White Clay Creek Subwatersheds

5.4 Hydrology, Water Supply, and Use

The climate of the White Clay Creek watershed is temperate with moderately cold winters and hot humid summers. Mean annual temperatures are about 54 degrees Fahrenheit and normal precipitation in the area on average measures about 44 inches per year (White Clay Creek Wild and Scenic River Study Task Force, 2001). Annual precipitation can however vary greatly from one year to another. The twenty-year period between 1994-2014 exhibits a total annual low of 27.76 and total annual high of 56.75 inches in 1997 and 2004, respectively from data measured at the Wilmington Airport in Delaware (Figure 5.4). Precipitation measured by a 5-year moving average has remained relatively constant, with a slight increase over the last decade.

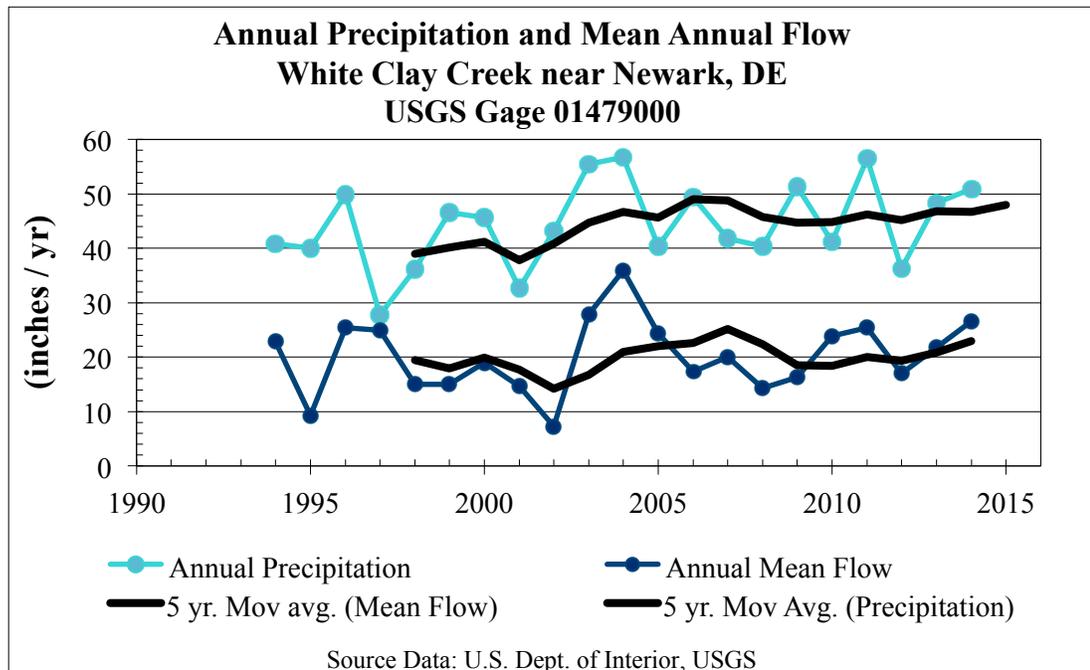


Figure 5.4 White Clay Creek Annual Precipitation and Mean Annual Flow

Flow conditions of the creek can vary widely among drought, normal, and flood periods. The mean annual flow of the White Clay Creek near Newark fluctuates based on precipitation, and averages 133 cubic feet per second (cfs), which is about half of the average annual precipitation (Figure 5.4). Peak and minimum daily flows for this same stream gage are depicted in Figure 5.5.

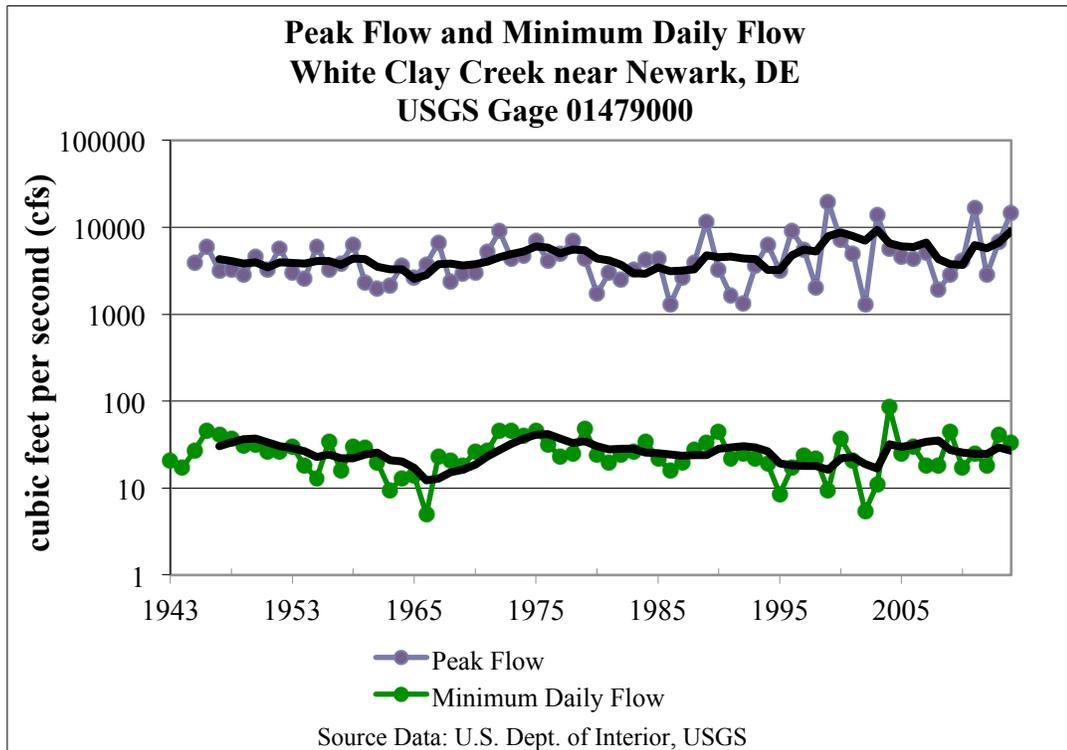


Figure 5.5 Daily Flows at the White Clay Creek near Newark, DE (1943-2015)

The watershed is often affected by seasonal severe weather including winter and spring nor'easters that can drop heavy snow or rain, autumn tropical systems that cause flooding, high winds, and heavy rainfall, and spring and summer severe thunderstorms (Office of the Delaware State Climatologist, nd). Data compiled from

the USGS stream gage, White Clay Creek near Newark, Delaware (01479000), signifies that some of the highest storms of record and flooding events have occurred in the last 25 years (Table 5.2). The highest storm of record was Hurricane Floyd on September 16, 1999 with a top peak flow of 19,500 cubic feet per second (cfs).

Table 5.2 Largest Storms in the White Clay Creek Watershed

White Clay Creek near Newark, Delaware (USGS Gage 01479000)			
Date	Storm	Peak Flows (cfs)	Return Interval
7/22/72	Agnes	9,080	25-yr
7/05/89	4 th of July	11,600	>25-yr
1/19/96	Unnamed	9,150	25-yr
9/16/99	Floyd	19,500	>200-yr
9/15/03	Henri	13,900	>50-yr
8/28/11	Irene	16,700	>100-yr
10/29/12	Sandy	6,740	
5/01/14	Unnamed	14,600	<100-yr

Source Data: (U.S. Dept. of Interior, USGS)

Another major influence on the flow of the creek and its aquatic species is the presence of dams. In Delaware, currently there are 5 low head dams along 13 miles of the White Clay Creek between tidewater and up into the Piedmont. Former Dam No. 1 was a 100 feet long, 3 to 8 feet high crumbling low head rock fill, timber, and concrete cap structure constructed circa 1750 that pooled water for a long-defunct diversion raceway for a mill that once stood about a mile downstream at the Hale Byrnes House (Kauffman, 2011). This obsolete dam was removed in December 2014, with the purpose of restoring fish passage, and connecting 3.5 miles of the White Clay Creek to the tidal Christina and Delaware Rivers. In addition to the dams in Delaware, the PADEP regulates several additional dams, and the National Inventory of Dams

identified five dams along the White Clay Creek (Corrozi et al., 2008). The major dams along the White Clay Creek in Delaware are:

- No. 1 (Delaware Park), removed: 4.3 miles above mouth
- No. 2 (Red Mill Road): 7.6 miles above mouth
- No. 3 (Old Paper Mill Road): 9.5 miles above mouth
- No. 4 (Route 72 Paper Mill Road): 10.1 miles above mouth
- No. 5 (Newark Water Intake): 11.1 miles above mouth
- No. 6 (Creek Road), removed: 11.6 miles above mouth
- No. 7 (Deerfield Golf Course): 12.7 miles above mouth

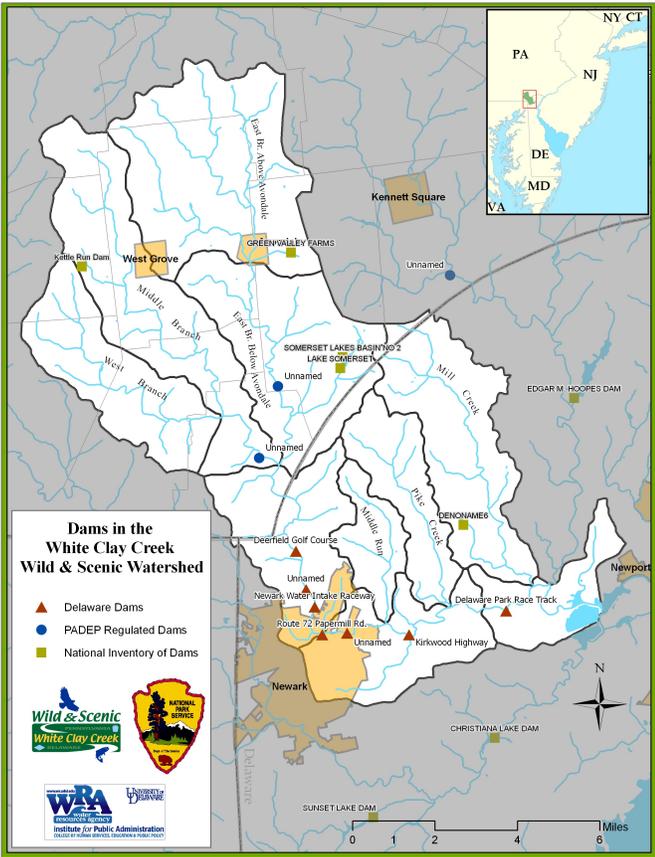


Figure 5.6 Dams in the White Clay Creek Watershed
 Source: University of Delaware Water Resources Agency

Public Water Supply Systems: Public drinking water supplies epitomize a precious natural resource in the watershed. Surface water and groundwater aquifers in the watershed provide drinking water to over 120,000 people in Chester and New Castle counties in Pennsylvania and Delaware. The Creek itself serves as a major drinking water source for much of northern Delaware, accounting for 33 million gallons per day (mgd) of the overall production of water supply from the watershed (Corrozi et al., 2008). Major water purveyors in the watershed are the City of Newark, Artesian Water Company and SUEZ Delaware (formerly United Water Delaware).

Today, the City of Newark provides water to about 33,000 people through about 9,000 service connections with 23 square mile service area (University of Delaware, 2002). Newark meets its customer's daily water demands, which average about 4 million gallons a day, by withdrawing water from two sources - surface water from the White Clay Creek and ground water from wells located near the southern and northern ends of the town (University of Delaware, 2002). The City of Newark also operates the 317 million gallon Newark Reservoir that provides backup storage for the White Clay Creek water treatment plant.

The City of Newark has established interconnections with the water distribution systems with SUEZ Delaware and Artesian. Newark purchases water through its interconnections with SUEZ Delaware everyday to supplement its water supply. Newark's interconnection with Artesian is used only in emergencies and is capable of moving water to or from Artesian. Artesian Water Company operates six wells that provide up to 1.9 mgd in the Cockeysville Marble Formation near Hockessin, Delaware (Corrozi et al., 2008). The marble layer supports a high-yielding aquifer, which also supplies continuous and relatively high base flows in the stream.

There are no surface-water intakes for public water supply in the Chester County portion of the White Clay watershed.

5.5 Demographics and Land Cover

Both population density and land cover are not uniformly distributed across the watershed. The White Clay Creek watershed is located in close proximity to major Mid-Atlantic metropolitan areas including Philadelphia, and Washington D.C. The watershed encompasses a portion of the City of Newark, Delaware (population 31,454) and it neighbors Wilmington, Delaware (population 71,500). According to the 2010 decennial census, approximately 124,000 people actually live in the watershed. Over the past 40 years, the population of the watershed has nearly doubled, from approximately 65,000 in 1970. Population distribution of the 124,000 watershed residents is not the same across the subwatersheds (Table 5.7). The lower reaches of White Clay that extend into Delaware and below Newark (Pike Creek, Mill Creek and Main Stem) tend to be more urbanized, and therefore more densely populated. Historically, these areas have tended to experience burgeoning population growth. However, the more rural and agricultural areas in Pennsylvania (East, West, and Middle branches), which though comparatively less dense, are still experiencing population growth and are expected to continue to grow in future decades.

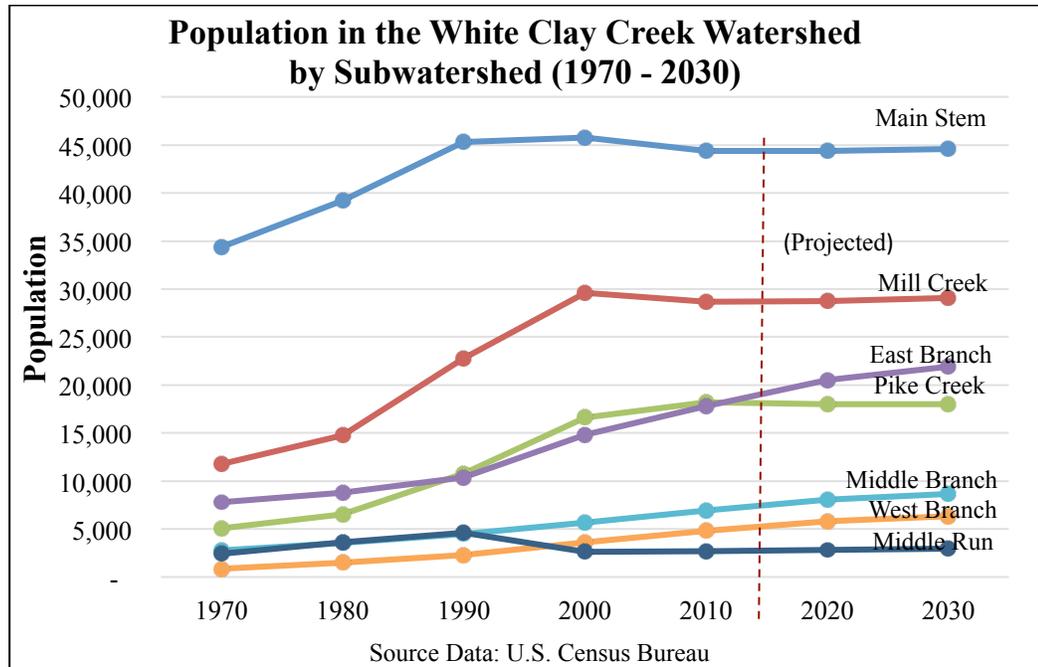


Figure 5.7 White Clay Creek Watershed Population by Subwatershed

Source: (Narvaez and Homsey, 2016)

Rivers and streams are strongly affected by existing land uses in the watersheds that support them. A sweeping range of uses from urban through suburban to rural characterizes the watershed as a whole; patterns include residential, commercial, office, industrial, institutional, agricultural, utilities and others. The White Clay Creek watershed is fairly evenly composed of three major land cover types: developed land (37%), agriculture (33%), and natural areas (forests and wetlands, 30%) (Figure 5.8) While there haven't been dramatic changes to land use over time, there has been an overall trend towards urbanization. Figure 5.10, produced by the UD WRA, summarizes the land cover acreage by subwatershed in the White Clay Creek in 2010.

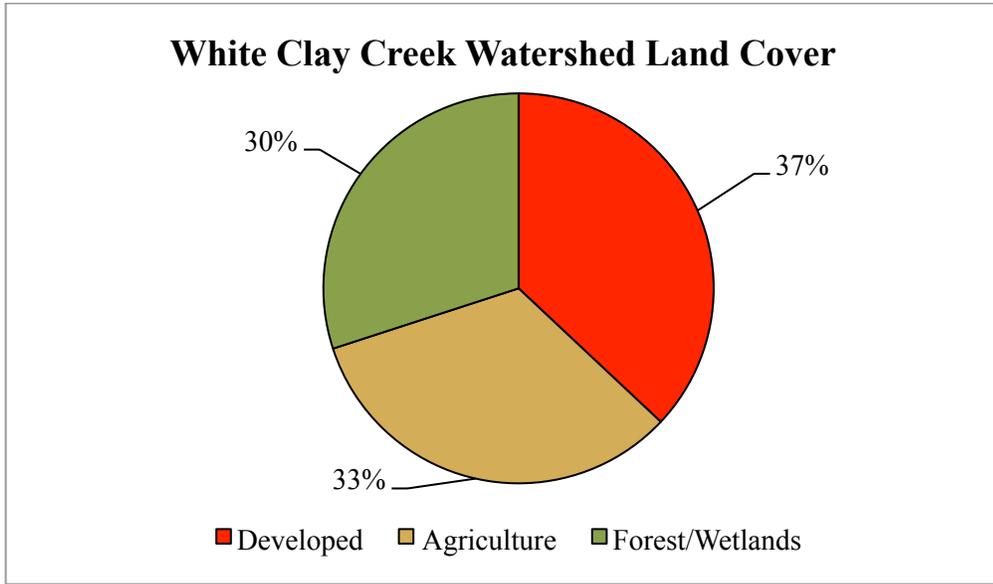


Figure 5.8 White Clay Creek Watershed Percentage of Land Cover Types
Source Data: NOAA

Table 5.3 White Clay Creek Land Cover Type

Subwatershed	Developed (mi ²)	Agriculture (mi ²)	Forest/Wetland (mi ²)	Other (mi ²)	Total (mi ²)
West Branch	2.2	5.0	2.9	0.01	10.11
Middle Branch	3.4	8.0	4.4	0.01	15.81
East Branch Above Avondale	3.5	11.0	4.2	0.03	18.73
East Branch Below Avondale	4.8	4.8	4.7	0.05	14.35
Mill Creek	8.3	1.5	3.2	0.03	13.03
Pike Creek	4.1	0.7	1.9	0.00	6.7
Middle Run	0.9	1.5	1.4	0.01	3.81
Main Stem Above Newark	2.0	2.1	6.0	0.01	10.11
Main Stem Below Newark	6.9	0.8	1.3	0.02	9.02
Lower Main Stem	3.3	0.2	1.7	0.26	5.46
Total	39.3	35.7	31.8	0.2	107
Percent	37%	33%	30%	0%	100%

