

April 2012

Summary and Analysis of

CWA Section 604(b) ARRA-Funded Planning Projects

U.S. Environmental Protection Agency
Office of Wetlands Oceans and Watersheds
Washington, DC

This summary was funded by the American Recovery & Reinvestment Act of 2009

Summary and Analysis of CWA Section 604(b) ARRA-Funded Planning Projects

April 2012

Prepared for:

U.S. Environmental Protection Agency
Office of Wetlands, Oceans and Watersheds
Washington, DC

Prepared by:

Tetra Tech, Inc.
Fairfax, VA

This summary was funded by the American Recovery and Reinvestment Act of 2009.

Contents

Figures

Tables

Executive Summary

The American Recovery and Reinvestment Act (ARRA) of 2009 provided an additional $39.3 million in funding for state planning efforts over and above the annual Clean Water Act (CWA) section 604(b) allocation. The states' use of section 604(b) funds to "carry out planning under CWA sections 205(j) and 303(e)" awarded between 2008 and 2010 is evaluated in this study. Project types eligible for funding through CWA section 604(b) include developing a state watershed planning framework, developing individual watershed plans and monitoring or other assessments of environmental conditions that are essential to effective water quality and watershed management planning.

In an effort to spur economic activity and job growth, Congress passed ARRA (also known as the Recovery Act), which President Obama signed into law on February 17, 2009. ARRA contained funding for numerous federal programs, including more than $4 billion for the Clean Water State Revolving Fund (CWSRF) and $2 billion for the Drinking Water State Revolving Fund (DWSRF). Because of the infusion of 2009 ARRA funding into the CWSRF program, an extra $39 million for water quality planning was made available to the states in fiscal year (FY) 2009 under CWA section 604(b), supplementing the $8.6 million allocated in FY09.

The U.S. Environmental Protection Agency (EPA) Office of Water is charged with overseeing the implementation of ARRA as it applies to the 604(b) program. As part of the oversight function, EPA conducted a categorization effort and analysis of ARRA-funded 604(b) planning projects. The purpose of the analysis was as follows:

- Evaluate the impact of ARRA on 604(b) water quality management planning efforts.
- Compare the types of projects funded by ARRA and non-ARRA (i.e., standard annual State Revolving Fund program) 604(b) grants.
- Highlight successful or innovative case studies.
- Communicate ARRA 604(b) program goals and achievements to the public.

ARRA required that, if possible, state CWSRF and DWSRF programs allocate at least 20 percent of their capitalization grants to the Green Project Reserve (GPR). However, this requirement does not apply to 604(b) funds. Projects and portions of projects that count toward the GPR fall into four categories: energy efficiency, water efficiency, green infrastructure, and environmentally innovative activities. Although those types of projects have always been eligible for financing through CWSRF and DWSRF, the 20 percent GPR requirement was intended to accelerate the incorporation of *green* elements into water resource, wastewater and drinking water projects.

In March 2009, EPA provided CWA section 604(b) guidance for states that outlined ARRA application requirements and identified the types of planning projects that would support states' efforts to successfully use at least 20 percent of CWSRF funds to implement GPR projects (Schwartz, 2009). The guidance suggested projects such as plans that identified locations for implementing green infrastructure practices that could protect or restore watersheds, assessments of water use by sector and possible conservation techniques that could be implemented, and ecosystem assessments that would identify possible impacts and potential adaptive responses to climate change.

EPA reviewed the ARRA-funded section 604(b) work plans submitted by each state and randomly selected for review non-ARRA work plans submitted by 15 states. EPA assessed each project as described in the states' work plans to determine the water quality management and planning elements associated with each project. EPA then created a set of *project type* categories on the basis of the various elements typically found in 604(b) projects. EPA assumed that states completed the section 604(b) projects as noted in the work plan or ARRA 1512 report (for ARRA projects), at the project scale, time frame, and funding levels indicated therein. In addition, when assigning projects to various *project type* categories, EPA provided credit only for elements specifically stated in the work plan.

Analysis of the data used in this study shows that ARRA 604(b) funds were used by states for projects that promote future GPR efforts (e.g., green infrastructure for stormwater management); for funding long-term, state-specific projects (e.g., total maximum daily load [TMDL] development); and for maintaining vital state water agency functions. States that already had GPR-related projects in the queue were better positioned to move in the new direction specified by EPA within the time limits of ARRA. Because states had a limited amount of time to select and propose ARRA projects under CWA section 604(b), not all were able to use the new funds to pursue planning projects that promoted future GPR project development.

An important backdrop to state ARRA project implementation during 2009–2010 is the national economic recession that occurred from 2007 to 2009. While fiscal effects on individual state agencies from reduced tax revenues varied, the general trend was toward reductions in personnel and other resources. Five states reported layoffs, 15 states implemented furloughs, and 15 states reported that additional staff reductions were expected in the future. Only nine states reported no changes in staffing levels, and no states reported staffing increases. Twenty states indicated that they reduced or eliminated programs because of budget reductions.

Source: Phillips, et al 2010

EPA reviewed 417 project descriptions (296 ARRA and 121 non-ARRA) in 101 state work plans (56 ARRA and 45 non-ARRA), coded each project into one or more of 9 *project type* categories and subcategories, and categorized the projects by project scale (i.e., statewide, regional, watershed level, local level). EPA also indicated if the project was funded through a pass-through grant or the state's grant. Other metadata was also captured including work plan funding year, estimated project completion date, funding amount, whether the project was new or existing and the number of jobs created.

Reviewing the ratio of ARRA to non-ARRA projects from the 15 randomly selected states in each *project type* category provided a simple and useful metric for comparison of consistency or divergence between the two major project groupings (ARRA versus non-ARRA). The overall ratio of ARRA projects to non-ARRA projects reviewed for this study was approximately 2.4 to 1, although the ranges of ratios for the different project categories varied more widely.

When characterizing *environmental benefits*, reviewers assessed the project summaries and supplemental information to determine what the ultimate, expected *environmental benefits* resulting from the project would be, and when they would be realized. Consistent with the approach used for *project type*, *project scale*, *time frame*, and *funding levels*, EPA assumed that states completed the section 604(b) projects as described in the work plan or ARRA 1512 report. For other project parameters that were characterized (i.e., *media focus*, *pollutant focus* and *GPR capacity building*), credit was given only for entries that could be confirmed (e.g., by explicitly stating so in the work plan, by researching impairment causes for specific targeted waterbodies). Accordingly, where more detailed work plans were provided, EPA was able to better assign entries for *media focus*, *pollutant focus*, and *GPR capacity building* categories. Because of the widely varying project description and work plan formats, level of detail, and information regarding project context, EPA reviewers used a *reasonable assumption* approach to determine whether certain parameters applied to a project as warranted.

When characterizing *environmental benefits*, reviewers assessed the project summaries and supplemental information to determine what the ultimate, expected *environmental benefits* resulting from the project would be and when they would be realized. Because section 604(b) projects all involve planning, the *environmental benefits* primarily relate to an improved ability to execute on-the-ground actions to address water quality issues (i.e., the benefits are tied to successful completion of a planning process that provides the basis for future action).

EPA's flexible framework for ARRA funding resulted in a mix of projects that varied by state. EPA learned that 320 out of 417 total projects (77 percent) were new efforts (263 ARRA projects and 57 non-ARRA projects). Of the remaining 97 projects (23 percent) that provided support for ongoing state planning efforts, 64 projects were non-ARRA, versus 33 funded under ARRA. Clearly, while ARRA funding helped to maintain vital program services, it also provided a needed boost for new initiatives.

EPA analyzed how ARRA funding levels influence the types of projects pursued. State allotments ranged from $100,000 to more than $4 million, with just under 80 percent of the states receiving $1 million or less. Higher cost projects tend to feature a broader range of benefits and are more likely to be conducted internally by the state, compared with lower-cost projects, which are more likely to be passed through.

EPA reviewed the pollutant focus of ARRA and non-ARRA 604(b) projects versus the leading causes of water quality impairment in each of the 15 states studied, as reported in their CWA section 303(d) reports In general, state 604(b) projects addressed key causes of impairment with relatively minor variations. States did not significantly alter the pollutant focus of their projects when ARRA funds became available, indicating an overall "stay-the-course" approach in addressing their priority water quality issues.

EPA's 2009 guidance to states regarding ARRA 604(b) funding yielded projects that were more diverse, comprehensive, and broadly focused than previous (i.e., non-ARRA) funding cycles, representing a great leap forward for state water resource planning efforts. ARRA funding allowed states to implement important new initiatives likely to have broader environmental (and non-environmental) benefits.

In some cases, however, ARRA funding was used to continue existing programs and close programmatic gaps and significant losses in institutional capacity (water quality standards review and revision, administrative functions, tool development, assessment, etc.) resulting from state funding decreases; it also represented an opportunity to address issues/projects languishing in the wings for some states. That use of funds is just as important as new initiatives; however, it does illustrate a trade-off, where future funding initiatives might not necessarily build new programmatic capacity but rather fill funding shortfalls.

1.0 Introduction

Clean Water Act (CWA) section 604(b) provides annual funding for states to "carry out planning under Section 205(j) and 303(e)" of the CWA. Those sections refer to a broad range of water quality planning activities, addressing both point sources and nonpoint sources. Activities could include developing water quality management plans or watershed plans, revising water quality standards, collecting and analyzing data or other similar activities. The American Recovery and Reinvestment Act (ARRA) of 2009 provided an additional $39.3 million in funding for state planning efforts over and above the annual 604(b) allocation. This report highlights the results of a U.S. Environmental Protection Agency's (EPA's) study of the states' use of section 604(b) funds awarded between 2008 and 2010, with an emphasis on ARRA-funded projects. The report reviews the types, scales and environmental benefits of projects funded. The report evaluates the impact of ARRA on water quality management planning efforts and serves as a basis for identifying opportunities to support innovative planning activities that will maximize both environmental and economic benefits in the future.

1.1 Clean Water Act Provisions for Quality Planning

Since the federal government enacted the CWA in 1977, states have been directed to develop a continuing water resource planning process under section 303(e) and were authorized to receive grants for water quality management plans under section 205(j). Changes to the CWA in 1987 established the Title VI State Revolving Fund provisions, which replaced the then existing construction grants program with the more flexible Clean Water State Revolving Fund (CWSRF) program. In 1996 Congress created a similar program, the Drinking Water State Revolving Fund (DWSRF), to support drinking water projects. The CWSRF program allows states to use funds to support traditional municipal wastewater collection and treatment construction projects as well as a wide variety of other water quality projects such as stormwater, nonpoint source pollution control, watershed restoration, and estuary management.

The aforementioned 1987 CWA amendments also included the addition of section 604(b), which established a *reservation of funds* to support states' ongoing water quality planning activities under CWA section 205(j) and 303(e). CWA section 604(b) requires each state to reserve one percent of its CWSRF allotment (or $100,000, whichever is greater) for planning purposes every fiscal year. Between 1987 and 2009, CWA section 604(b) program funding averaged $14 million per year, and fluctuated from a high of more than $20 million in 1990 and 1996 to a low of $8.6 million in 2006, 2008, and 2009 (see Figure 1).

CWA section 205(j) requires that each state must pass through at least 40 percent of its section 604(b) funds to regional public comprehensive planning organizations or other appropriate interstate organizations to conduct planning activities, unless the state applies for and is granted a waiver. Waivers are approved if a state's governor demonstrates to EPA that allocating at least 40 percent of 604(b) funding to regional or interstate planning organizations would not significantly assist with implementation of state planning goals or the goals of the CWA. See CWA section 205(j)(3). Approximately 20 states obtain EPA approval annually to waive all or part of the pass-through requirement, while a number of other states pass through more than 40 percent.