Source Data: NOAA

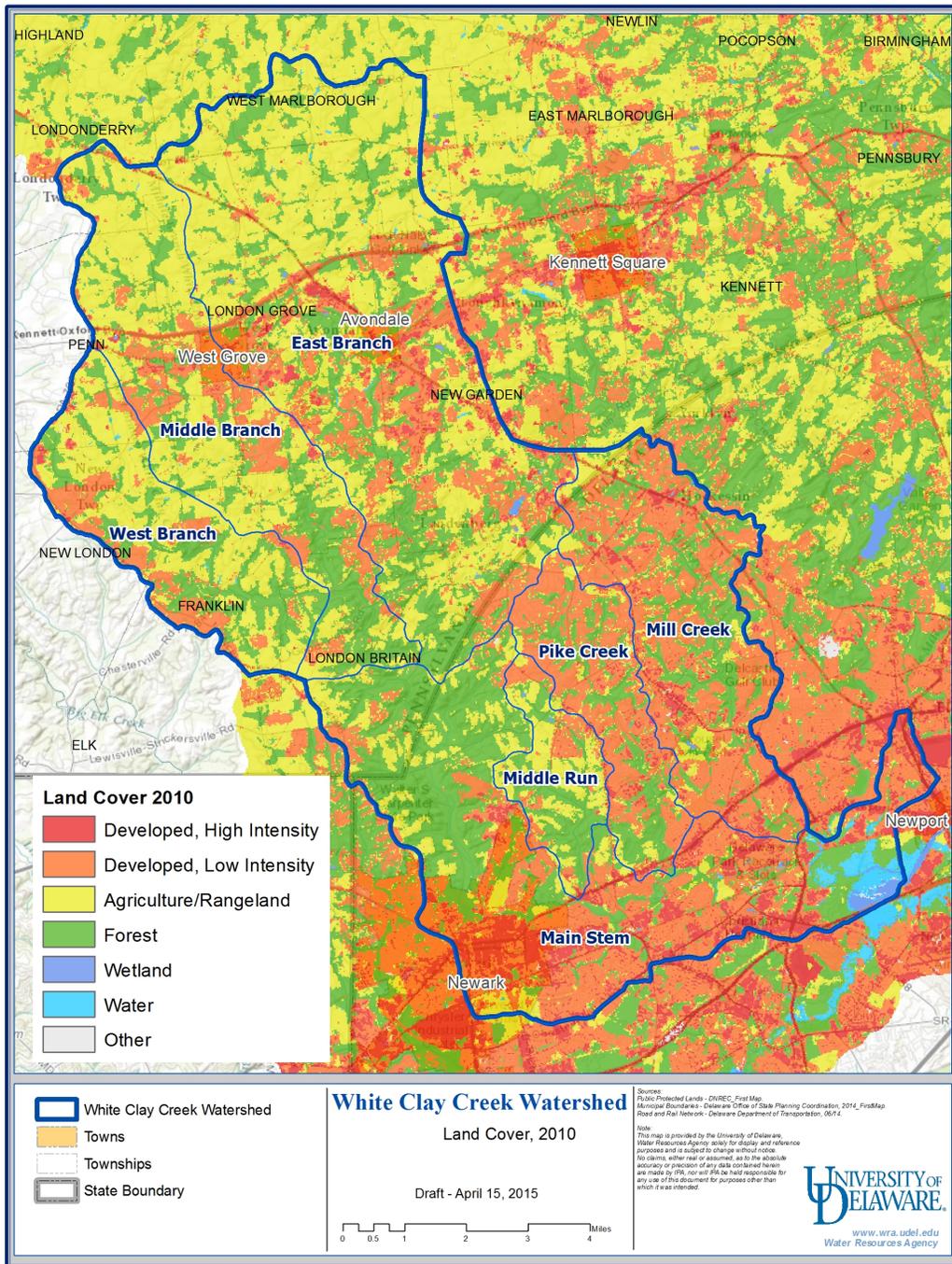


Figure 5.9 White Clay Creek Watershed Land Cover (2010)

Source: University of Delaware Water Resources Agency

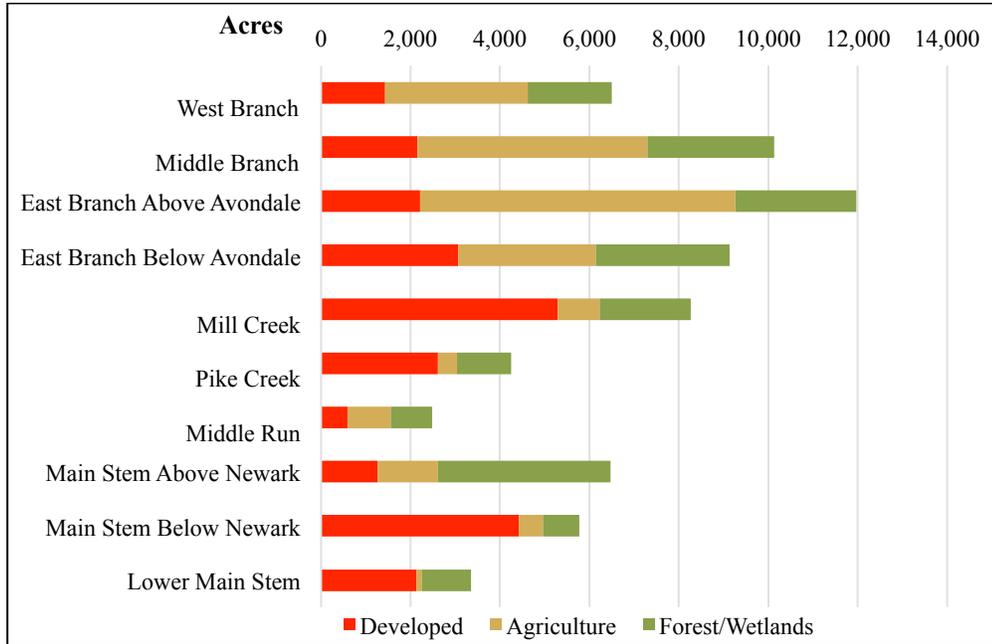


Figure 5.10 Land Cover Acreage by Subwatershed in the White Clay Creek
 Source: University of Delaware Water Resources Agency

5.6 Water Quality

This section examines water quality via time series trend analysis for seven water quality parameters to temporally characterize changing water quality at three monitoring locations along the White Clay Creek in Delaware over the last two decades. The many partners and members of the program who work within the watershed all in some way play a role in changing patterns.

The data was provided by the Delaware DNREC Watershed Assessment Section at STORET long-term monitoring stations along the White Clay Creek from three locations in Delaware: Chambers Rock Road, Delaware Park Boulevard (USGS gage 014790000), and McKees Lane (Figure 5.11). The following parameters were selected for this analysis: dissolved oxygen (DO), phosphorus (total phosphorus and

orthophosphate), nitrogen (total nitrogen and inorganic nitrogen), total suspended solids, and bacteria. The trend analysis begins for most of the parameters in 1995, five years prior to the Wild and Scenic designation, and extends through 2014. For each monitoring station, and within each water quality variable, available data was plotted as annual medians along with the existing water quality standard for that parameter. The Delaware Department of Natural Resources and Environmental Control (DNREC), Delaware River Basin Commission (DRBC), and Pennsylvania Department of Environmental Protection (PADEP), have established formal water quality goals for their respective portions of White Clay Creek (White Clay Creek Wild and Scenic River Study Task Force et al., 2001).

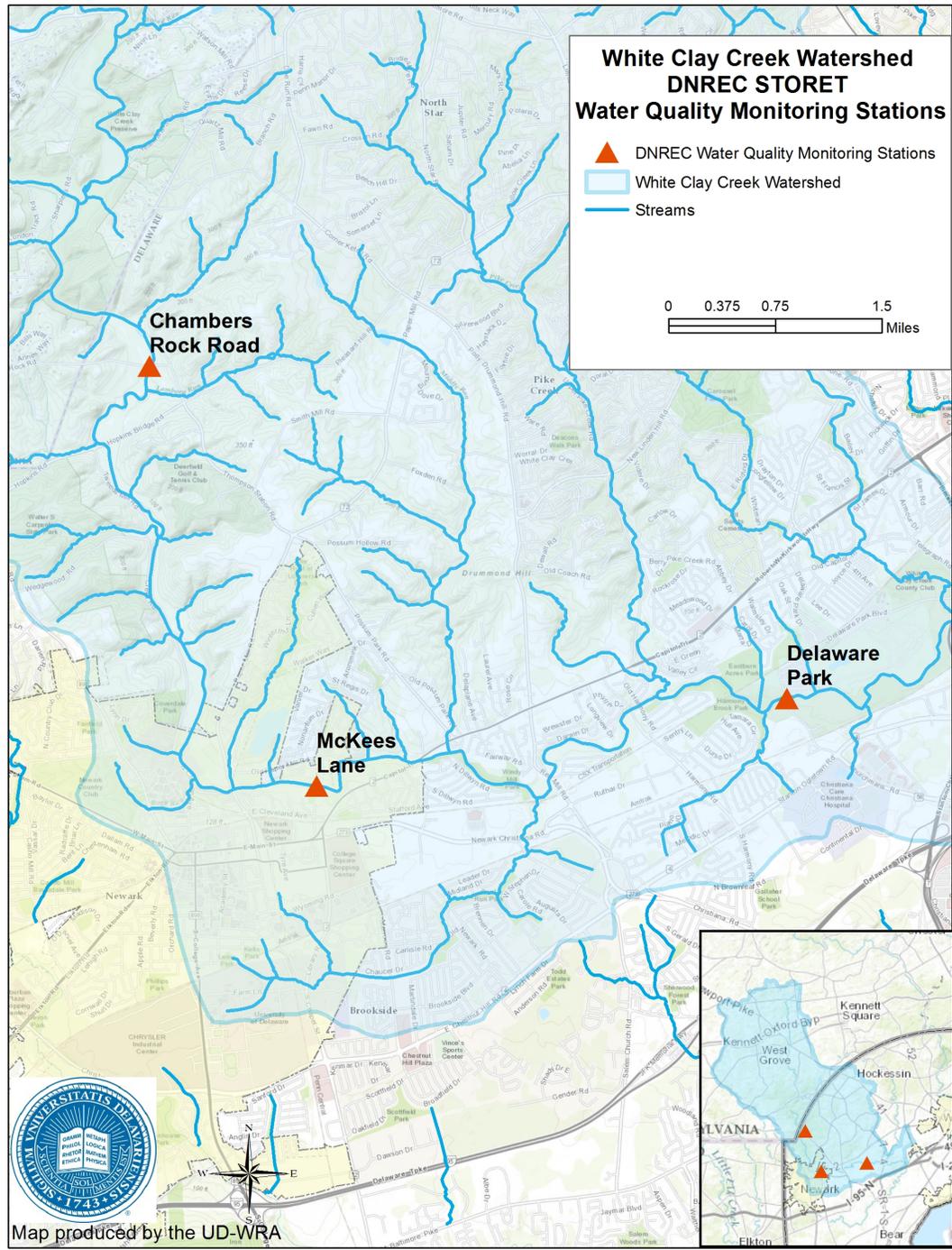


Figure 5.11 White Clay Creek DNREC Water Quality Monitoring Stations

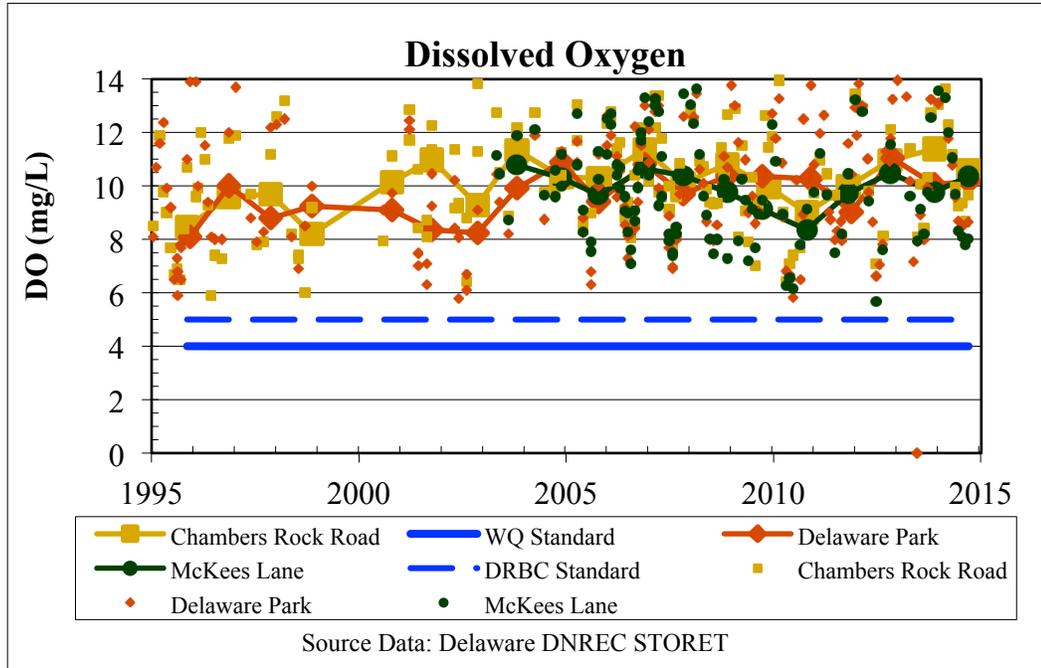


Figure 5.12 Dissolved Oxygen along White Clay Creek in Delaware (1995-2014)

Dissolved Oxygen: Dissolved oxygen is a water quality parameter that has not been an issue for the White Clay Creek at these three locations, and has either remained unchanged or shown improvement over the period of record. Dissolved oxygen concentrations, reported in units of milligrams per liter (mg/L), for all stations sampled, constantly exceed minimum standards set forth by the state of Delaware (4 mg/L) and the Delaware River Basin Commission (5 mg/L).

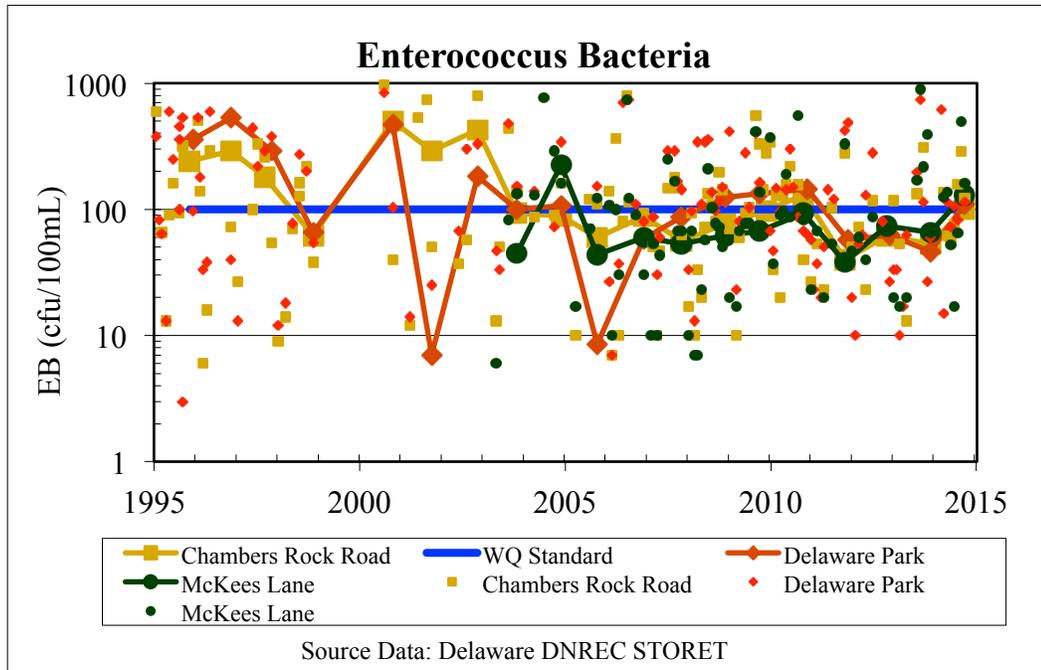


Figure 5.13 Enterococcus along White Clay Creek in Delaware (1995-2014)

Bacteria: In the White Clay, bacteria data is measured differently across state lines. In Delaware, data is collected for enterococcus, while in Pennsylvania fecal coliform and *E. coli* are the pathogens being monitored. In the Delaware section of White Clay, enterococcus bacteria levels (expressed as a geometric mean) have shown an overall decline from 1995 through 2014. Since 2000, values were mostly below the Delaware long-term water quality standard of 100 colony-forming units per 100mL (cfu/100mL). Instantaneous measurements are also displayed, and can be referenced against the instantaneous Delaware bacteria standard of 185 cfu/100mL, in order to determine the number of times in a year the standard is exceeded. Over the period of 1995 to 2014 there is no clear trend in the proportion of the number of exceedances to total number sampled (White Clay Creek Wild and Scenic Steering Committee, 2015).

Beginning in 2012, the White Clay Wild and Scenic Program partnered with the Pennsylvania Department of Environmental Protection to initiate a bacteria sampling program in the Pennsylvania portion of the watershed. From 2012-2014, water samples were collected during the recreational season at up to 14 sites to test for both fecal coliform and E. coli; E coli sampling continued in 2015. The data collected indicated elevated pathogen levels much higher than the recreational water quality standard (126cfu/100ml). The findings of that assessment resulted in the addition of 67 miles of bacteria impairments on the Pennsylvania impaired streams list (White Clay Creek Wild and Scenic Steering Committee, 2015). To address these impairments, future goals of the WCCWSP include increasing funding sources to strengthen bacteria collection and sampling analysis, and adding a microbial source-tracking component to this research to find out where the sources of bacteria are located.

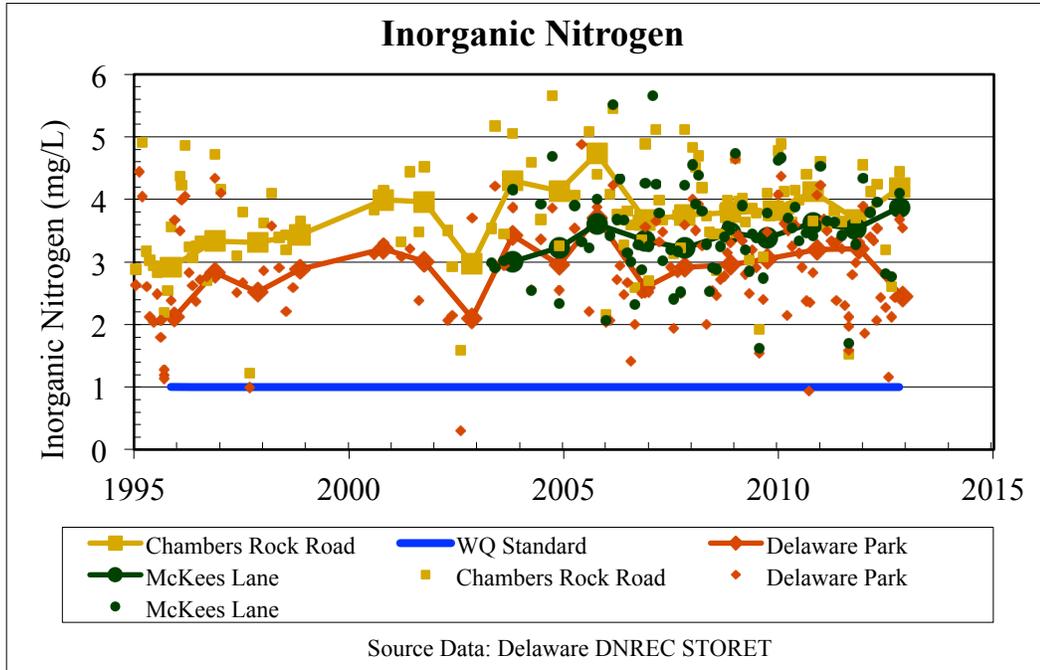


Figure 5.14 Inorganic N along White Clay Creek in Delaware (1995-2012)

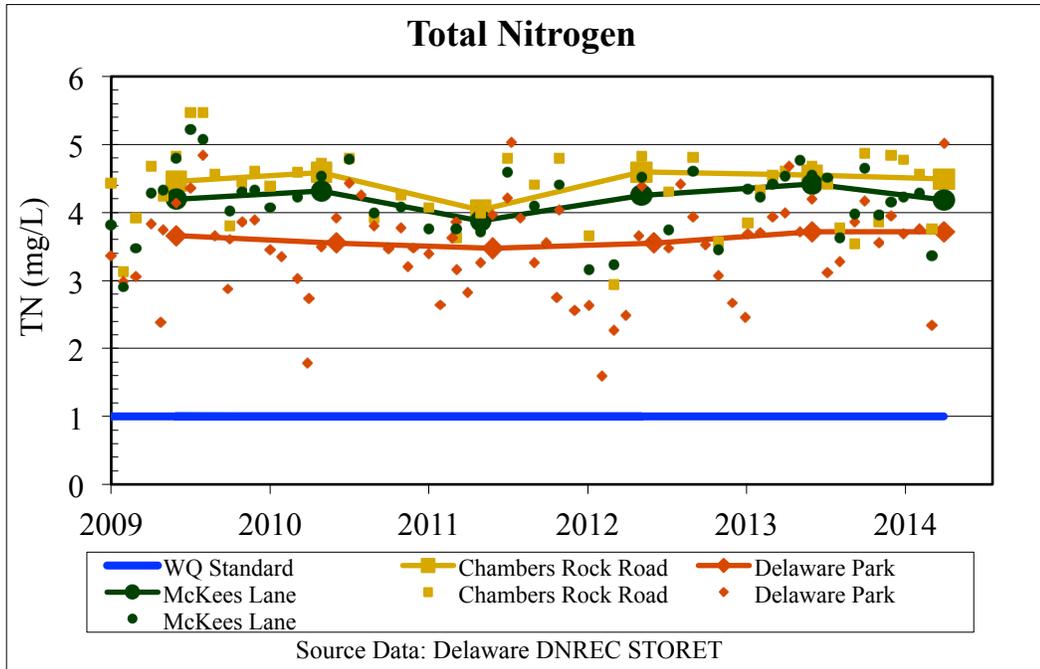


Figure 5.15 Total N along White Clay Creek in Delaware (2009-2014)

Nitrogen: Both inorganic nitrogen [nitrate+ nitrite+ ammonium] (Figure 5.14) and total nitrogen (Figure 5.15) trends show concentrations consistently exceeding the Delaware standard of 1.0 mg/L, indicating nitrogen levels remain poor in the White Clay Creek watershed. The nitrogen problem in the watershed has persisted over the long-term and is a major issue of concern for overall watershed health.

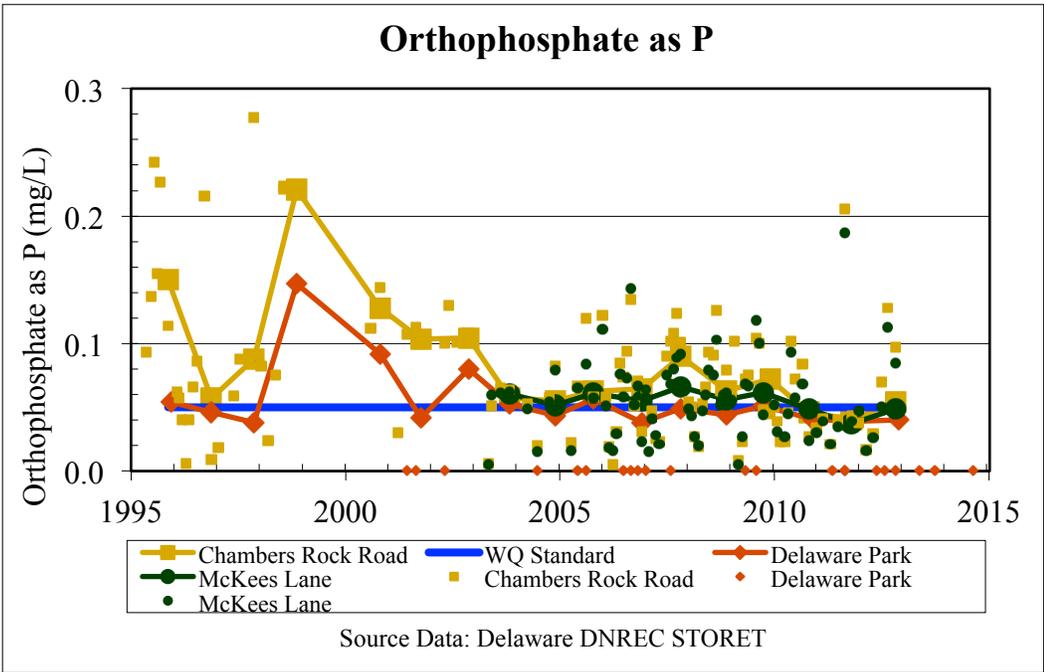


Figure 5.16 Orthophosphate along White Clay Creek in Delaware (1995-2012)

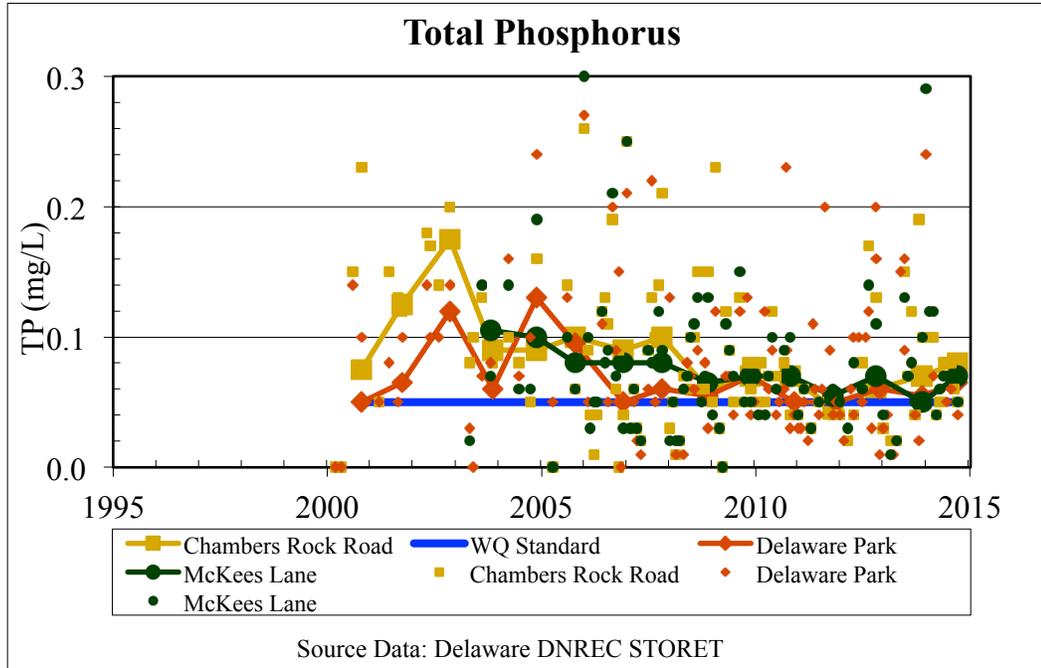


Figure 5.17 Total P along White Clay Creek in Delaware (2000-2014)

Phosphorus: Total phosphorus (Figure 5.17) in the White Clay watershed has been trending positively towards improvement in the last 15 years since 2000. Most current levels are near, though slightly above the Delaware standard of 0.05 mg/L. This means that although progress has been made with phosphorus reduction, there is still potential for improvement. The orthophosphate form of the nutrient and associated trends (Figure 5.16) depict similar trends to that of total phosphorus, though this apparent decrease could be skewed, attributed to the comparable lack of data in the early years in the period of record.

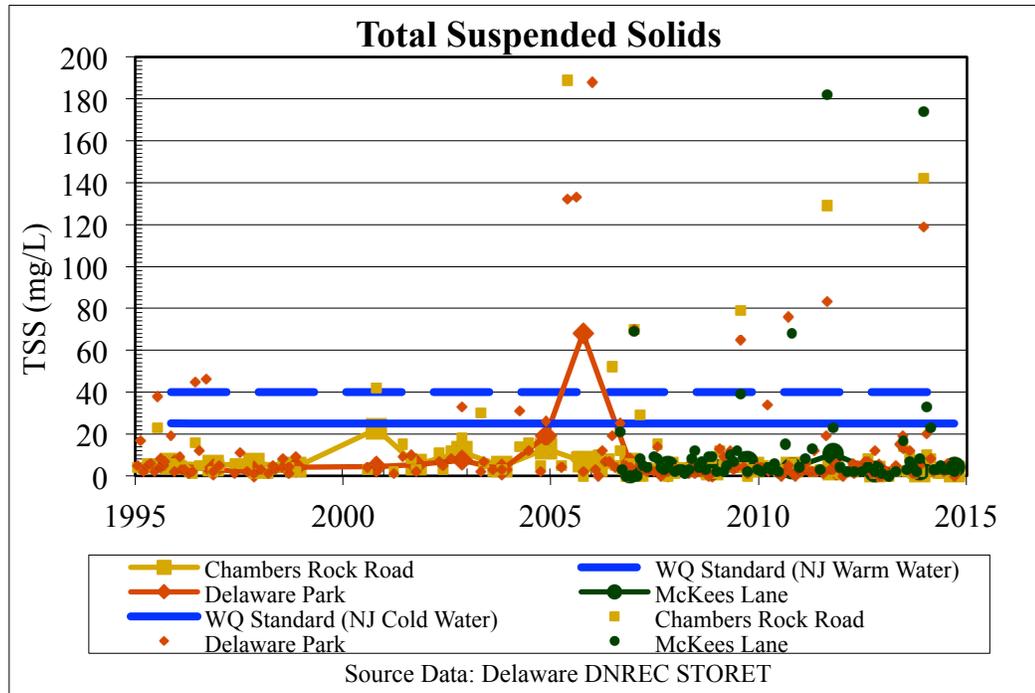


Figure 5.18 TSS along White Clay Creek in Delaware (1995-2014)

Total Suspended Solids (TSS): Suspended solids refer to particulate matter of varying sizes, both inorganic and organic, and may include materials as small as clay particles, or as large as gravel, rocks, and boulders. Suspended solids are indicative of anything that is floating, moving, or suspended in the water column, and as such, is a highly visible indicator of water quality. Problems with suspended solids in waterbodies are often associated with storm events, since storms and heavy rainfall events can quickly pick up, suspend, and move large amounts of eroded soil and debris from surrounding lands into rivers and streams.

Total suspended solids levels in the White Clay Creek (Figure 5.18) have overall remained relatively constant in the period of record, and based on the New Jersey standard (no current standard set for Delaware streams), are below acceptable

concentrations of 40.0 mg/L (warm water streams) and 25.0 mg/L (cold water streams). It's important to recognize that the concentration of TSS being transported by a river is continually changing over time. In White Clay, despite being consistently below the standards, there have been instances of severe exceedances of these limits, usually associated with large storms. The high levels of TSS frequency and magnitude of these exceedances cause problems not only for stream and aquatic health, but also yield increased costs for water purveyors to treat drinking water.

Water Quality Conclusions: In summary, based on the available data collected between 1995-2014, dissolved oxygen, phosphorus, total suspended solids, and bacteria are trending in a positive direction in Delaware, but still fail to consistently meet water quality standards (with the exception of DO which exceeds the standard). Although unacceptable levels of most of the water quality parameters have been decreasing or meeting the water quality standard, TSS and nitrogen continue to be water quality concerns in the Delaware portion of the White Clay watershed.

Table 5.4 assesses current trends in water quality in the watershed. Based on the data collected between 1995 and 2015, the overall trends across the three monitoring stations in Delaware for DO, bacteria, TSS, and phosphorus, display improvement for five of the seven total parameters. While the data analyzed in this section only examines monitoring sites in Delaware, the results are influenced by contributions being made upstream, across the Pennsylvania border. Over time it is expected that available water quality datasets in watershed will grow to be larger than at present. Ultimately, this will provide an expanded analysis of water quality trends in the watershed.

Table 5.4 White Clay Creek Watershed Water Quality Trends (1995-2015)

Parameter	Number of Stations			
	Improved	Constant	Degraded	Total
Dissolved Oxygen	2	1		3
Enterococcus	1	2		3
Inorganic Nitrogen		1	2	3
Total Nitrogen		3		3
Orthophosphate	2	1		3
Total Phosphorus	2	1		3
TSS	1	2		3
Total	8	11	2	21

5.7 Political Boundaries and Entities

As a bi-state watershed, the White Clay Creek is an intriguing case study for management as a Wild and Scenic River across different political jurisdictions. Most direct land, water, and resource management responsibilities belong to government with municipal, county, state and federal entities participating under various kinds of legislation and programs (White Clay Creek Wild and Scenic River Study Task Force, 2001). This section provides a summary of existing resource protection responsibilities and the differences between the two states in the watershed: Delaware and Pennsylvania.

The total portion of the 108 square mile watershed that lies within Delaware is about 43 percent, and the total portion that lies in Pennsylvania is about 57 percent (a very small portion, less than 1 percent, also crosses the Maryland border). Table 5.5 lists the major political entities that operate within the watershed including the two states, two counties, and thirteen municipalities/ townships/ and boroughs. The DRBC, a regional joint government agency also plays a role in water resource management in the watershed. In addition, an array of nonprofit and private organizations are involved in management, and will be discussed in further detail in the following Chapter.

Table 5.5 Governing Entities in the White Clay Watershed

States	Counties	Municipalities
<ul style="list-style-type: none"> • Delaware • Pennsylvania 	<ul style="list-style-type: none"> • Chester • New Castle 	<ul style="list-style-type: none"> • City of Newark • Avondale • East Marlborough • Franklin • Kennett • Londonderry • London Britain • London Grove • New Garden • New London • Penn • West Grove • West Marlborough

Table 5.6 Delaware and Pennsylvania Approaches to Governance

Government	State	
	Delaware	Pennsylvania
State	<ul style="list-style-type: none"> - Primary authority and responsibility for the aquatic environment, plant and animal species, water quality goals, and recreation management in all counties, cities, towns, and other unincorporated municipalities - Co-manage White Clay Creek Preserve 	<ul style="list-style-type: none"> - Primary authority and responsibility for the aquatic environment, plant and animal species, water quality goals, and recreation management in all counties, cities, townships, and boroughs - Co-manage White Clay Creek Preserve
County	<ul style="list-style-type: none"> - 1 county (New Castle County) - County’s planning and zoning powers are derived from the Delaware Code, Title 9 which enables NCC to regulate land use and zoning in areas outside incorporated municipalities within its borders 	<ul style="list-style-type: none"> - 1 county (Chester County) - Counties are considered “municipalities” with the ability to plan and zone - Must prepare comprehensive plans to guide local zoning, subdivision ordinances, and development proposals - Primary responsibility for stormwater and solid-waste planning
Local	<ul style="list-style-type: none"> - 1 municipality - Municipality has primary jurisdiction over land use and development activities within its borders independent of the county 	<ul style="list-style-type: none"> - 12 municipalities - Municipalities have primary jurisdiction over land use and development activities under Pennsylvania’s Municipalities Planning Code - Must submit proposed actions to Chester County Planning Commission for review

Table 5.6 encapsulates the differences and similarities of the two states in the watershed, with respect to the various levels of government and their corresponding responsibilities that apply to resource management in the White Clay. The major differences are the functions of the counties and the number of local jurisdictions. While local laws and regulations are the principal means of protecting rivers, other mechanisms, such as land acquisition, voluntary landowner action, and physical barriers to land development are utilized in the watershed. Figure 5.19 is a map of the watershed’s municipal boundaries.

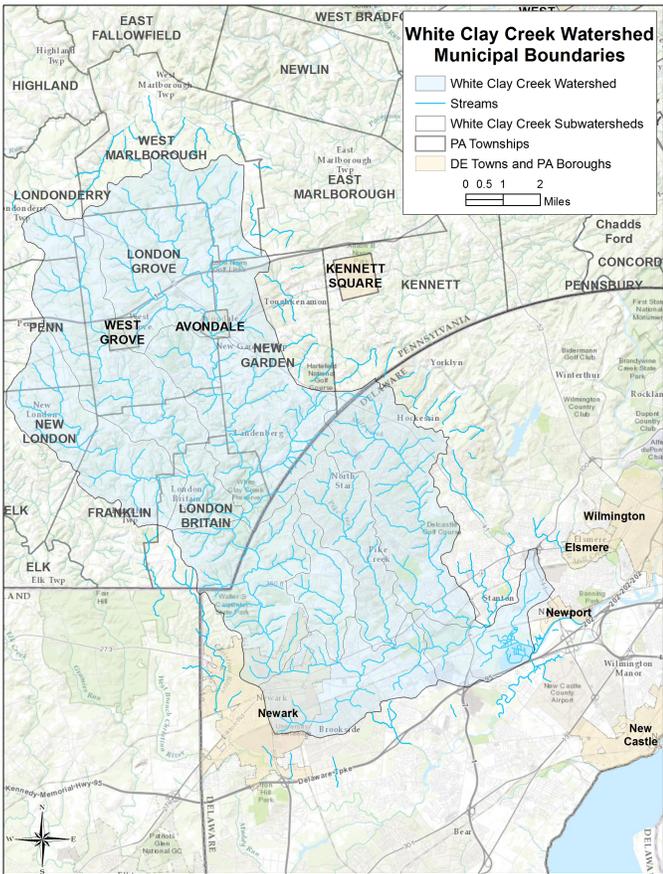


Figure 5.19 White Clay Creek Watershed Municipal Boundaries Map

Chapter 6

RESEARCH DESIGN: ANALYTICAL FRAMEWORK STRUCTURE

6.1 Research Methodology

The Institutional Analysis and Development (IAD) framework is used in this research to investigate the institutional arrangement and performance of the partnership approach to Wild and Scenic River management using the White Clay Creek as a case study. More specifically, results compiled in the following Chapter will address the impact of institutional factors including: biophysical characteristics, institutional rules-in-use, community attributes, and available resources on the actors and actions of the White Clay Creek watershed using data collection methods derived from Hardy and Koontz (2010). IAD is a theoretical framework that was originally developed by Elinor Ostrom and colleagues, and has since been used as an analytical framework for organizing inquiry into collaborative watershed partnerships.

6.2 Data Collection

Descriptive information about partnerships and factors contributing to partnership success were gathered for this study and synthesized for analysis per the different variables that make up the analytical framework. Data was collected from participant observation, key informant interview, and supplemental committee member survey. Additional data concerning watershed characteristics and organization including information on committee history, goals, objectives, financial resources, and partner organizations was obtained from a document and literature analysis, comprehensive river management plan and updates (non-regulatory documents),

annual reports, and web pages. This information was used to triangulate other data sources and close gaps in the study.

WCCWS Quarterly Steering Committee Meeting: The participant observation portion of the study included attendance at the quarterly White Clay Creek Wild and Scenic (WCCWS) Steering Committee meeting in early May 2016, and informal encounters with participating members within the same timeframe. The researcher recorded notes during the meeting on procedures, processes, and discussion topics; past meeting minutes were also reviewed to account for general patterns.

Management Plan Coordinator Interview: An in depth, semi-structured interview was carried out with the Management Plan Coordinator for the White Clay Creek in April 2016. The Management Plan Coordinator (MPC) is considered a key informant. Key informants are people with firsthand knowledge of the events being studied who are able to provide factual information about the organization from an insider perspective (Hardy and Koontz, 2010). The comprehensive list of interview questions administered to the Management Plan Coordinator can be found in Appendix C.

WCCWS Committee Member Survey: Questions from the antecedent interview were then repurposed and disseminated in the form of a survey to members of the management committee for the White Clay Creek Wild and Scenic program. The survey instrument was distributed via e-mail to members of the 2016 WCCWS Management Committee and responses were collected in May 2016. Of the total 19 committee members under consideration (MPC included), 12 surveys were completed and returned (63% response rate). The survey protocol sequentially consisted of: a pre-

letter recruitment (e-mail), the survey instrument (electronic link), reminder e-mail and thank you (e-mail).

The survey instrument draws on previous instruments used by Hardy and Koontz (2010). Survey questions consisted of a mix of open-ended inquiry questions, and Likert type rating questions, whereby respondents specified their level of agreement or disagreement with a particular statement relating to different variables. This combination of questions was intended to elicit comparable information among members. The data retrieved provides insight on consistencies and variations in perceptions of partnership goals, processes, and outcomes within the cooperative management structure in place for this interstate Wild and Scenic River. The full survey instrument can be found in Appendix D.

Data collected and responses obtained from the document analysis, interview, and committee surveys were synthesized and used to analyze patterns and themes pertaining to institutional performance of the White Clay Creek as a Partnership Wild and Scenic River. The subsequent section provides a foundation for understanding the analytical framework and its variables. The following Chapter presents the fusion of the data collected, using the IAD variables to guide the analysis of the institutional structure, its process, and outcomes.

6.3 Institutional Analysis and Development Framework

The Institutional Analysis and Development (IAD) framework is employed in this analysis to investigate how factors such as the biophysical structure, community attributes, and institutional rules-in-use in the White Clay Creek as a Partnership Wild and Scenic River impact decision-making processes and subsequent environmental, social, and policy outputs of the watershed partnership. The IAD has primarily been

applied in the literature to the governance of common pool resources and is therefore directly applicable to the case of watershed management (Sabatier et al., 2005). This section defines relevant terminology and presents a brief background on the framework.

Defining Institutions: Elementary as it may seem, foremost, the term “institution” must be clarified in the context of this analysis. To understand institutions one needs to know what they are, how and why they are crafted and sustained, and what consequences they generate in diverse settings (Ostrom, 2005). The standard definition of an institution, as posited by the dictionary is, “an established organization” and; “a custom, practice, or law that is accepted and used by many people”. Ostrom (2005) broadly defines institutions as “the prescriptions that humans use to organize all forms of repetitive and structured interactions including those within families, neighborhoods, markets, firms, sports leagues, churches, private associations, and governments at all scales” (p.3). A major problem in understanding institutions relates to the diversity of situations of contemporary life; as we go about our everyday life, we interact in a wide diversity of complex situations (ibid). Institutions facilitate the ease with which multiple actors interact in complex situations, prescribing what actions are allowed, required, or forbidden in given situations; and thus, institutions are especially significant when a task requires coordination (Blomquist et al., 2004). Moreover, institutional arrangements can be conducive to success, or they can present substantial barriers (ibid).