1.2 Historical Use of Water Quality Planning Funds

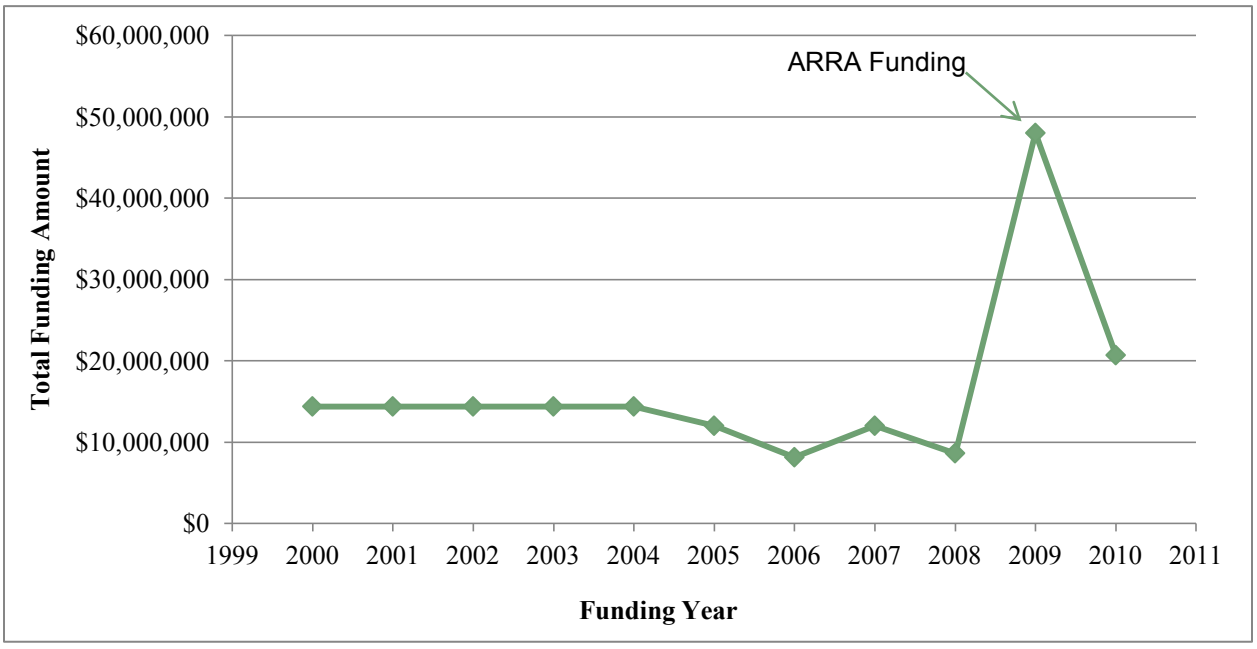
CWA sections 205(j) and 303(e) cover a range of activities addressing both point and nonpoint source pollution. Section 205(j), enacted in 1981, emphasizes the importance of statewide and local areawide planning, while section 303(e) addresses continuous planning at the state level, requiring each state to have an approved continuing planning process (CPP) to obtain authorization for administering the National Pollutant Discharge Elimination System (NPDES) program. Section 205(j) includes requirements

initially outlined in CWA section 208 (enacted in 1972), which required states to develop areawide waste treatment management plans. Funding for section 208 planning ceased in 1981 when section 205(j) was enacted. Section 205(j) now provides the local planning emphasis to balance with statewide section 303(e) CPP. Some states and/or designated planning agencies continue section 208 Areawide Waste Treatment Management Planning today.

Examples of projects eligible for funding through CWA section 604(b) include developing a state watershed planning framework, developing individual watershed plans, and monitoring or other assessments of environmental conditions that are essential to effective watershed planning. Section 604(b) funding may be used for direct planning efforts and for most activities that are part of a larger planning effort, such as developing a watershed data management system that will be used to plan point and nonpoint source remediation activities. Section 604(b) funds may also be used to support salaries, contracts, equipment, and travel that are directly associated with planning activities. Section 604(b) funds may not be used for implementation efforts such as inspections, enforcement, and installing best management practices (BMPs).

1.3 CWSRF, Section 604(b), and ARRA

In an effort to spur economic activity and job growth, Congress passed the ARRA (also known as the Recovery Act), which President Obama signed into law on February 17, 2009. ARRA contained funding for numerous federal programs, including more than $4 billion for the CWSRF and $2 billion for the DWSRF. Because of the infusion of 2009 ARRA funding into the CWSRF program, an extra $39 million for water quality planning was made available to the states in FY09 under CWA section 604(b), supplementing the $8.6 million allocated in FY09 under annual EPA appropriations (Figure 1).



Source: Roose 2011.

Figure 1. Annual congressional allotments under section 604(b) during 2000–2010.

ARRA required that, if possible, state CWSRF and DWSRF programs allocate at least 20 percent of their capitalization grants to the Green Project Reserve (GPR). Although this requirement does not apply to 604(b) funds, the requirement to fund potential GPR projects has implications for states' 604(b) planning

priorities. Projects and portions of projects that count toward the GPR fall into four categories: energy efficiency, water efficiency, green infrastructure, and environmentally innovative activities. Although those types of projects have always been eligible for financing through CWSRF and DWSRF, the 20 percent GPR requirement was intended to accelerate the incorporation of *green* elements into water resource, wastewater, and drinking water projects.[1]

In March 2009, EPA provided CWA section 604(b) guidance[2] for states that outlined ARRA application requirements and identified the types of planning projects that would support states' efforts to successfully use at least 20 percent of CWSRF funds to implement GPR projects. The guidance suggested projects such as plans that identified locations for implementing green infrastructure practices that could protect or restore watersheds, assessments of water use by sector and possible conservation techniques that could be implemented, and ecosystem assessments that would identify possible impacts and potential adaptive responses to climate change.

Analysis of the data used in this study shows that ARRA 604(b) funds were used by states for projects that promote future GPR efforts (e.g., green infrastructure for stormwater management); for funding long-term, state-specific projects (e.g., TMDL development); and for maintaining vital state water agency functions. States that already had GPR-related projects in the queue were better positioned to move in the new direction specified by EPA within the time limits of ARRA. Because states had a limited amount of time to select and propose ARRA projects under CWA section 604(b), not all were able to use the new funds to pursue planning projects that promoted future GPR project development. Because of a combination of communities continuing to employ more sustainable water management practices to respond to external drivers and the fact that GPR practices have been promoted in ARRA (and subsequently through the state CWSRF and DWSRF programs), states might be able to increase the amount and quality of GPR elements in subsequent projects and program activities during future 604(b) funding cycles if they are given advanced planning and additional outreach and guidance. Of course, continued development of projects with GPR elements will also depend on adequate funding to allow core programs to be maintained, while allowing innovative projects to be developed also.

1.4 Purpose of Study

EPA's Office of Water is charged with overseeing the implementation of ARRA as it applies to the 604(b) program. As part of the oversight function, EPA conducted a categorization effort and analysis of the ARRA-funded 604(b) planning projects. The purpose of the analysis was as follows:

- Evaluate the impact of ARRA on 604(b) water quality management planning efforts.
- Compare the types of projects funded by ARRA and non-ARRA (i.e., standard annual SRF program) 604(b) grants.
- Highlight successful or innovative case studies.
- Communicate ARRA 604(b) program goals and achievements to the public.

1. The 20 percent GPR requirement of ARRA 2009 was carried forward through FY10 and FY11 appropriations as well.
2. See *Guidance for Award of Water Quality Management Planning Grants Funded Under the Recovery Act* at http://water.epa.gov/aboutow/eparecovery/upload/2009_03_12_eparecovery_604bARRA_guidance_memo_FINAL-2.pdf.