Collaborative Institutions: Many analysts view collaborative institutions that attempt to forge consensus and build cooperation among conflicting stakeholders as a potential remedy to the pathologies of conventional environmental policy (Lubell,

2004). The hallmark of collaborative institutions is an attempt to encourage consensus and cooperation among the multiple actors with some political, economic, or administrative stake in policy outcomes (Lubell, 2004). In the context of watershed management, collaborative institutions emerged from dissatisfaction with the adversarial, command-and-control style of governance embodied by conventional environmental policies, which have left many environmental problems unresolved while at the same time inflaming large amounts of costly legal and administrative conflict (ibid).

Frameworks: Different methodological approaches have been developed in order for researchers to study institutions and institutional change. The study of institutions depends on theoretical work at three levels of specificity as elucidated by Ostrom (2011): frameworks, theories, and models. Specifically, frameworks identify the elements and general relationships among elements that one needs to consider for institutional analysis; frameworks also organize diagnostic and prescriptive inquiry. They provide a general set of variables that can be used to analyze all types of institutional arrangements. Frameworks provide a meta-theoretical language that can be used to compare theories (Ostrom, 2011). They attempt to identify the universal elements that any theory relevant to the same kind of phenomena needs to include (ibid).

IAD Background: IAD framework has been developed and used primarily by social scientists. IAD framework has assisted researchers and policymakers study governance systems, organize diagnostic, analytical, and prescriptive capabilities and also aids in the accumulation of knowledge from empirical studies and in the assessment of past efforts at reforms (Ostrom, 2011). The basic strategy is to identify

those aspects of the physical, cultural, and institutional settings that are likely to affect the determination of who is to be involved in a situation, the actions they can take and the costs of those actions, the outcomes that can be achieved, how actions are linked to outcomes, what information is to be available, how much control individuals can exercise, and what payoffs are to be assigned to particular combinations of actions and outcomes (Ostrom, 2011). In any given action arena (or situation), participants (the actors) are influenced (or incentivized) by many variables, including the biophysical attributes of the resources (relative scarcity, boundary conditions, rivalrousness of use, excludability, etc.) about which they are making decisions; the attributes of their own community (e.g., population size and relative homo- versus heterogeneity, and various positions held by different actors), and the collective-choice rules in use (Cole, 2013). Figure 6.1 describes the conventional IAD framework in diagram form.

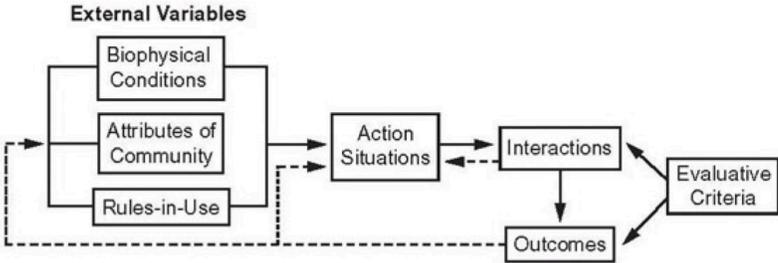


Figure 6.1 Framework for Institutional Analysis
 Source: (Ostrom, 2011)

Following the analytical approach described in this section, results are presented for each of the variable sets identified in the IAD framework, followed by evaluations of institutional performance and success of the White Clay Creek Wild and Scenic Partnership River in Chapter 7.

Chapter 7

RESEARCH RESULTS: INSTITUTIONAL ANALYSIS OF PARTNERSHIP WILD AND SCENIC RIVER MANAGEMENT

7.1 Actors and Agencies

Under IAD, the actor in a situation can be thought of either as a single individual or as a group. The term “action” refers to the behaviors to which the acting individual or group attaches a subjective and instrumental meaning (Ostrom, 2011). Using IAD, analysts make assumptions concerning actor’s preferences, information-processing capabilities, current information, personal resources, and decision rules (Sabatier et al., 2005). It can be presumed that the various institutional arrangements individuals use in governing and managing public goods, common-pool resources, or others offer different incentives and opportunities to learn (Ostrom, 2011).

There are several characteristics that increase a governance institution’s chances of successfully managing a common pool resource, such as a river or watershed. Actors are most likely to cooperate when they believe the process is fair in terms of representing their particular interests and avoids domination by other interests (Lubell, 2004). Perceived increases in agency commitment or budget resources will also reduce transaction costs, therefore increasing cooperation (Lubell, 2004). With regard to beliefs about other actors, if stakeholders trust others to fulfill promises made in the context of political contracting, they are more likely to cooperate (ibid).

General Membership: The White Clay Wild and Scenic Program

(WCCWSP) seeks to include members from the federal government, Commonwealth of Pennsylvania, State of Delaware, regional entities, local governments, nonprofit organizations, and private interests. As such, membership evokes partners with technical expertise in fields including, and not limited to: archaeology, cultural and historical resources, geology, agriculture, water resources, wildlife biology, fisheries biology, watershed management and/or recreation management (White Clay Creek Wild and Scenic Management Program, 2016). The “members at large” are considered non-voting and participatory, and dues are not collected from participants. Members dispense knowledge and support to the Program regarding watershed issues and projects.

According to the current Management Plan Coordinator for the White Clay Creek Wild and Scenic program, partner organizations change from year to year, and some agencies have been more inclusive in terms of partnering on projects and general involvement the last few years. The increased presence of the William Penn Foundation, and commensurate funding for clean water protection and restoration projects in the region and greater Delaware River watershed has increased collaboration between agencies. Of recent, Chester County Water Resources Authority, Brandywine Conservancy, and the Penn State Extension have been more open to dialogue than in the past. Formal partner agencies and organizations in 2015 are depicted in Figure 7.1.

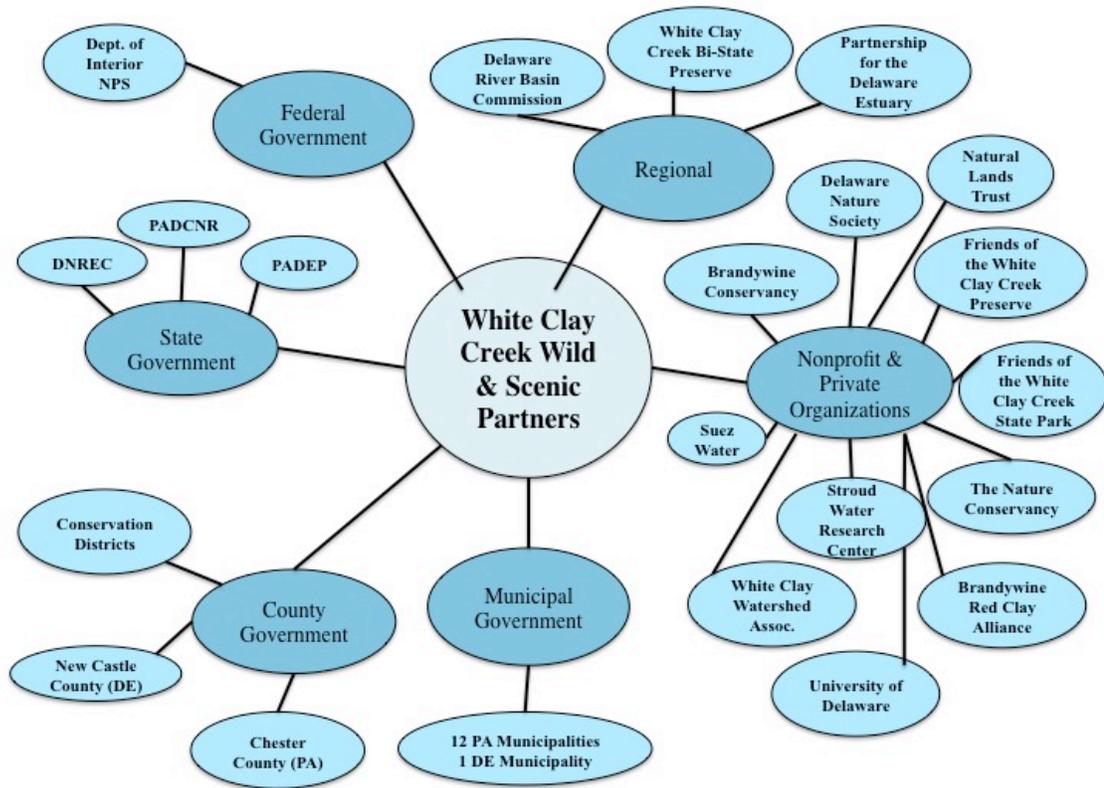


Figure 7.1 White Clay Creek Wild and Scenic Program Partners

Steering Committee: In addition to partnering organizations, the Wild and Scenic Program is guided primarily by the WCCWS Steering Committee. The Committee is comprised of two Co-Chairs, one from Delaware, and one from Pennsylvania, one paid staff (Management Plan Coordinator) supported through the White Clay Watershed Association (WCWA) as federal or other funding permits, and a minimum goal of 17 additional Steering Committee positions. Committee positions are filled with interested individuals who offer technical, cultural, special interest or knowledge of the watershed and support the mission in a non-partisan manner (White Clay Creek Wild and Scenic Management Program, 2016).

The Management Plan Coordinator (MPC) is a part-time position that was added in 2002 to assist the Committee in project and administrative duties. Since 2002 there have been three Management Plan Coordinators for White Clay, and the current MPC has held the position since 2012. The watershed Steering Committee (Table 7.1), with local and state partners, is charged with promoting the long-term protection of the White Clay Creek watershed and its resources in Pennsylvania and Delaware through the implementation of the Watershed Management Plan (White Clay Creek Wild and Scenic Steering Committee, 2015).

Table 7.1 White Clay Creek Wild and Scenic Steering Committee Profile

Public Agencies and Organizations	Private/Nonprofit Agencies and Organizations
<ul style="list-style-type: none"> • National Park Service (liaison) • DNREC, Division of Parks and Recreation • Chester County Planning Commission • Chester County Conservation District • New Castle Conservation District • City of Newark • Franklin Township • New Garden Township • London Britain Township • London Britain Land Trust 	<ul style="list-style-type: none"> • Coalition for Natural Stream Valleys • White Clay Creek Watershed Association • UD Water Resources Agency • Delaware Nature Society • Sovereign Consulting Inc. • White Clay Fly Fishers • Brandywine Conservancy • Natural Lands Trust • Friends of PA White Clay Creek Preserve

The program makes every effort to secure participation from the original signatories from year to year. The original signatories include:

- State of Delaware Department of Natural Resources and Environmental Control
- State of Pennsylvania Department of Conservation and Natural Resources
- Chester County
- New Castle County
- City of Newark
- London Grove Township
- Franklin Township
- London Britain Township
- New Garden Township
- Avondale Borough
- West Grove Borough

Delaware River Basin Commission (DRBC) and the townships with smaller watershed land area (West Marlborough, New London, Penn, Kennett, and Londonderry) are encouraged to participate either as Steering Committee members or with general membership. Representatives from the townships can include but are not limited to Environmental Advisory Councils (EACs), Open Space Committees, and Planning Commission members of the townships. In addition to the principal governing Steering Committee, there are also various subcommittees including members from the Steering Committee as well as general members; these include subcommittees focused on Restoration, Open Space, and Education. Subcommittees meet on an as needed basis, when situations arise that require groups to convene. The Steering Committee meets quarterly to get project updates from the Education, Open Space and Restoration Committees, as well as updates about watershed projects from the MPC and the National Park Service River Manager. All meetings are also open to the public.

7.2 Action Situations

In IAD, the first step in analyzing a problem is to identify a conceptual unit, called an action situation, that can be utilized to describe, analyze, predict, and explain behavior within institutional arrangements (Ostrom, 2011). Action situations are “the social spaces where individuals interact, exchange goods and services, solve problems, dominate one another, or fight” (Ostrom, 2011, p.11). A common set of variables is used to describe the structure of an action situation (Figure 7.2). As a conceptual unit, the action arena consists of two elements: (1) a set of actors behaving according to an explicit model of the individual and (2) a decision-action situation (Sabatier et al., 2005). The structure of a decision-action situation is determined by three sets of broad variables: the biophysical structure of the resource under consideration, the attributes of the broader community of participants, and institutional rules in use (Sabatier et al., 2005). All of these variables are composed of multiple subparts. Further, all are nested in larger systems that may vary over time (Ostrom, 2014). Taken together, these broad categories of variables determine the details of a particular action situation.

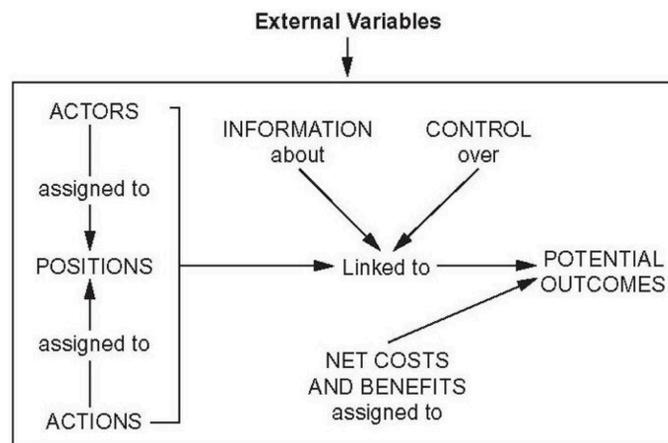


Figure 7.2 Internal Structure of an Action Situation

Source: (Ostrom, 2011)

Some of the major occurrences that have transpired since the White Clay Creek watershed earned official Wild and Scenic designation are highlighted here and presented as an abridged timeline of the program's past action situations.

1991: The White Clay Creek Study Act (P.L. 102-215) was signed into law by President George Bush in response to local citizen concern and desire for the bi-state watershed to be included in the National Wild and Scenic Rivers System. Dorothy Miller and other members of the White Clay Watershed Association were pivotal in leading this initiative.

1992: Established by the National Park Service, a study task force convened in 1992 that was charged with overseeing the preparation of the management plan, and created a broad forum for communication (White Clay Creek Wild and Scenic River Study Task Force, 2001). Chuck Barszcz was the National Park Service lead on the study and Dorothy Miller and Judith Shuler spearheaded the study task force. Additional members of the study task force included watershed residents, landowners, private organizations, and representatives of local, county, state, and federal governments. The task force subsequently established an advisory committee, which provided a means of communication with the National Park Service. Organized within the advisory committee were a number of subcommittees that focused on specific potential management issues, including: land use, recreation, cultural resource, water resources, and public education/information subcommittees.

1993-1994: Subcommittees held public workshops in both Delaware and Pennsylvania, putting out a number of pertinent reports and studies including: Resources and Issues Report (September 1994), Landowner Survey (November 1994),

Draft Eligibility and Classification Report (November 1994), Draft Management Goals and Actions (November 1994).

1995: The study task force organized a management planning committee to begin management plan development (White Clay Creek Wild and Scenic River Study Task Force, 2001). The National Park Service and Water Resources Agency for New Castle County prepared resource maps using GIS technology.

1998: Research and findings from information gathered in the preceding forums, from both public residents and policymakers, were used to support statements and goals set out in the original management plan, issued in 1998.

2000: The legislation that designated the 190 miles of the White Clay Creek and its tributaries into the national system was introduced to Congress by Congressmen Michael Castle (DE) and Joseph Pitts (PA); and by Senators Joseph Biden (DE), William Roth (DE), Rick Santorum (PA), and Arlen Specter (PA). White Clay Creek was officially designated a National Wild and Scenic River when President William Clinton signed P.L. 106-357 on October 24, 2000.

2001: White Clay Creek and Its Tributaries Watershed Management Plan was finalized.

2006: Linda Stapleford was hired as Management Plan Coordinator in 2006. Prior to this time, the National Park Service fulfilled many of the duties associated with the role.

2009: A proposal to expand the original designation was led by former Senator Ted Kauffman (D-Del.) in the Senate and Representative Pitts in the House. The later proposal passed twice in the Senate (in 2011 and 2013). Leading up to this point, the Management Plan Coordinator at the time worked with the municipalities and

corresponding board(s) of supervisors to champion expanding the designation to include the additional river segments. These river segments had previously been left out of the national designation because the townships wanted to maintain water quantity security, and keep open the possibility of constructing reservoirs in the future. Once the townships determined that was no longer a viable future mission, they agreed to ask congress for inclusion of these additional segments.

2012: Shane Morgan was brought on as the new Management Plan Coordinator; coming into the position, the new MPC played a role in keeping tabs on the Expansion Bill, getting letters signed for submission to the new Congress, with Coons' office taking the lead.

2014: The White Clay Wild and Scenic Expansion Act was reintroduced in 2014 by Delaware Senator Chris Coons (co-sponsored by Delaware Senator Tom Carper) and Pennsylvania Representative Joseph Pitts (co-sponsored by Delaware Representative John Carney and Pennsylvania Senator Robert Casey). After six years, both the Senate and House successfully passed the Coons-Pitts bill, signed into law by President Barack Obama in December 2014. The White Clay Wild and Scenic Expansion Act (P.L. 113-291) added approximately nine miles of stream segments to the existing designation. The new segments included a 1.6-mile stretch of Lamborn Run in Delaware, and a 7.4-mile stretch in Pennsylvania including portions of the East Branch and Egypt Run.

7.3 Biophysical Structure of the Resource

When analyzing problems of watershed management, factors such as rainfall and weather patterns, underlying geologic structure, stream size and network, soil types, slopes, and other landscape features are all important variables affecting a focus area. The biophysical structure of the resource may also refer to its condition, whether the resource is being overexploited, and the nature and complexity of the causal relationship between human behaviors and environmental outcomes (Sabatier et al., 2005). For example, nonpoint source pollution and point source pollution feature quite different temporal and spatial attributes that require appropriate management strategies (Sabatier et al., 2005).

The focus of the IAD framework has traditionally be on the working parts of a situation rather than on the factors underlying any particular action situation. It is worth mentioning that many scholars who have conducted research on resource governance using IAD have encountered the problem that utilizing the umbrella term “biophysical world” does not explain the multiple variables that affected a particular action situation (Ostrom, 2011); and while the many factors relating to the social components of the action situation can be well understood using this framework, it may not necessarily be the case for the biophysical factors.

Survey respondents from the White Clay Creek Steering Committee were asked to report environmental issues of concern and degree of progress needed for the issues. The results are displayed in Table 7.2. Respondents cited invasive species, stormwater runoff, nutrients, bacteria, and sedimentation among the highest items of concern and high level of progress needed, with scores of 4.27, 4.00, 4.00, 3.91, and 3.91, respectively. These results align with statements from the MPC stating that the major environmental issues in the watershed currently relate to nonpoint source

pollution, especially nutrients (nitrogen and phosphorus) as well as sediment and bacteria. Water supply/quantity scored lowest, with 3 respondents indicating that they could not properly score water quantity or supply as a parameter using the 5-point system, since it is more subject to natural weather conditions than the other categories. Overall, mean values for all of the environmental items of concern were rated above moderate progress needed.

Table 7.2 Perceived Environmental Issues in the White Clay Creek Watershed

Environmental Issue of Concern	Mean Value (0-5)	STDEV	N=
Invasive Species	4.27	1.01	11
Stormwater Runoff	4.00	1.00	11
Nutrients in Water	4.00	1.00	11
Sedimentation	3.91	1.14	11
Bacteria in Water	3.91	0.94	11
Toxics in Water	3.80	0.92	10
Habitat Loss	3.55	0.82	11
Species Diversity	3.45	1.04	11
Land Conversion	3.27	0.90	11
Flooding	3.10	0.74	10
Loss of Wetlands	3.09	0.83	11
Water Supply (Quantity)	2.88	0.64	8
Key: Very Low=1, Low=2, Moderate=3, High=4, Very High=5			

More than 54% of the White Clay Creek watershed is made up of first order streams (small perennial and non-perennial streams) that are only a few feet wide and carry small volumes of water (White Clay Creek Wild and Scenic River Study Task Force, 2001). Because their low volumes lack the capacity to filter or dilute pollutants,

these small headwater streams are highly susceptible to nonpoint source pollution. The environmental issues of concern identified by the respondents and MPC are indicative of nonpoint source pollutants. Nonpoint source pollution is generated from broad, diffuse sources that can be very difficult to identify, quantify, and consequently easily manage. These sources might include runoff from agricultural areas, stormwater runoff from urban areas, and seepage from septic systems and cesspools from suburban or residential areas. Nonpoint source pollution enters rivers and streams through surface and groundwater movement, or from the atmosphere through precipitation (Cech, 2009).

The Federal Clean Water Act (CWA), and other regulations that govern water quality have in the past focused pollution control primarily on atmospheric and point sources, while mechanisms to curb nonpoint sources have been deficient. Section 303 of the Clean Water Act requires states to compile a list of impaired waters and report them to EPA. Once a waterbody is listed as impaired, the CWA requires the state to develop what are known as Total Maximum Daily Loads (TMDLs) for the pollutant(s) of concern; TMDLs are a policy tool that helps states meet this requirement and address more burdensome nonpoint sources. Essentially, a TMDL is the maximum amount of a specific pollutant a waterbody can receive and still meet water quality standards. Once these pollution limits are established, further efforts must then be taken to reduce pollutant loads or sources.

Approximately 77% of the stream segments in the White Clay watershed have been identified by the PA DEP and the Delaware DNREC as not meeting their designated water use due to nonpoint sources of runoff from developed and agricultural lands (Chester County Conservation District, 2014). These segments are

recorded on state lists of impaired waters (CWA, Sections 303(d) and 305(b)) for elevated pathogen levels (E coli and fecal coliform bacteria in PA; Enterococcus in DE) and nutrients (DE). White Clay Wild and Scenic program funds are currently used to collect and analyze pathogen levels and should provide an indication of potential loading of the bacteria through source tracking (Narvaez and Homsey, 2016).

7.4 Community Attributes

The characteristics of the actors involved in a particular watershed management institution are often heavily influenced by the nature of the community from which they come from (Sabatier et al., 2005). Generally speaking, attributes of the community encompass the homogeneity of behavioral norms, cultural differences, and the community's aggregate levels of human and social capital or resources (Sabatier et al., 2005). Many studies of self-organizing resource regimes have found that when a local community is relatively homogeneous and stable, the likelihood of managing a locally owned resource in a sustainable manner is much higher (Ostrom, 2014). For this research, survey respondents were asked to identify how local community characteristics within the White Clay Creek watershed affect overall watershed management. A few inclusive patterns were ascertained from the collected responses, and have been broken down categorically.

Disparate Land Use: There is tremendous heterogeneity with both land uses in the White Clay Creek watershed and within these different spheres of land use, differences in human perspectives and locality needs. As stated by one respondent, “the mix of rural, suburban, and urban perspectives and needs” are contrasted throughout the watershed (Respondent 2). Another committee member reverberated this sentiment commenting specifically on the management repercussions resulting

from dissimilar land use areas of the watershed, “agricultural best management practices require a totally different approach from stormwater BMPs intended for suburban or urban landscapes” (Respondent 3). As examined by the data presented in Section 5.5, demographics and land use are quite variable in both watershed states, and across subwatershed boundaries. White Clay Creek watershed is fairly evenly composed of one-third developed land, one-third agricultural land, and one-third natural areas including forests and wetlands. While there haven’t been dramatic changes to land use over time, there has been an overall trend towards urbanization. To this same point, one respondent relevantly affirmed the corresponding hurdle that, “increased development leads to new residents, most of whom are unaware of the White Clay and actions necessary to improve” (Respondent 10).

Political Jurisdictions and Considerations: A second common characteristic described by committee respondents focused around the heterogeneity of state governance and quantity of jurisdictions across the Delaware-Pennsylvania border. One response highlighted both spatial and temporal differences across the watershed and time, citing current political composition (e.g., Town Supervisors, County Commissioners, and Governors) as highly influential in effecting management outcomes (Respondent 1). This same respondent did however adduce a positive outlook stating, “things are moving slowly towards a recognition of the need for active management” (Respondent 1).

Recalling the political arrangement of the watershed from Section 5.7, the total watershed area is split between Pennsylvania (57% watershed area) and Delaware (43% watershed area). Specified by one committee member “the change of government structure from Pennsylvania to Delaware is a challenge to institute a

single management approach for the watershed” (Respondent 3). Another corroborates this; “we are dealing with many townships in Pennsylvania and several communities in New Castle County, all of which may have different ways of approaching natural resource management” (Respondent 11). Explicating these statements further is the patchwork of local political entities that operate on the Pennsylvania side of the watershed, which include the state, Chester County, and twelve townships and boroughs constituted by varied configurations of governance systems. Another respondent agrees the multifarious municipalities are “more of an issue in Pennsylvania since there are so many local governments...” (Respondent 4). On the other side of the border, in the Delaware portion of the watershed, political entities primarily encompass only the state, New Castle County, and the City of Newark. New Castle County has jurisdiction over much of the unincorporated land areas within the watershed on the Delaware side. With a number of political jurisdictions under not just one but two state authorities, “each township has its own politics which can impact support for the watershed” (Respondent 4).

Municipal and Support and Participation: Others articulated the value of cooperative support that certain municipalities provide over others. According to one, “several townships are proactive and receptive, a significant plus in implementing conservation practices” (Respondent 10). Similarly, another affirmed more generally, “the committee has very good support from townships in the watershed” (Respondent 6). Further, this support from and cooperation by the local community is “a necessary factor in achieving management goals” (Respondent 8). The MPC echoed these views stating, “willing landowners and willing municipalities are crucial for implementation of projects such as land preservation, streamside buffers etc.” Often initiating such

projects successfully on private lands in the watershed depends on relationships with the landowner and their goals (what they hope to get out of the project).

According to the MPC, typically the larger municipalities that have more resources available to them have been more participatory. Certain municipalities are not fully represented as members of the committee (such as some of the smaller Pennsylvania municipalities including Avondale, Londonderry, and Penn). However, comprehensive involvement from all municipalities is always preferred. Education and communication were mentioned as ways to garner better support from both municipalities and local residents, since well-informed municipal government officials and residents have the capacity to bring policy tools and management projects to fruition. One respondent put it eloquently, “A community's characteristics form the community's perspectives and interests. Each area is different with different needs and issues. Through outreach and education, you can bring different communities together on common goals” (Respondent 7).

Conclusively, the watershed is neither homogenous temporally (in terms of program partners, political conditions and elected officials) nor spatially (in terms of land use, number of political boundaries, and municipal participation). And while this is a distinguishing facet of the watershed, it presents obstacles in terms of uniform management strategies across various political jurisdictions and the state border. Heterogeneity in White Clay Creek reinstates the notion that although watersheds can be assimilative spatial units based on landscape topography and geomorphology, they may not always be inclusive of homologous or unified human populations and communities.

Human Resources: Human resources denote the people who make up or contribute in any way to the functions of the organization. The Wild and Scenic Program itself has minimal full time human resources. The MPC is a part-time position and is the only paid employee by the program. The MPC provides updates to the Steering Committee via reports and meeting materials pertaining to projects and funds for the quarterly meetings, as well as the annual report. The University of Delaware Water Resources Center (formerly Water Resources Agency) via contractual agreement provides the program with a graduate student intern each year beginning in October and ending in May. The student intern provides 140 hours (approximately 5 hours per week) of assistance with data analysis, social media and web functions, and event coordination as needed by the MPC. An additional summer intern may also be hired from June through August for similar tasks expanding to encompass fieldwork and water quality sampling. Beyond these appointments, the predominant human resources for the program are the expertise of the committee members and their individual and agency contributions. Volunteers and community members who contribute their time are also considered valuable human resources to the program.

Technical Resources: Technical resources refer to programs, tools, devices, hardware or software used to obtain information. Technical resources are provided to the WCCWS program in the form of Geographic Information Systems (GIS) mapping assistance from the University of Delaware Water Resources Agency (UD WRA), as well as from the Brandywine Conservancy. In addition to mapping assistance, via contract with the UD WRA, support is also allocated to the program for writing and publishing brochures, graphic publications and reports on the state of the watershed, research initiatives, and other White Clay watershed updates. Chester County Water

Resources Authority also provides accessible interactive online mapping tools. Producing detailed and refined maps enable the program to study existing spatial conditions and anticipate future patterns in the watershed, thereby allowing efforts and project funds to be focused in priority areas that are most conducive to requisite and effective implementation.

The WCCWS program regularly accesses publically available datasets including the U.S. Geological Survey (USGS) data including historic and current stream gage data (stream flow conditions), and the Delaware Environmental Observing System (DEOS) which provides meteorological conditions including temperature and precipitation data. The program also retrieves information from the Delaware Water Quality Data Portal, a cooperative service sponsored by the USGS, EPA, and the National Water Quality Monitoring Council that integrates publically available water quality data from the USGS National Water Information System and the EPA STORage and RETrieval (STORET) data warehouse.

Financial Resources: Without a good financing system and management of assets, a watershed partnership is not viable in the long-term. The White Clay Watershed Association (WCWA) is the umbrella organization that is responsible for the WCCWS program's financial accounting. The WCWA is a 501(C)(3) organization incorporated in the state of Pennsylvania. The WCWA tracks expenditures, files the appropriate tax forms with the IRS and state, files for reimbursement from the National Park Service, and holds checking accounts for the program in WCWA's name (White Clay Creek Wild and Scenic Management Program, 2016).

Updates on program budget intent and fiscal year work plan are communicated and openly discussed at quarterly Steering Committee meetings. Administration

capital is distributed for program insurance, MPC salary, operating expenses, as well as UD WRA student intern and technical assistance. Other program funds are committed to complete various projects within broad categories such as education (which includes projects such as community outreach, school projects, and watershed signage), and restoration (which encompasses ecological restoration, wildlife surveys, historical projects, and water quality).

Each year, the Management Plan Coordinator and the various subcommittees determine what projects are worked on and subsequently develop the budget. The budget may include outside funding sources if it is anticipated that the NPS funds will not cover all costs. According to the MPC, generally the committee asks NPS for the amount that they expect to receive for that fiscal year.

Federal appropriation from NPS is the main funding source, though according to the MPC “funding fluctuates and can go up or down from year to year, which can sometimes make planning difficult”. There is a general federal baseline budget set by the NPS that is approximately \$200,000 for the White Clay Creek. Currently, about half of that goes to National Park Service staff for their role in administration and the remainder goes to the WCCWS program and committee. According to the MPC, NPS usually discloses to the committee the funding levels that can be expected for the next fiscal year, and are generally akin to the previous year, unless there are major budget cuts or increases at NPS.

National Park Service funding program support data from 2008 to 2015 was obtained from the MPC and Annual Reports, and is depicted in Figure 7.3. The figure generally reveals a significant drop in federal funding from 2008 to the present. It is likely that this decline in funding is in some ways attributed to the onset of the Great

Recession in 2008. According to the MPC, the large dip between 2012 and 2013 occurred during a federal government shutdown. During this duration of time, it was extremely difficult to get things approved since the focus of the federal government was on trying to come out of the recession. It is typical that federal funding for the environment gets cut first during such periods. During FY 2011-2014, the WCCWS program put money into a separate contract with the Natural Lands Trust for the open space program, which then needed to be spent down in 2015. This is also reflected in the full program budget.

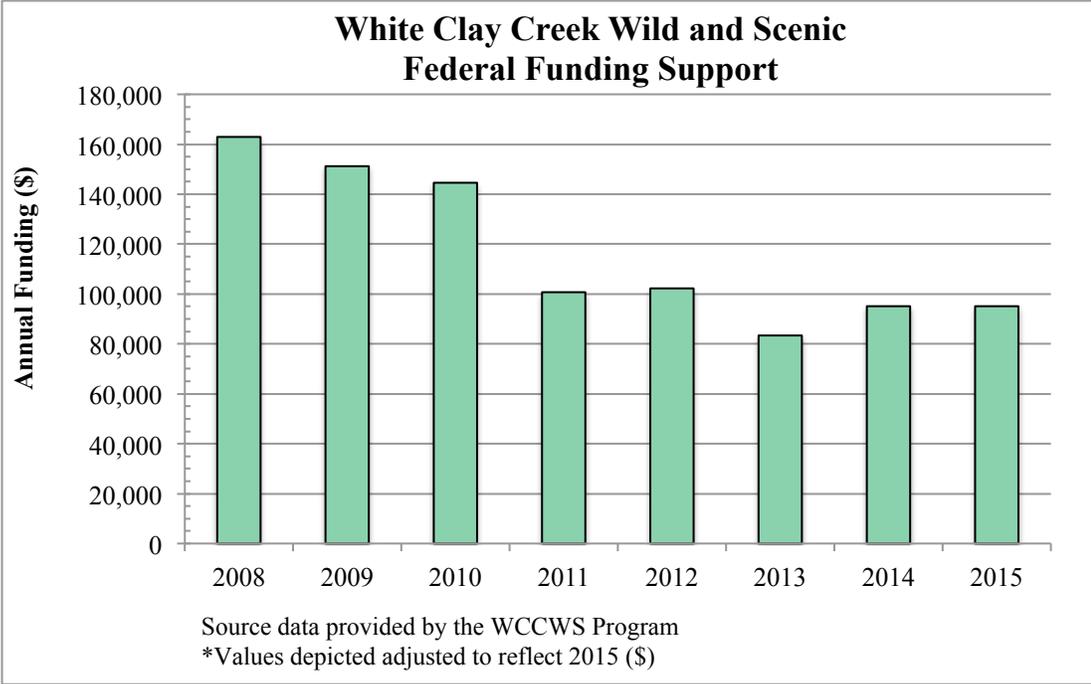


Figure 7.3 Total Federal Funding Support for WCCWS Program (2008-2015)

While endowment of financial support is a crucial element of the program and was essential to early success of White Clay, federal funding sources aren't necessarily where the majority of program funding comes from. Financing systems for watershed partnerships are most robust when they can rely on multiple sources (Raadgever et al., 2008). Like all Partnership Wild and Scenic Rivers, White Clay leverages federal funding from the National Park Service with in-kind contributions from state, county, and local governments, partner organizations and the community. Grants play an important role in overall program funding. In addition to the annual federal provision of funds, any member of the Steering Committee can apply for a grant and include the program with the WCCWS Co-Chairs and White Clay Watershed Association president's approval. There has been a significant increase in grant funding from 2008 to 2015 (Table 7.3). According to the MPC, a major factor that facilitates the success of the partnership in procuring funds is that the partners do not compete against each other to obtain these grants.

An additional monetary source of revenue is the White Clay Restoration fund, a Delaware State tax check-off, which started in 2012. Enacted by the General Assembly of the State of Delaware, an amendment to Title 30 of the Delaware Code established this tax check-off for Delaware taxpayers. The tax check-off designates contributions to the White Clay Creek Wild and Scenic River Preservation Fund (also created by the amendment) to enhance water resource restoration and management programs within the White Clay Creek watershed. The money can be spent on any restoration project that benefits watershed residents in the state of Delaware.

With the base of federal support, overall the WCCWS program has seen considerable success in maximizing federal funds to leverage additional funding. For example, in 2015, White Clay partners spent \$72,721 in federal funds to leverage \$238,130 cash and in kind services; thus, for every \$1 spent in federal funding, an additional \$3.27 was leveraged for a return on value of 327% (White Clay Creek Wild and Scenic Steering Committee, 2015). Table 7.3 exhibits the annual comparison of federal funding to other nonfederal sources of funding. Table 7.4 breaks down individual funding sources and their contributions over the last five years.

Table 7.3 WCCWS Funds & Contributions (2008-2015)

Year	2008	2009	2010	2011	2012	2013	2014	2015
In-Kind \$	110,085	143,622	135,174	55,319	74,862	74,314	73,087	82,224
Federal \$	162,926	151,355	144,565	100,628	102,201	83,429	95,113	95,000
% Change	73%	-7%	-4%	-30%	2%	-18%	14%	0%
Grants \$	1,101	7,943	1,054	1,054	2,065	87,171	62,604	33,127
WCC Fund \$					5,101	6,027	5,918	8,213
Charitable \$					127	68	262	410
In-Kind Match	68%	95%	94%	55%	73%	89%	77%	87%
Nonfed. Match	68%	100%	94%	56%	80%	201%	149%	130%

Source data provided by the White Clay Wild and Scenic Program

Table 7.4 White Clay Creek Wild and Scenic Funding Sources (2010-2015)

Funding Source	2010	2011	2012	2013	2014	2015
NPS	\$144,565	\$100,628	\$102,201	\$83,429	\$95,113	\$95,000
Suez Water	\$109	\$1,054	\$2,065	\$2,035	\$9,011	\$14,222
PADEP					\$54,695	\$9,300
WCC Restoration Fund			\$5,101	\$6,027	\$6,002	\$8,213
DNREC				\$84,526	\$5,006	\$3,285
Municipal Support					\$4,385	\$5,180
Mushroom Farmers PA				\$610	\$1,001	\$1,000
DE State Charitable				\$68	\$300	\$219
Habitat/Water Quality		\$81,661	\$8,339			
Open Space Preservation		\$47,416	\$30,970	\$15,261		
Professional (Hours)	2,580	900	1,000	1,000	800	1,625
Professional (\$)	\$135,174	\$55,319	\$74,862	\$74,314	\$54,603	\$51,834

Source data provided by the White Clay Wild and Scenic Program

7.5 Institutional Rules

Institutional rules refer to the existing sets of social choice or management rules structuring how new rules are made or how resources are used (Sabatier et al., 2005). Rules are shared understanding among those involved that refer to enforced prescriptions about what actions are required, prohibited, or permitted (Ostrom, 2011). In an open democratic governance system, many sources exist for the rules and norms that individuals use everyday. In addition to the legislation and regulations of a formal central government, there are apt to be laws passed by regional, local, and special governments (ibid). Partnerships contain institutional rules internal to the partnership, while at the same time they operate within a broader institutional context. Both of these can profoundly affect their decisions, actions, and outcomes (Hardy and Koontz, 2010). As a variable, rule-following or conforming actions by humans are not as predictable as behaviors governed by scientific laws. All rules are formulated in

human language; therefore, rules share the problems of lack of clarity, misunderstanding, and change (Ostrom, 2011).

Internal Partnership Rules: The WCCWS program “promotes and supports the preservation, protection, restoration, and enhancement of natural and cultural resources, in addition to encouraging a balance of recreational enjoyment of the White Clay Creek watershed in Pennsylvania and Delaware” (White Clay Creek Wild and Scenic Management Program, 2016). Program members are responsible for the implementation of the White Clay Creek and Its Tributaries Watershed Management Plan (2001).

Function and Authority: Like all Partnership Wild and Scenic Rivers, the WCCWS program is strictly advisory in nature and has no regulatory authority. What the program and its members can do is provide advice to agencies and institutions with management or regulatory authority. The purpose and duties of the WCCWS Program Steering Committee are to (1) offer technical, cultural, or special interest or knowledge of the watershed; (2) support the program mission in a nonpartisan manner; (3) provide oversight for fiscal and legal compliance; (4) express an active interest and play an active role in project initiation and completion; (5) show competence and willingness to participate in additional committees or meetings pertaining to the watershed; (6) commit to high quality and timely decision-making; (7) attend a minimum of 2 out of the 4 quarterly meetings per year (White Clay Creek Wild and Scenic Management Program, 2016).

Procedures and Appointment Terms: The Steering Committee elects two Co-Chairs, one each from the Commonwealth of Pennsylvania and the State of Delaware among the Committee or general membership. The term of each Co-Chair is three

years, and additional terms may be approved at the discretion of the Committee. Co-Chairs are selected by nomination by the Committee or general program members. When an opening within the Steering Committee exists, similarly, nominations to fill that opening may be made by any Committee or general program member. A majority vote decides which nominee fills the opening and the terms of fulfillment are three years with a maximum of three consecutive terms (or nine years). Subsequently the committee member may remain at the discretion of the others.

Meetings: The Committee meets quarterly during normal business hours once in January, April, June/July, and October. The Committee convenes for updates on activities and plans that affect the watershed, as well as to receive fiscal reporting from the MPC and National Park Service liaison. A meeting quorum (minimum number of assembled members that must be present at any meeting for motions to be valid) consists of seven Steering Committee members; if a quorum cannot attend, additional meeting dates are evaluated.

Staff request meeting materials from Steering Committee members one month in advance and meeting materials are distributed to the rest of the committee by the MPC two weeks prior to the scheduled quarterly meeting. Co-Chairs alternate presiding over the meeting with support from the MPC and it is the responsibility of the non-presiding Co-Chair and MPC to compile and record minutes of all meetings. The MPC then issues the draft minutes to members for review with one week to respond before becoming finalized. Meeting minutes are also published on the program's website. The April meeting of each year summarizes the year to date, and committee vacancies and new members are announced at this meeting. The 2016 April meeting was rescheduled and held in May 2016 due to a conflict of the meeting

location as a public voting place. At this meeting, with the anticipated relocation of the current Delaware Co-Chair, the Committee put to vote and unanimously approved the election of a new Co-Chair.

According to the Program's website, the WCCWS program reviews program procedures every five years to amend or enact new rules as needed. Otherwise, procedures can be revised at any time by a majority Committee vote. Prior to a vote for adoption of any amendments, final proposed amendments must be distributed at a regular quarterly meeting, and are announced in advance of the meeting. The most recent program procedures were accepted and adopted by a majority of the program in March 2013.