2.0 Section 604(b) Project Selection, Review, and Categorization

EPA reviewed ARRA-funded section 604(b) work plans submitted by each state, and non-ARRA work plans submitted by 15 states. EPA headquarters worked with each EPA Region to inform states of the section 604(b) study and requested the most updated version of each work plan. For reference in this report, FY08, FY09, and FY10 projects funded through conventional means are termed *non-ARRA*; projects funded in FY09 under ARRA are simply referred to as *ARRA* projects.

2.1 Project Selection

EPA reviewed the most updated, available FY09 section 604(b) ARRA work plans submitted by each state as well as the section 604(b) FY08, FY09, and FY10 work plans for 15 randomly selected states, as indicated above. Those work plans were used to identify specific projects for the study. In some cases, states clearly distinguished between different projects in their work plan (basically providing a separate work plan for each project), whereas other states aggregated several distinct projects within a common work plan. Each project identified in the state work plans was assigned a unique identification number that was used to track the project in a Microsoft Excel spreadsheet. Categorization and characterization information, as described below, was then entered for each individual project.

CWA Section 604(b) ARRA Work Plans: This study included a review of all of the states' and territories' section 604(b) ARRA work plans (a total of 56), as submitted to EPA. EPA also referred to states' section 604(b) and ARRA websites (and any available project-specific websites, when available). In some cases work plans did not include complete project information (such as when pass-through projects had not yet been awarded at the time the work plan was submitted). In these cases, EPA conducted limited Web searches to locate and review state's 604(b)- and ARRA-related websites (and any available project-specific websites, when available) to supplement work plan information. Under ARRA section 1512, recipients of ARRA funds are required to report each quarter (via federalreporting.gov) on the use of ARRA funds. EPA used the information available in the ARRA section 1512 reports to supplement the information provided in each state's section 604(b) ARRA work plan.

Section 1512 of ARRA requires that prime funding recipients disclose information about each project for which ARRA funds were expended or obligated. Prime recipients are defined as nonfederal entities that receive ARRA funding as federal awards in the form of grants, loans, or cooperative agreements directly from the federal government. Federal agencies are not considered prime- or sub-recipients. The reports required under section 1512 were required to be submitted on a quarterly basis by recipients beginning in October 2009. These quarterly reports contain detailed information on the projects and activities funded by ARRA and help to provide the public with transparency into how federal dollars are spent as well as help drive accountability for timely, prudent, and effective spending of ARRA dollars.

Information from the section 1512 reports is to be included in states' 604(b) applications and on a quarterly basis in a report to EPA. This allows inclusion of such information in subsequent reports and enables EPA to report how the states are using or will use recovery funds in a timely manner. Listed below are the elements required in each quarterly section 1512 report submitted to EPA and for 604(b) applications:

1. The total amount of recovery funds received from EPA.
2 The amount of recovery funds received that were expended or obligated to projects.
3. A detailed list of all projects for which funds have been expended or obligated, including
    a. Name of project or activity.

   b. Description of project or activity (about a paragraph in length).
   c. An evaluation of the completion status of the project or activity.
   d. An estimate of the number of jobs created or retained on a quarterly basis (and how this is calculated).
4. For infrastructure investments made by state and local governments, the purpose, total cost and rationale of the investment, as well as a contact person at the implementing agency.
5. Detailed information about any subcontracts or subgrants awarded by the recipient, including data elements required to comply with the Federal Funding Accountability and Transparency Act of 2006 (P.L. 109-282). Individuals or grantees reporting on awards below $25,000 may provide an aggregate report.

CWA Section 604(b) Non-ARRA Work Plans: Using a random number generator,[3] EPA selected 15 states for an analysis of section 604(b) non-ARRA work plans from FY08, FY09, and FY10, for a total of 45 work plans in addition to ARRA work plans. EPA reviewed non-ARRA work plans for all three years from each of the following randomly selected states:

Arizona	Louisiana	New Jersey
Florida	Maine	New York
Hawaii	Massachusetts	North Carolina
Idaho	Minnesota	Washington
Illinois	Montana	Wyoming

2.2 Project Review and Categorization

EPA reviewed each selected work plan described in Section 2.2 and identified individual projects proposed for funding under section 604(b). For each ARRA work plan, EPA also reviewed the ARRA section 1512 quarterly reports and some state ARRA websites, as available (as noted previously, in some cases where work plans did not include complete project information, EPA conducted limited Web searches for state 604(b)- and ARRA-related websites). Individual projects were usually identified as designated by the state in the work plan. For example, if a state listed four separate main projects, EPA's analysis mirrored that breakdown. Some states elected to define specific elements of large planning efforts as separate projects in the work plan; in these cases, the states often have more individual projects listed. States that opted to group more tasks under a single project heading typically had fewer projects listed. When individual projects were not clearly defined in a work plan, EPA looked at funding breakdowns and other work plan information to help identify separate projects. As needed, EPA used the ARRA section 1512 reports to confirm what the state considered to be a separate ARRA project. Information about each project that was entered into the aforementioned spreadsheet database included a summary of project elements, dates, scales, funding levels, and pass-through recipients, as applicable.

EPA assessed each project as described in the states' work plans to determine the associated water quality management and planning elements. EPA then created a set of *project type* categories on the basis of the various elements typically found in 604(b) projects. EPA used the *project type* categories shown in Table 1 to code each project in the database and to group and sort projects according to the type of work that was carried out.

3. EPA used the Random Number Generator function (RAND) in Microsoft Excel to assign a random number between 0 and 1 to each of the 50 states and Washington, D.C. EPA chose the 15 states with the lowest randomly selected numbers for non-ARRA analysis. For a list of the results, see Appendix A.

Broad *project type* categories are further subcategorized, as applicable (e.g., the project type category of *Water Quality Planning or Watershed-based Planning* includes subcategories for *Wastewater Management Planning, Stormwater Management Planning, TMDL Implementation Planning*).

Table 1. Project type categories (and subcategories) used for the assessment.

<table>
<tr><td colspan="2">1. Ecosystem Information Collection and Assessment: Includes projects that emphasize collecting or assessing qualitative and quantitative information. Subcategories include:</td></tr>
<tr><td>a. Collecting or Assembling Existing Data or Qualitative Information
b. Ambient/Water Quality or Biological Monitoring
c. Data Analysis, Modeling and Mapping</td><td>d. Data Storage, Management and Transfer (includes databases and networks designed to increase accessibility to data for planning purposes)
e. TMDL Development</td></tr>
<tr><td colspan="2">2. Water Quality Planning or Watershed-based Planning: Includes a wide range of planning projects that include both formal, comprehensive watershed-based plans as well as issue-based plans (stormwater). Subcategories include:</td></tr>
<tr><td>a. Comprehensive Water Quality Management Planning (including CWA section 303(e))
b. Section 208 Areawide Management Planning
c. Nine-element Watershed-based Plan Development
d. TMDL Implementation Planning</td><td>e. Other Watershed Planning (Project with a planning focus that is not well-defined or does not easily fit into other categories)
f. Wastewater Management Planning
g. Stormwater Management Planning</td></tr>
<tr><td colspan="2">3. Project Elements Qualifying as Green Project Reserve</td></tr>
<tr><td>a. Green Infrastructure: These projects include planning for a wide array of practices at multiple scales that manage and treat stormwater and that maintain and restore natural hydrology by infiltrating, evapotranspiring and capturing and using stormwater. Green infrastructure category includes the following subcategories:
• Planning for Implementation of Low Impact Development (LID) Practices and Programs
• Planning for Natural Landscape Feature (Forests, Floodplains, Wetlands) Protection or Restoration
• Implementing Demonstration Projects
b. Water Efficiency: Planning and Assessment: These projects plan for improved technologies and practices to deliver equal or better services with less water.
c. Energy Efficiency Planning and Assessment: These projects plan for improved technologies and practices to reduce energy consumption of water quality projects.</td><td>d. Environmentally Innovative Projects: These projects demonstrate new or innovative approaches to managing water resources in a more sustainable way, including projects that achieve pollution prevention or pollutant removal with reduced costs and projects that foster adaptation of water protection programs and practices to climate change. Subcategories include
• Decentralized Wastewater Treatment Systems
• Climate Change Adaptation Planning
• Other Environmental Program or Project: Includes projects that use development or redevelopment to preserve or restore site hydrologic processes through sustainable landscaping and design; projects that use water balance approaches (water budgets) to preserve hydrology; projects that quantify the benefits of using integrated water resource management approaches; and additional innovative projects that do not easily fit into other project type categories.</td></tr>
<tr><td colspan="2">4. Nonpoint Source BMPs: Planning projects marked in this category typically identify and propose agricultural or unspecified BMPs to address pollution problems identified during planning efforts. Subcategories include:</td></tr>
<tr><td>a. Planning and Designing BMPs or Restoration Activities
b. Implementing Demonstration Projects</td><td>c. Technical Assistance (e.g., Nutrient Management Plan Development)</td></tr>
<tr><td colspan="2">5. Water Policy, Regulation, or Ordinance Development/Revision: Includes projects that influence or lead to changes to or development of zoning ordinances, BMP policies, pollutant targets, on-site wastewater management rules, and other government oversight issues. Subcategories include:</td></tr>
<tr><td>a. State-level
b. Local-level</td><td>c. Region-level</td></tr>
<tr><td colspan="2">6. Development of Technical Guidance or Local (e.g., Watershed) Project Reports: Includes projects that result in a guidance document or other written resource that will support future water quality management efforts.</td></tr>
</table>

7. Consensus Building/Coordination: Includes projects that emphasize coordinating and collaborating with multiple stakeholders at a local, watershed, regional or state level.	
8. Public Outreach, Training, and Educational Information Transfer: Includes projects that share information with water stakeholders through meetings, workshops, lectures, or electronic or other means of communication.	
9. Water Program Support: Includes projects that support one or more elements of a state's water program. Subcategories include:	
a. *Monitoring Program*, including Water Quality Assessment and Reporting for 303(d) and 305(b) b. *Administration*	c. *Permitting* d. *Water Quality Standards*

Because the amount of detail offered in states' section 604(b) ARRA and non-ARRA work plans varied widely, EPA made assumptions that would ensure a consistent review. EPA assumed that states completed the section 604(b) projects as noted in the work plan or ARRA 1512 report (for ARRA projects), including the project scale, time frame, and funding levels. In addition, when assigning projects to various *project type* categories, EPA provided credit for only the elements specifically stated in the work plan. In other words, for the purpose of project type categorization, EPA did not make assumptions about what activities were conducted for each project.

For example, if sample work plan A described a TMDL development project, the scope of which included (1) assembling existing watershed data, (2) collecting water quality monitoring data, (3) analyzing data, (4) developing the TMDL, (5) collaborating with stakeholders, and (6) conducting public outreach through watershed meetings, EPA assigned that project credit for each of those elements. The first four elements would be captured in different subcategories (1a, 1b, 1c, and 1e) under category *1. Ecosystem Information Collection and Assessment* (Table 1). The fifth project element (collaborating with stakeholders) would be marked under project type category *7. Consensus Building/ Coordination*, and the sixth project element would be marked under project type category *8. Public Outreach, Training, and Educational Information Transfer.* Therefore, the example project in work plan A would receive credit for six different total categories and subcategories.

In contrast, if sample work plan B described a TMDL development project that listed only (1) collecting data, (2) analyzing data, and (3) developing the TMDL as the project activities, that project received credit in one project type category, *1. Ecosystem Information Collection and Assessment,* and in three subcategories (1b, 1c, and 1e). Because EPA did not make assumptions about what activities might have been conducted, as illustrated by those examples, the project in work plan B appears in the analysis to fall into fewer categories, even though the nature of the TMDL projects mean that they might have included similar elements. This highlights one limitation of the data used in this study, which relied on states' work plans to characterize projects: where more detailed work plans were provided by the states, EPA was able to better assign project type and benefit categories.

Some *project type* categories were selected to highlight elements that are important for this section 604(b) analysis; for example, projects that could qualify as supporting GPR activities (e.g., tools and plans for identifying appropriate types of and sites for green infrastructure or other types of low-impact development, green infrastructure training and capacity building, water conservation planning, green building planning and other projects). As a result, some project elements were often captured in more than one *project type* category (e.g., green infrastructure planning might be captured by *project types* 2g, 3a, and 4a). Please note that the funding of some GPR-supporting activities is somewhat restricted under 604(b). For example, projects describing water and energy efficiency improvements were planning-based projects, not stand-alone projects involving technology upgrades or facility-specific practices (which would not qualify for 604(b) funding).