Decision-making: Decisions are made democratically through a majority vote of the Steering Committee. According to the program website, in cases where a majority vote cannot be reached, the Co-Chairs will make the final decision. If the Co-Chairs cannot reach agreement, the decision falls to the Co-Chair whose state is most affected by the decision.

Members of the WCCWS Committee were asked as part of the research survey to describe their perspective on how the decision-making process works. From this survey data, respondents were consistent in their answers expressing high functionality of the consensus-based decision-making system that is in place. Half of the respondents were cited as using terms such as "group decisions", "consensus", or "agreement" as working well for the program. One respondent stated, "Given the very varied nature of kinds of knowledge within the group it works well. People speak up when they have something to offer, otherwise they listen, learn, and ask questions" (Respondent 1).

With respect to the inquiry on representation and who the major decision makers are, responses varied somewhat. One respondent was consistent with statements from the program website that “Co-Chairs and certain committee members guide decisions on certain issues” (Respondent 10). Another opines a similar stance that “major decision makers vary depending on the topic” (Respondent 7). One member ascertains that although the decision-making process itself works well, representation is not as comprehensive as it could be. The respondent surmises that there is “a fairly responsive and consensual decision process, taking place either at regularly scheduled meetings or, as necessary, online through circulation of background materials by the watershed Management Plan Coordinator, who does an excellent job of communication. However, the representation on the committee is heavily weighted towards nonprofit, organizations, water providers, and extension staff with very little representation from local municipalities. Since the municipalities govern much of what can be done and also can potentially provide matching funding for watershed activities, their absence is sorely felt” (Respondent 3). The MPC upheld this statement, agreeing that some of the smaller municipal areas don’t have representation on the committee.

External Partnership Rules: In addition to the structure and decision processes that govern the WCCWS partnership through program bylaws and operating procedures, existing laws and regulations also impact institutional rules. Table 7.5 is a compilation of some of the protection measures that exist in the watershed as local, county, state, regional or federal statutes, regulations, and programs. This table is not a comprehensive inventory of all the regulatory controls that may be relevant to the

WCCWS program, however it provides a reference of some of the external regulatory mechanisms currently in place.

Table 7.5 Applicable Statutes and Program Protections

Protection	State	
	Pennsylvania	Delaware
Municipal/County	-Pennsylvania Municipalities Planning Code (MPC; Act 247) -Chester County Comprehensive Plan Landscapes [1996] and Landscapes2 [2009]	-Delaware Stormwater and Sediment Regulations -New Castle County Water Resource Protection Area (WRPA) Ordinance [1987] -New Castle County Dept. of Public Works Drainage Code -City of Newark Zoning Regulations -Delaware Code Title 9, Chapters 13, 26, 30
State	-Pennsylvania Stormwater Management Act (Act 167) [1978] -Pennsylvania Municipal Waste Planning Recycling and Waste Reduction Act (Act 101) [1988] -Executive Order: Governor of PA, 1989-2 -Pennsylvania Rivers Conservation Program -Pennsylvania Scenic Rivers Act (P.L. 1277, Act 283) [1972] -Christina Basin TMDLs	-Delaware Land Protection Act [1990] -Source Water Assessment and Protection Program [1999] -Delaware Greenway Program -Delaware Open Space Program
Regional	-Delaware River Basin Compact [1961] -White Clay Creek Preserve and White Clay Creek State Park	
Federal	-National Environmental Policy Act [1969] -Clean Water Act [1972] -Endangered Species Act [1973] -Safe Drinking Water Act [1974] -Resource Conservation and Recovery Act [1976] -EPA Superfund Program	

Moreover, the agencies that play an active role in the WCCWS program, either as Steering Committee members or general partners, have responsibilities associated with their full time obligation to those organizations. During the initial establishment of the White Clay Creek Management Plan, existing management responsibilities were tabulated by entity, and watershed resource category as either maintaining primary or secondary/advisory management roles for subcategories within the major categories (water resources, threatened/endangered species, recreation resources, land resources, historical/archeological resources, and fish/wildlife). The complete management responsibilities dataset can be found in Appendix E.

7.6 Evaluating Institutional Performance

The final sections of this Chapter evaluate the outcomes that are being achieved within the partnership. Evaluative criteria are applied to outcomes and the processes of achieving outcomes. Per IAD, institutional arrangements can be evaluated by established criterion including transaction costs, efficiency, fairness, accountability, and adaptability.

Transaction Costs: Transaction costs can include a broad spectrum of dimensions. For this research, transaction costs identified by the IAD framework that are utilized as evaluative criteria are information costs (sharing information), coordination costs (coordinating activities), strategic costs (agreeing on management strategies), and building new relationships with stakeholders. The WCCWS Committee members were asked to provide a score for the level of difficulty experienced from 1 (very low) to 5 (very high) with respect to the committee's experiences in working with partnering organizations (Table 7.6).

Table 7.6 Transaction Costs Reported by the WCCWS Committee

Transaction Costs	Mean Value (0-5)	STDEV	N=
Coordinating Activities	3.00	1.10	11
Sharing Information	2.73	0.90	11
Building new relationships with stakeholders	2.45	0.82	11
Agreeing on management strategies	2.27	0.90	11
<i>Key: [Level of Difficulty] 1=very low; 2=low; 3=moderate; 4=high; 5=very high</i>			

Sharing Information: Actors and participants should have the opportunity to express their information needs, direct information production, exchange, and discuss data and viewpoints in order to develop a shared knowledge base and mutual understanding of the system to be managed and problems that occur (Raadgever et al., 2008). To broaden the knowledge base and prevent selective information use, institutional mechanisms should be put in place to ensure that all available information is used (ibid). Scores amassed from the committee members indicate a somewhat low mean value (2.73) for the information costs variable, operationalized in this research as sharing information. This score indicates a low to moderate level of difficulty of the partnership in sharing information. According to the WCCWS MPC, at times it can be difficult to share information among members of the committee and also with partnering organizations. Although the MPC specifically indicated her willingness to share information and data that is available, that data must still must actively sought out by the individual or entity that desires or has a need for that information. Ostensibly, communication plays an ancillary role in the facilitation of information sharing. Plainly stated by the MPC, “it would be nice to have a centralized location for all the data that has been and is currently being collected in the watershed.” This would likely result in the development of an overall improved technical capacity, more

mutual understanding, a shared vocabulary, and shared insights (Raadgever et al., 2008).

Coordinating Activities: Institutions are especially significant when a task requires coordination, as is the case with a bi-state watershed partnership. Given the organizational and physical complexity involved with such conjunctive management, it is likely to require considerable amounts of coordinated behavior (Blomquist et al., 2004). Overall scoring for coordination costs discerned by committee members were ranked as moderate (mean rating of 3.00). The sentiment reflected by the MPC was positive but resolute that “coordination is possible, but it takes a considerable amount of work”. The mean score for coordinating activities was the highest of the transaction cost variables, illustrating that although the result was only rated as moderate difficulty, of the four costs examined, coordination costs of the partnership were attributed the greatest difficulty by committee members.

Agreeing on Management Strategies: Because the partnership operates under the established condition that decisions are made democratically and through consensus, strategic costs (agreement of management strategies) is considered an important evaluative variable. To quote the MPC, “few things are easy but nothing is impossible” and one strength of the partnership lies in the members’ “ability to work with others and find shared goals”. The mean score prescribed by committee members gives assent to this statement, as it is the lowest (2.27) assigned to the transaction costs.

Building Relations with New Stakeholders: Finally, building relationships with new stakeholders also scored low (2.45), indicating the perceived low extent of difficulty in executing this category within the partnership.

Overall, scores rating the transactions costs (sharing information, coordinating activities, agreeing on strategies, building relationships) experienced by the committee resulted in values that represented low to moderate difficulty. It could be therefore ascertained that while the committee perceives relatively low difficulty in these categories, there is still the potential for progress, especially in coordinating activities.

Table 7.7 Institutional Performance Reported by the WCCWS Committee

Evaluation Criteria	Mean Value (0-5)	SDEV	N=
Fairness	5.00	0.00	12
Efficiency	4.50	0.52	12
Adaptability	4.33	0.65	12
Accountability	4.27	0.79	11
<i>Key: 1=Very Low; 2=Low; 3=Moderate; 4=High; 5=Very High</i>			

Efficiency in the economic sense is determined by the magnitude of net benefits associated with an allocation of resources. The concept of efficiency plays a central role in studies estimating benefits and costs or rates of return on investments, which are often used to determine the economic feasibility or desirability of public policies (Ostrom, 2011). When asked to rate efficiency (making the most productive use of resources) as criteria for evaluating the WCCWS program on a scale of 1(very low) to 5 (very high), committee members responded with a mean value of 4.50. According to the MPC, the program “needs more money to be very efficient, but we are also using the resources we do have quite efficiently”.

Equity as measured by fairness (all participants have a voice), received the highest criteria score with unanimous 5.00 ratings given by all survey respondents. Fairness cited as very high by the MPC is a result of all participants being encouraged

to share their voice and opinions. Additionally, all meetings are open to the public in a setting that welcomes comment and participation from local citizens.

Accountability (decision makers are accountable to stakeholders for their actions) received the lowest score (4.27) by committee members, though the criterion is still rated as high. The MPC attributes lower accountability to the limited resources and associated limited projects that the committee can execute and is responsible for. The cities, townships, and boroughs (specifically the elected officials) are more accountable than the committee itself. WCCWSP is only accountable for projects set out by the board under leadership.

If an institutional arrangement isn't adaptable, or is too inflexible to cope with unique conditions, it is unlikely to prosper (Ostrom, 2011). The committee scored adaptability (to new circumstances) as a mean value of 4.33. The committee has an annual work plan that is established for each year that cannot be changed, but it is purposefully kept extremely broad to allow for versatility if issues arise or goals shift. The committee can submit a reallocation of appropriated funds to the National Park Service, but this has to undergo a re-appropriation process. It is important to note that these criteria used to measure institutional performance of the committee (fairness, efficiency, accountability, and adaptability) have been observed only by those persons involved with the committee, and thus may be biased.

7.7 Evaluating Partnership Success

Committee members were asked to score the importance of a number of factors that promote collaboration between WCCWS partners (Table 7.8). All factors were rated as very or extremely important, and communication received the highest mean score of 4.73. The MPC asserts that the WCCWS program can help government

and other partner organizations achieve their own goals by “open lines of communication, sharing what the program is doing, and by creating an overlap in missions and goals”. Another curious finding of the reporting of these factors by the committee was that trust received the lowest mean value (4.09). While this score would still classify as being ‘very important’ to the committee, it is curious that despite being a critical element in building social capital according to many political scientists, trust would come out with the lowest score.

Table 7.8 Factors that Promote Collaboration Between WCCWS Partners

Item	Mean Value (0-5)	STDEV	N=
Communication	4.73	0.90	11
Leadership	4.64	0.92	11
Shared Vision	4.45	0.82	11
Time	4.36	0.67	11
Planning	4.27	0.90	11
Flexibility	4.18	0.98	11
Trust	4.09	1.22	11
<i>Key: 1=Not Important, 2=Slightly Important, 3= Moderately Important, 4=Very Important, 5= Extremely Important</i>			

Survey Respondents were asked to identify internal and external factors that affect the WCCWS program’s ability to achieve its goals; internal factors being variables within the partnership and external variables being outside the scope of the partnership itself, but within the larger action situation. This question was posed to the committee as open ended; therefore responses were coded contextually and characterized by broad categories. The responses are summarized in Table 7.9 by identified factor and number of committee members who referenced that factor.

Table 7.9 Internal and External Factors that Influence WCCWS Success

Internal Factors [#]	External Factors [#]
Funding [9]	NPS Funding [2]
Human Resources [6]	Local/Community Support [2]
Time [4]	State Rules, Regulations, Enforcement [2]
Planning [1]	Political Climate [1]
	Education [1]

Overwhelmingly, the most common denoted factor intrinsic to the partnership in influencing success in meeting goals was funding, cited by nine of the respondents. Two people specified the apportioning of federal dollars (NPS) as an influential external factor. Beyond the evident significance of funding, multiple respondents referenced various dimensions of human resources as an important factor inherent to the committee. For example, one response emphasized that a “lack of new members and energy to carry out tasks or stimulate new ideas and activity” can stymie achievement of goals (Respondent 9). One participant recognized “having a great administrator (MPC) and committee members who work well together” (Respondent 4). Others focused on the limits that stem from the part-time status of the watershed MPC contending, “more could be accomplished with a full-time position” (Respondent 3) and the MPC “needs more consistent and dependable support, with money to pay for it” (Respondent 7). Another confirms, “one person can only handle so much” (Respondent 11). The MPC concurred with these statements conforming, “the Steering Committee plays a great advisory role, though it would be nice to have more staff such as a volunteer or communications coordinator... the program just cannot grow right now”.

Others’ Goals: Additionally, a query was posed to the Steering Committee members inquiring how the WCCWS program could most assist government and other

organizations to achieve their goals. As a partnership, the goals of external government and nongovernment entities and organizations are considered equally important to the WCCWS program in management strategies within in the watershed. Several respondents delineated education, communication, and informed conversations as essential. One asserted by “providing timely and accurate information regarding issues facing the watershed” (Respondent 2). Another enumerated that “regarding governments, the committee should ask their boards what their goals are, rather than assuming them; this requires a great deal of face time and preparation” (Respondent 3). In a similar respect, an important consideration is to “keep the most current issues and program before all government and nongovernment entities so they are fully informed on how what they do impacts the White Clay” (Respondent 11). Another statement encapsulates this same conviction of open dialogue, “It all starts with communication and identifying the entities that really want to do something; talk is cheap but action is what makes the difference” (Respondent 7).

Some other committee members focused on sharing human and capital resources with these entities to reduce costs. For example, “providing trained volunteers can reduce implementation and monitoring costs” for those agencies (Respondent 9). One reference was made about how the WCCWSP working to improve water quality helps these entities “meet municipal permit requirements and improves drinking water quality” which might indirectly cut costs for treatment (Respondent 4). Dollars are always an integral component; “Matching funding support has been very valuable toward leveraging additional support. Raising the profile of the White Clay as a community resource, and what people can do to take action has been an important role in gaining public support for change” (Respondent 10).

Measuring Success: Finally, the survey asked committee members to describe how they measure success of the WCCWS Committee. Generally, the responses were highly empirical, but nonetheless these views are still valuable in understanding how members within the committee may perceive success differently. According to the MPC, how you measure success in a partnership like this really depends on where people's ideals are.

For one, preserved lands (such as parcel easements) and restoration areas (such as riparian buffers or trees planted) were identified as a means of estimating progress. Some respondents were broad, indicating that to them success is equivalent to "the degree that the White Clay Watershed is protected" (Respondent 2). For the MPC, acres of preserved land, stream miles of buffers planted, and BMPs installed serve as some indication of progress and success. Ultimately, the program has a watershed-wide goal of 40% reforestation, but as time goes on willing landowners may run out. Still, another upholds "New parcels of land are being eased. Trees are being planted to increase riparian buffers. Stream contamination is being mitigated. Some goals take time but in general the committee is very successful in achieving goals" (Respondent 6).

Others considered more tangible forms of measuring and reporting success including quarterly updates and annual program reports. "Progress is tracked through the quarterly updates and work being done through the various subcommittees in conjunction with many partnering groups and municipalities" (Respondent 11). In addition the committee produces an annual report that lists the past year's successes. "Mostly these are achievements of goals that were established jointly during the course of the year and during budget preparation" (Respondent 4). The MPC purports

the program website and social media applications can also provide stats on reaching people and whether the program audience has expanded. Overall, though according to the MPC there isn't necessarily money to measure these variables, which makes systematically tracking and measuring success difficult.

7.8 Environmental Outputs

While perceptions are a useful indicator of success, more objective data are examined in the final section of this Chapter. Interview, documents, and available datasets provide details about the WCCWSP's environmental and social outputs.

Dam Removal: The removal of Dam No. 1, also known as the Byrnes Mill Dam in December 2014 was a major accomplishment in the watershed, as the removal opened up four miles of river corridor for fish and was the first dam removal in the state. The University of Delaware Water Resources Agency led this project with many partners including the American Rivers, NOAA, NPS and others. The WCCWSP funded a portion of the historic aspect of the dam removal specifically. In total, about \$210,000 was spent in planning and removal of the dam. The WCCWS program continues to work with partner organizations where possible to support similar projects for other obsolete dams along the creek.

Land Preservation: Land preservation, such as open space and conservation easements, is a factor that committee members distinguished as a measure of partnership success. Identified in 2001 by the White Clay Management Plan, a cursory inventory determined at the time just 10% or 7,096 acres of the watershed was protected open space. According to data from the Brandywine Conservancy, from 2005 to 2015, opens space acreage in White Clay increased significantly in every category (Figure 7.4). In total, preserved acres increased from 11,611 acres in 2005 to

20,005 acres in 2015. With approximately 69,000 acres of land area in the watershed, this 2015 figure represents about 29% of protected open space in White Clay.

Conservation easements and homeowner open space categories exhibited the greatest increase acreage with 2,292 and 2,063, respectively. This is particularly significant since, to quote the MPC, “some of the most difficult goals to achieve within the program involve engaging and convincing landowners to participate”. The WCCWSP directly has contributed to the preservation of just under 2,000 acres of open space and \$88,760 directly to land preservation and acquisition (White Clay Creek Wild and Scenic Steering Committee, 2015).

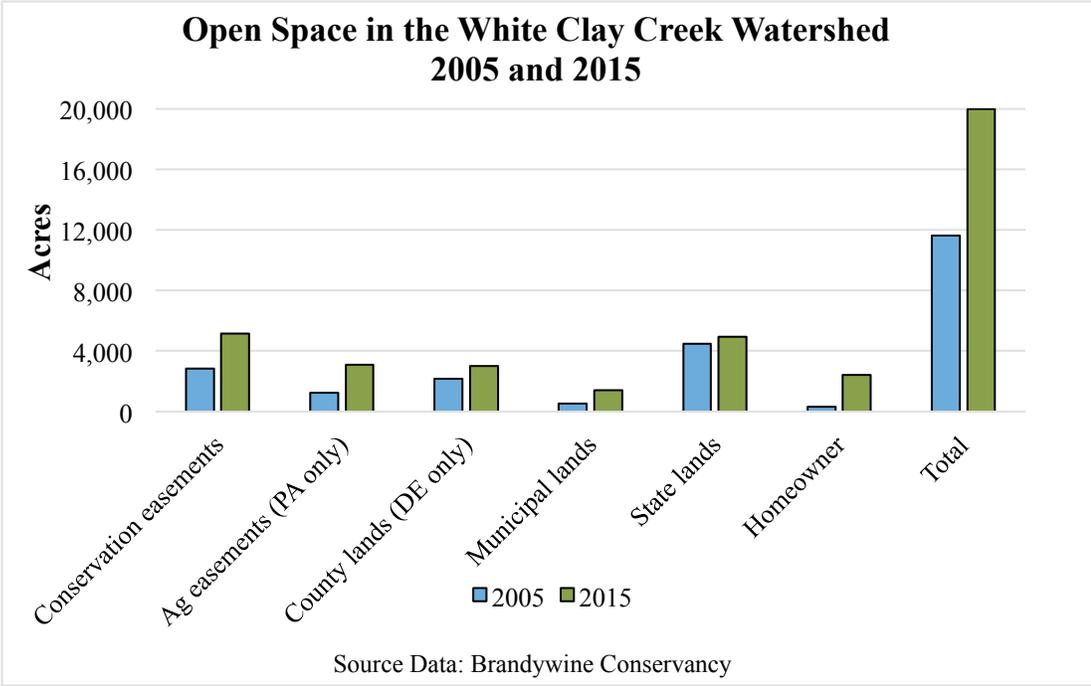


Figure 7.4 Open Space in the White Clay Watershed (2005 and 2015)

Riparian Buffers: A riparian buffer is an area of trees or other vegetation adjacent to a stream or waterbody that forms a transition area between the aquatic and terrestrial environment. Riparian buffers are an essential management tool for water quality and an overall healthy watershed. However, because the majority of the land in the White Clay watershed is privately owned, it can be difficult to plan and install these streamside buffers. The scientifically rigorous White Clay Reforestation Plan has been in place since 2009, and the Brandywine Conservancy completed complementary GIS gap analysis in 2015 to identify gaps in the forests areas of the watershed. Overall, these efforts help strategically guide projects. The information enables the WCCWSP to provide watershed municipalities with detailed maps of priority areas for reforestation and identify smaller projects that each municipality can undertake independently (White Clay Creek Wild and Scenic Steering Committee, 2015). Data compiled by Stroud Water Research Center and the Brandywine Conservancy are summarized in Table 7.10 showing the annual stream buffers implemented in the watershed from 2010 to 2015.

Table 7.10 Riparian Buffers in the White Clay Creek Watershed (2010-2015)

Year	Acreage	Trees Planted	Stream Buffer (linear feet)
2010	10	3000	2400
2012	2.44	1150	1850
2013	8.18	2800	1400
2014	0.6	100	470
2015	12.7	3105	6180
Total	33.92	10155	12300 (2.33 miles)

Source: (Narvaez and Homsey, 2016)

Best Management Practices: In addition to riparian buffers, the White Clay Wild and Scenic Program has also funded a number of other best management practices (BMPs) in the watershed, including stormwater basins, grass swales, and habitat plantings, summarized in table 7.11. These BMPs have been implemented in various public and private locations throughout the watershed in conjunction with different partners.

Table 7.11 WCCWS Program Funded Watershed BMPs (2013-2015)

Year	BMP	Number	Location	Description
2013	Stormwater Basins	3	City-owned land outside the Hunt at Louviers, City of Newark, DE	Retrofitted three stormwater basins (@64,000 ft ²) to improve water infiltration and nutrient uptake from a 53.8 acre drainage area.
2013	Grass Swales	2	Swift Park, Hockessin, DE	Regraded and replanted two (2,500 ft ²) formerly mowed grass swales with native perennial plants.
2014	Rain Basins	2	Goddard Park, London Grove Township, PA	Retrofitted two rain basins (8,500 ft ²) with native vegetation.
2014	Manure Management	1	Heifer Farm, Franklin Township, PA	Installed 1,000 ft of pasture fencing, 470 ft. of stream bank fencing, and planted 0.6 acres of streamside buffer.
2014	Habitat Planting	1	Landenberg Junction Trail Head, New Garden Township, PA	Planted 3,500 ft ² of barren soil in the floodplain.
2015	Manure Management	1	Concentrated Animal Feeding Operation (dairy), London Grove Township	Upgraded current liquid manure storage to a water-tight containment structure with leak-detection line.
2015	Riparian Buffer and Floodplain Enhancement	1	New Garden Township Park, PA	Planted 1,500 linear ft of a second-order stream.
2015	Riparian Buffer and Floodplain Enhancement	1	Curtis Mill Park, Newark, DE	Installed along 300 linear ft of the main branch (1 acre).

Source: (Narvaez and Homsey, 2016)

7.9 Social Outputs

The social outputs of the WCCWSP have been centered around outreach and educating the public about the watershed. Table 7.12 provides a summary of White Clay Wild and Scenic education and outreach programs from 2008 to the present. The major event that the program administers each year is the annual White Clay Creek Fest. The goal of the event is to “raise awareness of the drinking water, scenic, recreational, historical, and natural resource values of the White Clay Creek through various activities and exhibits” (White Clay Creek Wild and Scenic Management Program, 2016). Along with the WCCWSP, the program is hosted by Delaware State Parks and Suez Water Delaware, with participation from a number of exhibitors and vendors. The event is held the first Saturday in May at the White Clay Creek State Park, and a typical schedule of events includes activities such as stream studies, hikes, performances, and presentations.

Table 7.12 White Clay Wild and Scenic Education and Outreach Programs

Program	Description	Year
White Clay Creek Fest	Created and hosted the annual White Clay Creek Fest. Each year attendance has increased, about 100 people attended the inaugural event and 1,400 attended in 2015.	2009–Present
White Clay Creek Symposium	Hosted the first White Clay Creek Symposium focusing on research in the White Clay watershed at the Stroud Research Center with over 40 people in attendance.	2012
City of Newark National Wildlife Federation (NWF) and Community Habitat	Supported Community Habitat workshops in an effort to certify the City of Newark, and educate residents about the importance of native plants and habitats (30 participants each).	2011–2014
Shad in Schools Program	Focused on the culture, history, and biological aspects of American shad while teaching through hands-on activities with shad eggs and fry; reached 149 students directly and 800 students indirectly.	2011–2014
White Clay Creek Passport	Program designed to get families out in the watershed. The passport provides participants with suggested hikes, watershed stewardship activities, and fun facts.	2013–Present

According to the management plan, some goals of watershed education and outreach include: (1) increase general awareness of the watershed and its issues; (2) increase general awareness and appreciation of the natural, cultural, and recreational resources of the watershed; (3) provide education and information to municipalities throughout the watershed to support municipal implementation of the management plan; (4) familiarize residents with BMPs to protect and enhance the resources of the watershed; (5) instill in children a sense of stewardship and pride in the watershed; and (6) provide children the means and opportunity to learn about the watershed in area schools.

Most recently, the WCCWSP has been outsourcing education programs, sponsoring local children from various schools across the watershed to participate in environmental programs at the Delaware Nature Society and Stroud Research Center. The 2015-2016 school year saw an 86% increase in children sent to Stroud for school programs from the previous year; of the 1,500 kids that participated in educational programs at the research center, the WCCWSP supported attendance of 500 of them.

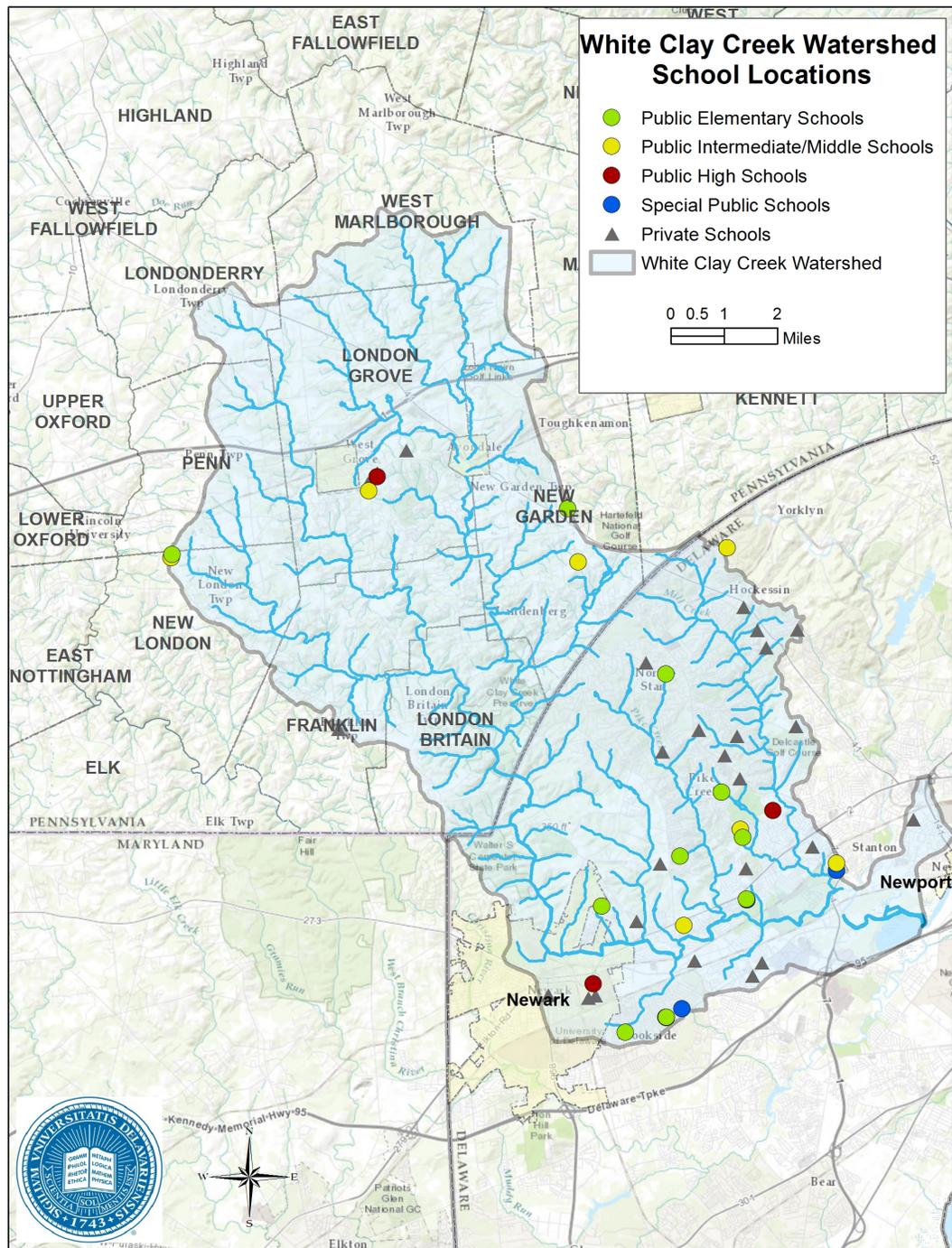


Figure 7.5 Schools in the White Clay Creek Watershed

In addition to sponsoring outreach and educational events and programs, the WCCWS program administers various forms of publications on a regular basis. Two reports on the State of the Watershed have been published with the assistance of the UD WRA (2008 and 2016) that evaluate the health of the overall watershed based on specified indicators. The Steering Committee and MPC distribute their annual report that outlines progress made that year. In addition to featuring these larger publications, the program's website features monthly blog posts regarding relevant watershed themes and updates. Articles are also submitted to local municipal newsletters in London Grove and New Garden Townships on water-related topics of interest to the local community. E-mail subscribers also receive a Wild and Scenic newsletter via Mailchimp. Stats for audience reached are tracked by the MPC. It was stated in the May 2016 MPC Report to the Committee that the Mailchimp newsletter reached 319 recipients, with a 36.7% average open rate and a click rate of 7.8%. Program website stats were also reported as 383 average visits were reported per month.

The program has also provided funding for a series of nine best management markers (10" x 13" aluminum signs) that are designated for installation in various public spaces, in an effort to passively raise awareness. In a similar endeavor to spread the word about the White Clay, road signs (30" x 24" aluminum signs) were installed in select locations throughout the watershed over a decade ago. Over the past year, the WCCWSP conducted an inventory and assessment of existing watershed signage to determine the presence or absence of signs at known locations and determine their conditions. Funded by the program, over the next year seventeen signs will be replaced at the various locations to remind drivers that they are within the boundaries of the watershed.

Chapter 8

SUMMARY OF FINDINGS

8.1 Summary of Analysis

The previous chapters in this thesis successively cultivate a refined focus down to the level of a case study, the application of a multi-stakeholder collaborative watershed management approach to governing a National Wild and Scenic River. The narrative begins with an explanation of the broad fundamentals of rivers, watersheds and river basins, the actors involved in managing those resources, the policy arena within which they operate, and why partnerships have evidenced as emerging strategies for such. Ensuing is a broad glance at the history of the Wild and Scenic Rivers Act, and how different approaches to management have manifested across the bounty of diverse landscapes that span the United States. This research then selected one of these management strategies, which is a unique application only executed within thirteen national designations. Next, this paper identifies common explanatory variables amid these thirteen rivers under the collaborative management approach, including typical actors, organizational structure, processes, roles and functions within the management sphere. The research then evaluates how this management regime is applied in a case study, using a substantial analytical framework to guide the structure.

White Clay Creek watershed is a unique case study; not only as a Partnership Wild and Scenic River but also as a bi-state, mixed land use watershed that is also a primary drinking water source for the local population. By obtaining insight on the White Clay Creek Wild and Scenic program as a partnership model, trends strengths

and inadequacies were unearthed. Overall, this research sought to understand the structure of the management arrangement, institutional processes, and outcomes that result from working in this particular forum, and to uncover participant perceptions on factors that promote the partnership. The findings from this study suggest factors such as the biophysical structure of the watershed, community attributes, institutional arrangement and rules, and the procured resources have specific implications for partnership management processes and outputs.

8.2 Conclusions and Management Implications

It must be explicitly stated that the findings from this research should not be construed as necessarily indicative of the partnership approach to Wild and Scenic River management in the national realm. There are unique factors that correspond with each federally designated river that employ this management approach and it would certainly be of value in the future for those details to be further explored. Therefore, while this research investigated some of the general institutional characteristics of Partnership Wild and Scenic River management, the findings are confined only to the case study area. Furthermore, the partnership approach to management is not a panacea for all applications of Wild and Scenic River management in the United States. There are particular attributes that are requisite for the initial establishment and realization of this management regime.

Collaborative management efforts in different settings can be impacted by diverse sets of variables. A gamut of variables might potentially range from the level of human capital (e.g., income, education) and social capital (e.g., trust, networks, norms of reciprocity) in watershed communities, to the financial, technical, and human resources made available by government agencies, nongovernmental agencies,

academic entities, and local citizens (Hardy and Koontz, 2010). Public policymaking and implementation (and consequently watershed planning and management) is increasingly being handled via local, consensus-seeking partnerships involving the stakeholders that are most affected (Leach et al., 2002). It is expected then that formalizing methods in research to study these institutional arrangements, their functionality, and measures of success will provide useful value in the broader policy sense.

The data collected, the conclusions reached from the preceding results in this research, and their implications for Wild and Scenic River management in the White Clay Creek watershed depict a few important final takeaways, with respect to the overarching research questions presented in Section 1.3. This research of the White Clay Creek Wild and Scenic Program offers the following conclusions:

1. Structural Arrangement: The White Clay Wild and Scenic Program is characterized by a bi-state, interagency nontraditional management framework. The structure is based on the underlying principle that existing institutions and authorities provide the foundation for the long-term protection of the watershed. The program and its actors include a syndication of all government units including local municipalities, counties, states, and the National Park Service, as well as nonprofits, nongovernmental organizations, educational and research institutions, water purveyors, business and industry, private landowners, and residents. This structure is intended to merge multifarious interests together under a common purpose and within a permanent and representative body.

2. Biophysical Characteristics: Invasive species was the environmental parameter of concern within the watershed that unexpectedly scored highest (4.27) by

WCCWS Committee respondents. Nonpoint source pollutants including nutrients in water and stormwater runoff were characterized as the second highest scoring variables (4.00). Water supply and quantity received the lowest score (2.88) demonstrating low concern by the committee. The results of these scores are directly correlated with the composition of the committee members as survey respondents, and their associated individual priorities. It would be reasonable to ascertain that the perceived concern for certain parameters guide or direct the management strategies and project focus of the committee.

3. Community Attributes: The watershed is neither homogeneous temporally (in terms of program partners, political conditions, and elected officials), nor spatially (in terms of land cover, number of political boundaries, and municipal participation). This heterogeneity contributes to impediments in terms of implementation of uniform management strategies within the watershed across various political jurisdictions and the state border.

4. Institutional Processes and Outcomes: The WCCWS program performs in a strictly advisory capacity and executes the major role of providing information and recommendations to existing watershed entities with regulatory and management authority. There are important institutional rules and processes that govern the partnership both internally (memorandum of understanding, program bylaws, and committee meeting procedures) and externally (existing regulations, laws, and agency responsibilities). Democratically oriented, consensus-based decision-making precipitates all determinations made within the program; as such members of the committee unanimously scored fairness as the highest performance measure (5.00). In terms of outcomes, the program generates mostly social outputs focused on watershed

education, outreach, and publications aimed at children and watershed residents. Environmental outputs include the implementation or support of best management practices, dam removal, and land preservation.

5. Factors that Promote WCCWS Partnerships: First, financial resources are an enormously influential factor in the WCCWS program in its success and ability to carry out projects to meet goals set out by the management plan. Ultimately, committees and watershed partnerships in general can only do so much with the limited budgets and resources they have available. Federal backing by the National Park Service and congressional funding support is rudimentary, especially for Partnership Wild and Scenic Rivers in the formidable initial years of developing management strategies and establishing partnerships. Later, leveraging funding from partner agencies becomes more crucial. Diverse funding sources, despite certain benefits, may create limits for project application where funds may be associated with specific constraints on timeline, use appropriation, or state implementation.

Human resources, participants, and their level of knowledge, awareness, and participation are integral components in the functionality of a watershed partnership. In the case of White Clay, it appears that there is indeed a need for paid full-time program staff. There has been some suggestion for the consideration of expanding the role to be a full-time river administrator, though this would directly depend on resource availability. The MPC is highly valued as a vital resource for the committee, partners, and program overall but at times can be stretched thin.

As an institution operating under the overarching rule of consensus-based decision-making, communication by program participants is absolute key; communication between the MPC and the committee, between committee members,

with other current and future partners, and even with other Partnership Wild and Scenic Rivers. Strengthening all lines of communication is healthy for the individual relationships that are built within the program itself, and the watershed by extension.

8.3 Recommendations for Future Research

Data collection and conclusions procured via this research yield the following recommendations for future studies in the area of governance for Wild and Scenic Rivers:

1. Augment the Literature: Generally speaking, while technical reports, policy briefs, and other interagency publications on Wild and Scenic Rivers abound, there is minimal existing academic literature on effective management schemes for these rivers. As discussed in Chapter 3, there are several mechanisms for distributing Wild and Scenic River designations, and various federal or state agencies that are responsible for management of those river corridors and surrounding buffer area. It would benefit scientists, researchers, managers, and policymakers alike to increase the frequency and systemic study of these federal rivers in an erudite manner to uncover more of the preexisting management conditions and implications that are associated with regions or clusters of rivers under the federal system.

2. Streamline Wild and Scenic River Datasets: Additional research is needed in a more general sense for streamlining available Wild and Scenic River datasets. It would be beneficial for the National Park Service, American Rivers, the group of Partnership rivers, or another proficient entity with the means, to compile all available data in a consistent format that can be easily accessed and regularly updated. Such data may potentially include river segment characteristics, demographic data, income, land use, water quality, program resource data such as annual federal funding and

annual leveraged funding, measureable figures such as land preservation, restoration areas, and geospatial data. While a preliminary attempt at compilation of such data was carried out as part of this research for the PWSRs (Section 4.3), a more robust compendium of data would be valuable to future researchers carrying out any analyses of similar in nature within this area.

3. Conduct Institutional Analyses of Other Partnership Wild and Scenic

Rivers: There are a number of other applications that could be explored related to similar research that may build upon this investigation. Although the results of this research cannot be generalized to other Partnership Wild and Scenic Rivers, the underlying methodology may be modified and used to similarly perform an institutional analysis of any individual river that falls within the PWSR cluster. Analogous interview questions and survey instrument may be used for such studies. Further, as opposed to an individual case study, a similar analysis would provide value if two PWSRs were to be institutionally compared. For example, the White Clay Creek and the Lower Delaware River are the only two PWSRs that are interstate watersheds and thus may compared under this common characteristic. Also, the White Clay Creek and Eightmile River are the only two PWSRs designated on a watershed basis, and thus an institutional investigation may provide compelling insight via such comparison. Lastly, if the aforementioned datasets were to be successfully streamlined, a more detailed analysis that includes all of the thirteen PWSRs may be useful. Such studies would likely serve the Partnership Wild and Scenic River community well in terms of opening up the lines of communication to share ideas with one another.

4. Expand White Clay Analysis to Survey Past and Future Committee

Members: One of the identified limitations of this research is the temporal limitation of the study; the data collected and reported in this thesis is not representative of the White Clay Creek Wild and Scenic Program over its entire lifecycle, and is not emblematic of past or future partnership conditions. Thus, another extension of research specific to this case study might also include a follow up survey to WCCWS Committee members in the future, to evaluate if and how perceptions of institutional management have changed over time, and if processes and outcomes have shifted as a result. Similarly, past Management Plan Coordinators, Co-Chairs, and committee members survey responses could also be collected using the same methods to measure past change in partnership perceptions.

Certainly a watershed-wide collaborative approach to protecting the White Clay Creek Wild and Scenic River and its associated resource values is no small feat. The geographic, political, and social hurdles inherent to diverse groups of people that are responsible and have a stake in this common resource makes management substantially complex. Although there is always progress to be made, the White Clay Creek watershed can serve as an example and success story for other Partnership Wild and Scenic Rivers, as well as in the context of interstate watershed management for the rest of the United States.

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- Wild and Scenic Rivers Act (1968) Pub. L. No. 90-542, as amended, 16 U.S.C. 1271-1287.

Appendix A

UNIVERSITY OF DELAWARE INSTITUTIONAL REVIEW BOARD

IRB Review Status: Exempt



RESEARCH OFFICE

210 HULLIHEN HALL
UNIVERSITY OF DELAWARE
NEWARK, DELAWARE 19716-1551
Ph: 302/831-2136
Fax: 302/831-2828

DATE: April 13, 2016

TO: Kristen Molfetta
FROM: University of Delaware IRB

STUDY TITLE: [892556-1] An Institutional Analysis of the Partnership Approach to Wild and Scenic River Management

IRB REFERENCE #:
SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: April 13, 2016

REVIEW CATEGORY: Exemption category # (2)

Thank you for your submission of New Project materials for this research study. The University of Delaware IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will put a copy of this correspondence on file in our office. Please remember to notify us if you make any substantial changes to the project.