2.3 Perspective on State Water Programs during the ARRA Funding Period

An important backdrop to state ARRA project implementation during 2009–2010 is the national economic recession that spanned from 2007 to 2009[4]. While fiscal effects on individual state agencies from reduced tax revenues varied somewhat, the general trend was toward reductions in personnel and other resources. A study by Phillips et al. (2010) found that state environmental agencies eliminated or held vacant 2,112 personnel positions because of FY2010 budget limitations in the 36 states and 1 territory surveyed. Five states reported layoffs, 15 reported implemented furloughs, and 15 reported that additional staff reductions were expected in the future. Only nine states reported no changes in FTE staffing; no states reported staffing increases. Twenty states indicated that they reduced or eliminated programs because of budget reductions. Another study, sponsored by the Environmental Council of the States (2011) found the trend continuing well into 2011. "State budgets have declined significantly during 2009, 2010, 2011 and 2012, and every sign is that this will continue into 2013 and beyond," the study noted, "[e]ven if the economy stabilizes, state revenue usually takes two years to catch up."

Brown and Fishman (2010) noted that ARRA funds provided some degree of relief to state water agencies in a related study of the decline of state environmental agency budgets, between FY2009 and FY2011. ARRA, they concluded, "had a major impact on state environmental budgets" because it "temporarily increased federal funds for environmental programs run by the states." The researchers added that "(t)his one-time surge in money available certainly helped stem many states' environmental budget shortages, but data confirm it was a temporary lift." The study further noted an acceleration in state environmental agency budget decreases during the period, with annual allocations falling by an average of about $9 million per state in FY2010 and nearly $12 million per state in FY2011. For FY2011 the study found, nearly two-thirds of state environmental budgets were declining.

2.4 Summary of Project Type Categorization Results

After reviewing 417 project descriptions (296 ARRA and 121 non-ARRA) in 101 state work plans (56 ARRA and 45 non-ARRA), EPA coded each project into one or more of the 9 *project type* categories and subcategories shown in Table 1. In addition to *project type* categories, EPA also categorized the projects by project scale (i.e., statewide, regional, watershed level, local level; see Table 2), whether the project was funded through a pass-through grant or the state's grant, and the following other types of metadata:

- State
- EPA Region
- Work Plan Funding Year
- Estimated Project Completion Date
- Founding Amount
- New or Existing Project
- Number of FTEs Created

EPA learned that 320 out of 417 total projects were new efforts (263 ARRA projects and 57 non-ARRA projects) and that 97 projects continued preexisting efforts (33 ARRA projects and 64 non-ARRA projects).

4. According to the National Bureau of Economic Research, the recession began December 2007 and ended June 2009. www.nber.org/cycles/recessions_faq.html (NBER 2012)

Table 2. Scale of projects.

Statewide	165 (110 ARRA; 55 non-ARRA)
Regional	30 (12 ARRA; 18 non-ARRA)
Watershed-level	182 (142 ARRA; 40 non-ARRA)
Local-level	40 (32 ARRA; 8 non-ARRA)

Reviewing the ratio of ARRA to non-ARRA projects (i.e., in the 15 selected states) in each *project type* category provides a simple and useful metric for comparison of consistency or divergence between the two major project groupings (i.e., ARRA versus non-ARRA). The ratios provide some sense of proportionality within each *project type* category, indicating whether the types of ARRA projects funded followed the general pattern of the non-ARRA efforts. The ratio of ARRA projects (296) to non-ARRA projects (121) reviewed for this study was approximately 2.4 to 1 overall (comparison of the specific ARRA and non-ARRA projects is discussed further in Section 3.4). Table 3 summarizes the number of ARRA and non-ARRA projects reviewed and the corresponding ratios for the number of projects with elements that fell within the various *project type* categories.

Table 3. Ratio of all ARRA to non-ARRA projects by project type[1].

Project type	# of project elements[2]	ARRA projects	Non-ARRA projects	Ratio ARRA:non
1. Ecosystem Information Collection/Use	274	206	68	3.0 : 1
2. Water Quality/Watershed Planning	163	119	44	2.7 : 1
3. Project Elements Qualifying as GPR				
3a. Green Infrastructure	83	77	6	12.8 : 1
3b. Water Efficiency	16	16	0	~
3c. Energy Efficiency	11	11	0	~
3d. Environmental Innovation	21	20	1	20.0 : 1
4. Nonpoint Source BMPs	50	32	18	1.8 : 1
5. Water Policy, Regulation, Ordinances	44	38	6	6.3 : 1
6. Technical Guidance/Reports	62	41	21	2.0 : 1
7. Consensus/Coalition Building	95	56	39	1.4 : 1
8. Outreach, Training, Education	160	93	67	1.4 : 1
9. Water Program Support	103	67	36	1.9 : 1

[1] ARRA projects include FY09; non-ARRA projects include FY 08, FY09, and FY10 projects.

[2] Most projects are listed under more than one project type category because each of the 417 total projects includes multiple elements (e.g., a single project might include data collection, water quality planning, and consensus building and outreach elements.)

The last column in Table 3 lists the ratios of ARRA to non-ARRA projects. Ratios near 2.4:1—the overall ratio of ARRA to non-ARRA projects reviewed—indicate relative proportionality among the various *project types* in the ARRA versus non-ARRA periods. In Table 3, the *Ecosystem Information Collection and Assessment* category, which includes basic, long-term state program priorities (e.g., collecting and assembling water quality and other data, conducting mapping and modeling activities, and developing TMDLs), has an ARRA to non-ARRA project ratio of 3.0:1, close to the 2.4:1 overall ratio. That indicates that states used ARRA funds for this type of project in roughly the same overall proportion as they did for

non-ARRA efforts supported by 604(b) funds. Note that the *Ecosystem Information Collection and Assessment* category includes the largest number of projects, an indication that the collection and use of environmental data is a cornerstone activity of state water quality agencies.

Similarly, the *Water Quality Planning or Watershed-Based Planning* category—which includes a wide range of activities that have been underway for decades, such as developing water resource management plans, TMDL implementation measures, and waste management plans under various sections of the CWA—also has an ARRA to non-ARRA project ratio of approximately 2.4:1 (i.e., 2.7:1). Another case in point is the group of projects in the *Nonpoint Source BMPs* category; once again, the data indicate general proportionality between ARRA and non-ARRA efforts, with a ratio of 1.8:1. The general consistency or proportionality between ARRA and non-ARRA projects in that category reflects long-term efforts by states to develop and implement nonpoint source pollution control programs under CWA section 319, an effort that was well underway before ARRA funding was authorized. Funding that type of activity apparently continued as a state program priority when ARRA support became available. The final example of consistency between ARRA and non-ARRA projects can be seen in the category of *Development of Technical Guidance or Local Project Reports*, with a ratio of 2.0:1. Again, this category of projects was well-established before ARRA and is represented proportionately among the non-ARRA projects reviewed.