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or nicolefm@udel.edu. Please include your study title and reference number in all correspondence with this office.

cc:

Course Completion for Human Subjects Research

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM) COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Kristen Molfetta
- **Email:** kmolfet@udel.edu
- **Institution Affiliation:** University of Delaware (ID: 1198)
- **Phone:**

- **Curriculum Group:** Course In The Protection Human Subjects
- **Course Learner Group:** Human Subjects Protections - Social-Behavioral-Educational Focus - All UD Researchers/Faculty/Staff
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19243192
- **Completion Date:** 04/10/2016
- **Expiration Date:** 04/10/2019
- **Minimum Passing:** 85
- **Reported Score*:** 99

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction (ID: 1127)	04/10/16	3/3 (100%)
Students in Research (ID: 1321)	04/10/16	5/5 (100%)
History and Ethical Principles - SBE (ID: 490)	04/10/16	5/5 (100%)
Defining Research with Human Subjects - SBE (ID: 491)	04/10/16	5/5 (100%)
The Federal Regulations - SBE (ID: 502)	04/10/16	5/5 (100%)
Assessing Risk - SBE (ID: 503)	04/10/16	5/5 (100%)
Informed Consent - SBE (ID: 504)	04/10/16	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	04/10/16	5/5 (100%)
Research with Prisoners - SBE (ID: 506)	04/10/16	5/5 (100%)
Research with Children - SBE (ID: 507)	04/10/16	5/5 (100%)
Research in Public Elementary and Secondary Schools - SBE (ID: 508)	04/10/16	5/5 (100%)
International Research - SBE (ID: 509)	04/10/16	5/5 (100%)
Internet-Based Research - SBE (ID: 510)	04/10/16	5/5 (100%)
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	04/10/16	4/5 (80%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	04/10/16	5/5 (100%)
University of Delaware (ID: 12245)	04/10/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
 Email: citisupport@miami.edu
 Phone: 305-243-7970
 Web: <https://www.citiprogram.org>

**COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)
COURSEWORK TRANSCRIPT REPORT****

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Kristen Molfetta
- **Email:** kmolfet@udel.edu
- **Institution Affiliation:** University of Delaware (ID: 1198)
- **Phone:**

- **Curriculum Group:** Course In The Protection Human Subjects
- **Course Learner Group:** Human Subjects Protections - Social-Behavioral-Educational Focus - All UD Researchers/Faculty/Staff
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 19243192
- **Report Date:** 04/10/2016
- **Current Score**:** 99

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Students in Research (ID: 1321)	04/10/16	5/5 (100%)
History and Ethical Principles - SBE (ID: 490)	04/10/16	5/5 (100%)
Defining Research with Human Subjects - SBE (ID: 491)	04/10/16	5/5 (100%)
Belmont Report and CITI Course Introduction (ID: 1127)	04/10/16	3/3 (100%)
The Federal Regulations - SBE (ID: 502)	04/10/16	5/5 (100%)
Assessing Risk - SBE (ID: 503)	04/10/16	5/5 (100%)
Informed Consent - SBE (ID: 504)	04/10/16	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	04/10/16	5/5 (100%)
Research with Prisoners - SBE (ID: 506)	04/10/16	5/5 (100%)
Research with Children - SBE (ID: 507)	04/10/16	5/5 (100%)
Research in Public Elementary and Secondary Schools - SBE (ID: 508)	04/10/16	5/5 (100%)
International Research - SBE (ID: 509)	04/10/16	5/5 (100%)
Internet-Based Research - SBE (ID: 510)	04/10/16	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	04/10/16	5/5 (100%)
Conflicts of Interest in Research Involving Human Subjects (ID: 488)	04/10/16	4/5 (80%)
University of Delaware (ID: 12245)	04/10/16	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
 Email: citisupport@miami.edu
 Phone: 305-243-7970
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Appendix B

RECRUITMENT E-MAILS

PWSR Research Interview Inquiry for River Administrators

My name is Kristen Molfetta and I am a master's student at the University of Delaware (UD) in the Water Science and Policy program. In addition to my role as a research assistant at the UD Water Resources Agency, I have been working with the White Clay Creek Wild and Scenic program for the last couple of years as a student intern. This work has really facilitated the research interest for my master's thesis topic, which focuses on the unique "partnership" governance model that each of your wild and scenic rivers employ in the approach to management.

As a crucial element of my analysis, I am in need of specific information about factors that promote partnerships within Partnership Wild and Scenic Rivers. I have developed a set of interview questions and was hoping I could speak with you to administer these questions. I can be very flexible in terms of conducting these interviews (either by phone, e-mail, or in person) and they should only take about an hour of your time. Participation in the interview is completely voluntary. Your responses will ultimately be kept anonymous, as the data collected from the interview will be used in the overall assessment of the partnership approach to Wild and Scenic River management. Finally, if you wish to see the results of my study, culminating with my masters thesis, please let me know and I can send you the final draft once the interviews and subsequent analysis are complete. Please know that your participation in this interview is completely voluntary.

I realize that time is not always abundant for sending responses to graduate students, but your insight and expert knowledge would be invaluable in this research. Thank you for this consideration, and I appreciate hearing from you as soon as possible to set up a meeting time to discuss. If you have any further specific questions or concerns please do not hesitate to let me know.

Sincerely,
Kristen Molfetta
kmolfet@udel.edu

PWSR Research Survey Inquiry for WCCWS Committee Members

As a member of the White Clay Creek Wild and Scenic Management Committee, you have been invited by the WCC Wild and Scenic Student Intern to participate in a brief online research survey. The goal of this research is to collect information that helps describe some of the factors that affect the collaborative or 'partnership' approach to Wild and Scenic River management within the White Clay Creek. Some of these factors include management processes, goals, and outcomes (such as performance of the management committee and progress on environmental issues within the watershed). This research will be compiled and culminated with the intern's Masters thesis, and the final document can be shared with all committee members if interested. The survey should take approximately 10-15 minutes to complete. Please note that while there is a space for respondent name and organization, this is simply for tabulating purposes. Anonymity will be maintained throughout, and individuals can be assured that they will not be linked directly to their responses.

I greatly appreciate your time and effort assisting with this study. If you have any questions, please don't hesitate to contact me.

Kristen Molfetta (kmolfet@udel.edu)
White Clay Wild and Scenic Program Student Intern
Graduate Public Administration Fellow
University of Delaware Water Resources Agency

Appendix C

RIVER ADMINISTRATOR INTERVIEW QUESTIONS

Partnership Wild and Scenic River (PWSR) Name: _____

Respondent Name: _____

Respondent Organization Name: _____

1. *[Environmental Issues]* What are the major environmental issues in your river corridor or watershed related to nonpoint source pollution?

2. *[Institutional Framework & Performance]* a. What additional organizations do you partner with? b. Please estimate on a scale of 1 (low) to 5 (high) the performance of your PWSR in terms of the following items:

(Please circle one number for each item)

Item	Quality of Performance				
	Low		Medium		High
Efficiency (making the most productive use of resources)	1	2	3	4	5
Fairness (all participants have a voice)	1	2	3	4	5
Accountability (decision-makers are accountable to stakeholders for their actions)	1	2	3	4	5
Adaptability (to new circumstances)	1	2	3	4	5

3. *[Decision Process and Structure]* a. How does the decision-making process work? Who are the major decision-makers for local river corridor/watershed management?
b. Are there any local stakeholders that are excluded?

4. *[Goals/Measuring success]*

a. How do you measure success?

b. To what extent are sought out goals being achieved?

c. What goals are most difficult to achieve and what are the associated obstacles?

d. What goals are the easiest to achieve and what are the associated facilitating factors?

5. [Progress]

To the best of your knowledge, please identify on a scale of 1(low) to 5(high) the level of progress needed for your PWSR to meet its goals in terms of the following items (at present, and in the immediate future).

(Please circle one number for each item)

Item	Level of progress needed to meet goals				
	Low		Medium		High
Land Conversion	1	2	3	4	5
Stormwater Runoff	1	2	3	4	5
Flooding	1	2	3	4	5
Water Supply (quantity)	1	2	3	4	5
Toxics in water	1	2	3	4	5
Sedimentation	1	2	3	4	5
Nutrients in water	1	2	3	4	5
Bacteria in water	1	2	3	4	5
Invasive Species	1	2	3	4	5
Species Diversity	1	2	3	4	5
Loss of Wetlands	1	2	3	4	5
Habitat Loss	1	2	3	4	5
Other: Please Specify	1	2	3	4	5

6. [Outcomes]

a. What are the specific environmental outcomes of your PWSR? (Check all that apply)

Environmental Outcomes	
Dam Removal	
Riparian Restoration	
BMP Implementation	
Trail Development	
Land Preservation	
Invasive Species Eradication	
Improved Water Quality	
Other (Specify):	

b. What are the specific social outcomes of your PWSR? (Check all that apply)

Social Outcomes	
Outreach	
Education	
Newsletters	
Websites	
Volunteer Monitoring	
Other (Specify):	

c. What are the public policy changes attributed to your PWSR? (Check all that apply)

Policy Changes	
Ordinances	
Comprehensive Planning	
TMDLs	
Other (Specify):	

7. *[Culture/Community Attributes]* How do local community characteristics affect watershed management?

8. *[Internal and External Factors]* What internal and external factors do you think affect your PWSR's ability to achieve its goals?

9. *[Scope of influence]*

a. How have government or external organizations impacted your Wild and Scenic management committee/council's goals, activities and outcomes? (e.g., data collection, technical assistance) b. What government or external organizations are most important to the success of your PWSR?

10. *[Collaboration]*

a. How can your Wild and Scenic management committee/council most assist government and external nongovernmental organizations achieve their goals? b. What factors would promote improved collaboration within your network? (e.g., trust, communication)

11. *[Financial, Technical, Human Resources]*

a. What types of financial resources are available to your Wild and Scenic River? What are the main funding sources? What is your annual budget?
 b. What types of technical resources are available to your Wild and Scenic River?
 c. What types of human resources are available?

12. *[Transaction Costs]*

Please estimate on a scale of 1(low) to 5(high) how easy or difficult it is for your PWSR management committee to collaborate with external partnering organizations in terms of the following items:

(Please circle one number per item)

Item	Level of Difficulty				
	Low	Medium	High		
Sharing information	1	2	3	4	5
Coordinating activities	1	2	3	4	5
Agreeing on management strategies	1	2	3	4	5
Building new relationships with stakeholders	1	2	3	4	5

Appendix D

MANAGEMENT COMMITTEE SURVEY INSTRUMENT

1. Respondent Name and Organization: _____

2. How does the decision-making process work within the White Clay Wild and Scenic Management Committee? Who are the major decision-makers for local watershed management?

3. Please estimate on a scale of 1 (very low) to 5 (very high) the performance of the White Clay Wild and Scenic Management Committee in terms of the following items:

Item	Quality of Performance				
Efficiency (making the most productive use of resources)	1	2	3	4	5
Fairness (all participants have a voice)	1	2	3	4	5
Accountability (decision-makers are accountable to stakeholders for their actions)	1	2	3	4	5
Adaptability (to new circumstances)	1	2	3	4	5

4. How do you measure success of the White Clay Management Committee? To what extent are sought out goals being achieved? What goals are most difficult to achieve? Easiest?

5. To the best of your knowledge, please identify on a scale of 1(very low) to 5(very high) the level of progress needed for White Clay to meet its goals in terms of the following items:

Item	Level of progress needed to meet goals				
Land Conversion	1	2	3	4	5
Stormwater Runoff	1	2	3	4	5
Flooding	1	2	3	4	5
Water Supply (quantity)	1	2	3	4	5
Toxics in water	1	2	3	4	5
Sedimentation	1	2	3	4	5
Nutrients in water	1	2	3	4	5
Bacteria in water	1	2	3	4	5
Invasive Species	1	2	3	4	5
Species Diversity	1	2	3	4	5
Loss of Wetlands	1	2	3	4	5
Habitat Loss	1	2	3	4	5
Other: Please Specify	1	2	3	4	5

6. How do local community characteristics affect watershed management in White Clay?

7. What internal and external factors do you think affect the White Clay Management Committee's ability to achieve its goals?

8. How can the White Clay Management Committee most assist government and external nongovernmental organizations achieve their goals?

9. How important are the following factors in promoting improved collaboration within the committee and its network?

Item	Not Important	Slightly Important	Moderately Important	Very Important	Extremely Important
Trust	1	2	3	4	5
Communication	1	2	3	4	5
Shared Vision	1	2	3	4	5
Time	1	2	3	4	5
Planning	1	2	3	4	5
Leadership	1	2	3	4	5
Flexibility	1	2	3	4	5

10. Please estimate on a scale of 1(very low) to 5(very high) the level of difficulty that the management committee experiences in collaborating with external partnering organizations in terms of the following items:

Item	Level of Difficulty				
Sharing information	1	2	3	4	5
Coordinating activities	1	2	3	4	5
Agreeing on management strategies	1	2	3	4	5
Building new relationships with stakeholders	1	2	3	4	5

Appendix E

WCC AGENCY MANAGEMENT RESPONSIBILITIES

1 = Primary; 2 = Secondary or Advisory	WATER RESOURCES						
Agency	Water Supply	Water Quality	Stream Flow	Ground water	Const. Permit	Stream Discharge	Wet land
Municipal							
Town Board Supervisors, PA	1	1	1, 2	1			1
Planning Commissions, PA	2	2	2	2			2
Zoning Hearing Boards, PA							
Newark City Council, DE	1	1		1			1
Newark Planning, DE		2		2			2
Parks & Rec (PA&DE)							
Historical Commissions							
Private							
Homeowner Assoc.		2					2
WCWA		2					2
DE Nature Society		2					
Brandywine Conservancy		2					2
Stroud		2					2
The Nature Conservancy		2					2
UDWRA	1	1					
County							
Chester County WRA	1			1			
Chester Conservation Distr.		1					
New Castle Dept. Land Use				2			
New Castle Conserv. Distr.		1					
State							
PADEP		1		1	1	1	1
PA/DE State Historic Preservation Office					2		
DNREC Fish & Wildlife			2				
DNREC Parks & Rec							2
DNREC Div. Of Water	1	1	1	1		1	1
Regional							
DRBC	1	1	1	1	1	1	2
WCC Bi-State Preserve		1	1	1			1
Federal							
EPA		1		1	2	1	1
U.S. FWS		2			2	2	1
U.S. ACOE					1		1
NRCS		1					

1 = Primary 2 = Secondary or Advisory	THREATENED & ENDANGERED SPECIES				
Agency	Pop.	Nominations	Inventory	Monitoring	Habitat Enhance.
Municipal					
Town Board of Supervisors (PA)		2	2	2	2
Planning Commissions (PA)		2	2	2	2
Newark Planning Commission (DE)			2	2	
Newark Board of Adjustment (DE)					
Parks & Rec. Depts. (PA&DE)	1		2	2	1
Private					
WCWA		2	2	1	
DE Nature Society		2	2	1	
Brandywine Conservancy	1	2	2	1	1
Coalition for Natural Stream Valleys		2	2	1	
Stroud		2	2		
The Nature Conservancy		1	1	1	1
County					
Chester County Conservation District					2
New Castle County Council		2	2	2	1
New Castle County Dept. of Land Use		2	2	2	2
New Castle Conservation District					2
New Castle County Parks	1	2	1	1	1
State					
PA DCNR Forestry		1	1	1	1
PA DEP					
PA Fish & Boat Commission					1
PA Game Commission	1				
DNREC Fish & Wildlife	1	1	1	1	1
DNREC Div. Parks & Rec		1	1	2	1
DNREC Div. of Water					
Regional					
WCC Bi-State Preserve	1	2	2	1	1
Federal					
EPA		2	2	2	2
US FWS		1	1	1	1
NRCS					1

1 = Primary 2 = Secondary Or Advisory	RECREATIONAL RESOURCES			
Agency	Inventory	Monitor	Enhance	Stewardship
Municipal				
Town Board Of Supervisors (PA)	1	1	1	1
Planning Commissions (PA)	2	2	2	
Newark City Council (DE)				
Newark Planning Commission (DE)	2	2	2	
Parks & Recreation Depts. (PA&DE)	1	1	1	1
Historical Commissions				
Private Organizations				
WCWA	2	2	2	2
County				
Chester County Parks Department			1	1
Chester County Planning Commission	2	2		
New Castle County Council	1	1	1	1
New Castle County Dept. Of Land Use	2	2	2	
New Castle County Parks	1	1	1	1
State				
PA DCNR Scenic Rivers	2	2	2	2
PA DCNR State Parks	1	1	1	1
PA Fish & Boat Commission	1	1	1	
PA Game Commission				1
PA/DE Historic Preservation Office				
DNREC Fish & Wildlife	1	1	1	1
DNREC Parks & Recreation	1	1	1	1
Regional				
WCC Bi-State Preserve			1	
Federal				
NPS				

1 = Primary 2 = Secondary or Advisory	LAND RESOURCES						
Agency	Comp Plan	Zoning	Sub-div	Site Plan	Variance	Flood plain	Steward ship
Municipal							
Town Board Supervisors (PA)	1	1	1	1		1	
Planning Commissions (PA)	2	2	2	2		2	
Zoning Hearing Boards (PA)					1		
Newark City Council (DE)	1	1	1	1		1	
Newark Planning Commission (DE)	2	2	2	2		2	
Newark Board of Adjust.					1		
Parks & Rec Depts. (PA&DE)						1	1
Historical Commissions				2			
Private Organizations							
Homeowner Association							1
DE Nature Society							1
Brandywine Conservancy							1
Stroud							1
The Nature Conservancy							1
County							
Chester Planning Commission	2	2	2				
Chester Conservation District				1			1
New Castle County Council	1	1		1		1	
New Castle Dept. of Land Use	2	2	1	1		2	
New Castle Board of Adjust.				2	1		
New Castle Conservation Dist.							1
New Castle County Parks							1
State							
PA DCNR State Parks							1
PA DCNR Forestry							1
PA/DE Historic Preservation Office				2			
DNREC Fish & Wildlife		2	2	2			1
DNREC Parks & Rec	2	2	2	2			1
DNREC Div. Of Water						2	
Regional							
DRBC						2	
WCC Bi-State Preserve							1
Federal							
NRCS							1

1 = Primary 2 = Secondary Or Advisory	HISTORICAL & ARCHEOLOGICAL RESOURCES				
Agency	Nominations	Inventory	Monitor	Restoration	Advocacy
Municipal					
Town Board Of Supervisors (PA)				1	
Planning Commissions (PA)	2	2	2		2
Newark City Council (DE)	1	1	1		
Newark Planning Commission (DE)	2	2	2		
Parks & Recreation Depts. (PA&DE)				1	
Historical Commissions	2	1	1	1	1
Private Organizations					
WCWA		2	2	2	1
County					
Chester County Parks Department		2	2		
Chester County Planning Commission					1
New Castle County Council					
New Castle County Dept. Of Land Use	2	1	1		1
New Castle County Parks					
State					
PA DCNR Scenic Rivers					
PA DCNR State Parks					
PA Fish & Boat Commission					
PA Game Commission					
PA/DE State Historic Preservation Office	1	1	1		1
DNREC Fish & Wildlife					
DNREC Parks & Rec	1	1	1	1	1
Regional					
WCC Bi-State Preserve		2	2	2	2
Federal					
NPS	1				

1 = Primary 2 = Secondary or Advisory	FISH & WILDLIFE			
Agency	Habitat Enhance.	Stocking	Hunting	Monitoring
Municipal				
Town Board Of Supervisors (PA)	2			2
Planning Commissions (PA)	2			2
Newark Planning Commission (DE)	2			2
Newark Board Of Adjustment				
Parks & Rec Depts. (PA&DE)	1			2
Private Organizations				
WCWA	1			1
DE Nature Society	1			1
Brandywine Conservancy	1			1
Coalition For Natural Stream Valleys	1			1
Stroud	1			1
The Nature Conservancy	1			1
County				
Chester County Conservation District	2			
New Castle County Council	2			2
New Castle County Dept. Of Land Use	2			2
New Castle County Conservation District	2			
New Castle County Parks	1			1
State				
PA DCNR Bureau Of Forestry				
PA DEP				
PA Fish & Boat Commission		1		
PA Game Commission	1		1	1
DNREC Div. Fish & Wildlife	1	1	1	1
DNREC Div. Parks & Rec	1		2	
DNREC Div. Of Water				
Regional				
WCC Bi-State Preserve	1	1	1	1
Federal				
EPA				
U.S. FWS				1
NRCS	1			