Significant divergence between ARRA and non-ARRA project types can be seen in the other categories, which might reflect declining agency budgets because of lowered revenues from the 2007–2009 recession and emerging priorities for water resource management programs that focus on the following:

- Regulatory issues (e.g., addressing municipal separate storm sewer system [MS4] post-construction requirements under the stormwater management provisions of CWA section 402).
- Nonregulatory and programmatic issues (e.g., substantial state budget cuts and personnel needs related to the economic recession of 2007–2009).
- ARRA-specific priorities (e.g., climate change, water resource/energy efficiency, and environmental innovation under the GPR).

Those project categories (*Green Infrastructure; Environmental Innovation; and Policy, Regulation, Ordinances*) indicate ARRA versus non-ARRA changes in program activities, as shown in the ARRA to non-ARRA ratios in Table 3; i.e., the ratios increase markedly for those categories.

Note that some categories (e.g., *Water Efficiency and Energy Efficiency*) are not represented at all in the non-ARRA group of projects, but they are represented among the ARRA projects funded. In addition, large ratios of ARRA to non-ARRA projects are evident in the categories of *Green Infrastructure* and the *Water Policy, Regulation, or Ordinances Development/Revision* group. Nearly all the disproportionate representation of those categories among the ARRA projects is tied directly to the ARRA program priorities described in the guidance issued by EPA, subsequent to the FY08 604(b) grant cycle, which accounts for 15 of the 45 non-ARRA work plans. As noted in Section 1.3, Congress created a new category of priority activities for the two SRF programs in 2009, which required, if possible, that both loan funds allocate at least 20 percent of their capitalization grants to the GPR (e.g., energy efficiency, water efficiency, green infrastructure, and environmental innovation).

Project categories with lower ARRA to non-ARRA ratios (e.g., *Consensus/Coalition Building; Outreach, Training, Education;* and *Water Program Support*) indicate a lesser emphasis for ARRA funding versus the randomly selected non-ARRA projects reviewed.

Similar results for ARRA and non-ARRA *pass-through* projects are listed in Table 4. The trends in Table 4 are generally similar to the trends in Table 3, with the exception of a lower ratio for nonpoint source BMP projects, indicating that states did not emphasize use ARRA funds for that type of activity. States used ARRA pass-through funds in higher proportions for *Green Infrastructure*; *Environmentally Innovative Projects*; and *Water Policy, Regulation, or Ordinance Development/Revision Projects*.

Table 4. Ratio of 604(b) pass-through[1] ARRA to non-ARRA projects by project type.

	# of project elements[2]	ARRA Projects[3]	Non-ARRA projects[3]	Ratio ARRA:non
1. Ecosystem Information Collection/Use	113	88	25	3.5:1
2. Water Quality/Watershed Planning	103	78	25	3.1:1
3. Project Elements Qualifying as GPR				
a. Green Infrastructure	58	53	5	10.6:1
b. Water Efficiency	9	9	0	~
c. Energy Efficiency	5	5	0	~
d. Environmentally Innovation	13	12	1	12.0:1
4. Nonpoint Source BMPs	34	21	13	1.6:1
5. Policy, Regulation, Ordinances	28	26	2	13.0:1
6. Technical Guidance/Reports	27	18	9	2.0:1
7. Consensus/Coalition Building	46	35	11	3.2:1
8. Outreach, Training, Education	80	53	27	2.0:1
9. Water Program Support	26	16	10	1.6:1

[1] Includes only those projects with confirmed pass-through—a total of 180 projects (142 ARRA, 38 non-ARRA). Does not include 7 projects in Idaho (3 non-ARRA; 1 ARRA) and New Jersey (3 non-ARRA) in which funding was specified as "partial pass-through in the work plan" but did not identify specific recipients or amounts).).

[2] Most projects are listed under more than one project type category because each of the 417 total projects includes multiple elements (e.g., a single project might include data collection, water quality planning, and consensus building and outreach elements.)

[3] ARRA projects include FY09; non-ARRA projects include FY 08, FY09, and FY10 projects.

The structure and detail of a state work plan also influenced the number of projects recorded for each state. If the state grouped multiple efforts into a single project description in the work plan, the EPA reviewer followed that lead. For example, three small projects might have contributed to one larger water management effort. If the work plan grouped the information as one overall water management project, it was recorded as one project for review purposes. Additionally, some states described a single project that would ultimately involve pass-through funds to multiple organizations. If the information about individual pass-through recipients was not available in the work plan, these details could not be ascertained for the purposes of this study. For example, New Jersey featured a work plan project that passed all ARRA funds through to 15 counties to update their comprehensive wastewater management plans. Information was not available in the work plan to accurately review the elements of each of these 15 individual county projects; therefore, the project was recorded as one pass-through effort to multiple counties. As noted earlier, the varying structures and detail contained in the work plans limited the study results somewhat as reviewers tried to achieve consistency across state work plans.

3.0 Project Benefits/Results Analysis

Section 2.0 of this report provided a description and analysis of the *project types* and, thus, provides a starting point for a discussion of project results and benefits. This section examines the results and likely environmental benefits of the projects reviewed. It provides both overview and in-depth observations of state ARRA and non-ARRA projects.

3.1 General Observations

The following general observations are made with respect to the types of projects funded under ARRA versus the non-ARRA projects. These observations, which are qualitative in nature, supplement the more quantitative analyses discussed in the remainder of this section:

- ARRA funding was distributed at a time when many states (e.g., New Jersey, North Carolina) were facing significant reductions in agency staffing because of decreased tax revenues tied to the economic recession of 2007–2009 (Phillips et al. 2010), and some states were prompted to use the funds to maintain existing water resource planning and planning support functions. For example, New Jersey passed all of its ARRA funding to 15 areawide planning entities in an effort to consolidate water and wastewater planning in the state (for a project case study, see Appendix B).
- Past planning and water resource management efforts in some states (e.g., Maine, Montana, Wyoming) had created an environment and *project-ready* operational framework that could support intensive, focused watershed and subwatershed planning initiatives. Those states leveraged ARRA funds to hire watershed planning coordinators, complete watershed assessments, and produce TMDLs and watershed plans to address water quality impairments and threats. For example, Montana launched a series of intensive watershed and subwatershed assessment projects to inform TMDL development and BMP selection.
- States with densely populated areas regulated as MS4s under the NPDES Stormwater program (e.g., Massachusetts, Illinois) established by CWA section 402 used ARRA funds to address planning needs for two key underdeveloped components of their stormwater management programs: retrofitting existing drainage and detention/retention infrastructure to reduce receiving water impacts, and developing ordinances and requirements to ensure that newly built developments do not cause or contribute to water quality impairments. Massachusetts, for example, initiated stormwater studies associated with nutrients, street dirt, stream erosion, and other issues.
- Unaddressed, widespread, and highly focused pollutant sources in some states (e.g., mines, septic systems, streambank erosion) were targeted by ARRA projects through broad-based, high-visibility planning projects that maximized stakeholder involvement, technology transfer, and the development of new training, technical, programmatic, regulatory, and other tools. For example, Alabama used ARRA funds to examine the role of coal mine discharges on surface waters of the state by collecting water quality and biological community data upstream and downstream of selected surface mines to assess water quality impacts (for a project case study, see Appendix B). Such efforts are generally limited in the non-ARRA projects reviewed, which mostly reflect conventional and relatively modest planning efforts.
- EPA reviewed the pollutant focus of ARRA and non-ARRA 604(b) projects versus the leading causes of water quality impairment in each of the 15 states studied, as reported in their CWA section 303(d) reports (see Table C19 in Appendix C). In general, state 604(b) projects addressed key causes of impairment with relatively minor variations. In addition, the pollutant focus mix between ARRA and non-ARRA projects was consistent; i.e., states did not significantly

alter the pollutant focus of their projects when ARRA funds became available, indicating an overall "stay the course" approach in addressing their priority water quality issues.

- The ARRA 604(b) GPR priority categories (energy efficiency, water efficiency, green infrastructure, and environmental innovation) generated broad interest, with green infrastructure planning activities leading the group because of the MS4 stormwater management issues noted above. Innovative projects to track BMP performance, improve assessment metrics, refine assessment methodologies, and improve predictive modeling were also well-represented (e.g., Georgia, North Carolina, Massachusetts, Illinois, others). North Carolina, for example, passed through funds to the Upper Coastal Plain Council for development of a uniform methodology for tracking agricultural land conversions and assisting with incorporation of more green and low-impact strategies in local land use ordinances in the Tar-Pamlico River basin.
- The increase in section 604(b) funding provided an opportunity for many states to revise outdated areawide or regional plans to manage wastewater from areas served by centralized or decentralized treatment facilities, including projects that streamlined and improved the allocation of wasteloads to surface waters, significantly reduced overlap and redundancy in wastewater planning, and greatly lowered the number of localities conducting planning activities to emphasize regional approaches. Missouri, the U.S. Virgin Islands, Virginia, Maryland, and other states cited wasteload allocation analyses in their ARRA work plans.

3.2 Methodology for Assessing Environmental Benefits and Other Parameters

As noted in Section 1.0, the purpose of this study was

- Evaluate the impact of ARRA on water quality management planning efforts and identify lessons learned.
- Compare the types of projects funded by ARRA and non-ARRA grants.
- Highlight successful or innovative case studies.
- Communicate ARRA 604(b) program goals and achievements to the public.

This section outlines the methodology for the study's assessment of environmental benefits and the other project parameters/attributes, which are described in more detail below. In deriving the actual and expected benefits of each project, EPA relied on the section 604(b) ARRA work plans submitted to EPA, the quarterly reports submitted under ARRA section 1512, and supplemental information provided by state ARRA websites, where available. Contextual and other information on selected projects was developed during EPA field trips to some project sites during 2011 and is included to provide perspective on some aspects of project conception, organization, and implementation.

EPA developed a broad suite of review parameters to characterize the projects in terms of ultimate environmental benefits, specific water media focus, type of pollutants addressed, relevance to GPR activities, and the time frame in which the expected environmental benefits would be realized. Brief definitions of each of these review parameter groupings are provided in the Tables in Section 3.3.

As noted in Section 2.2, the varying level of detail in state work plan narratives necessitated the use of some assumptions to ensure a consistent review. Consistent with the approach used for *project type*, *project scale*, *time frame*, and *funding levels*, EPA assumed that states completed the section 604(b) projects as described in the work plan or ARRA 1512 report (for ARRA projects). However, unlike the approach used when assigning *project type* categories, EPA generally provided credit for reasonably anticipated benefits and elements explicitly stated in the work plan, when assigning *environmental benefit*

categories to projects. For other project parameters that were characterized (i.e., *media focus*, *pollutant focus*, and *GPR capacity building*), credit was given only for entries that could be confirmed (e.g., by explicitly stating so in the work plan, by researching impairment causes for specific targeted waterbodies). Accordingly, where more detailed work plans were provided, EPA was able to better assign entries for *media focus*, *pollutant focus*, and *GPR capacity building* categories.

Because of the widely varying project description and work plan formats, level of detail, and information regarding project context, EPA reviewers used a *reasonable assumption* approach to determine whether certain parameters applied to a project as warranted. For example, with respect to identifying types of pollutants addressed by a project, it would be reasonable to assume that a project addressing urban stormwater (i.e., municipal separate storm sewer system) would involve a full range of *pollutant* parameters (e.g., nutrients, sediment, bacteria, metals) found in that specific urban watershed. Similarly, a watershed planning project based on EPA's nine elements of watershed plans would by definition include developing assessment data and stakeholder involvement. Assumptions used in the analysis were not applied liberally but were used when justified or indicated by the project narrative, supplemental materials, or other information on the project accessed and reviewed during the analyses.

3.3 Definitions of Project Characterization Parameters

When characterizing *environmental benefits*, reviewers assessed the project summaries and supplemental information to determine what the ultimate, expected environmental benefits resulting from the project would be and when they would be realized. Because section 604(b) projects all involve planning, the environmental benefits primarily relate to an improved ability to execute on-the-ground actions to address water quality issues (i.e., the benefits are tied to successful completion of a planning process that provides the basis for future action).

The review approach chosen recognizes that developing a watershed plan, for example, does not in and of itself result in water quality improvements any more than producing design blueprints results in the construction of a house. The watershed plan and the blueprints do, however, lay the groundwork for the ultimate, expected results that follow when the plans/designs are implemented. The plans/designs are as integral and important to the final results as is implementation/construction, because they provide targeted, orderly, relevant information on current conditions, what needs to be done, how it should be done, where to do it, and so on. The review parameter definitions that follow are somewhat self-explanatory. Additional information is included, where needed, to ensure a full understanding of the nature of each parameter and how it was applied during the review process.

Environmental Benefit Parameters

The *environmental benefit* parameters identify the ability of proposed improvements or enhancements in specific assessment, analytical, planning, administrative, and implementation functions to result in real environmental benefits. The environmental benefit categories are summarized in Table 5.

Table 5. Environmental results/benefit parameters and indicator data.

Environmental results/benefits	Indicator data
Improved ability to assess or predict water quality/quantity changes (baseline water quality/watershed assessment data, monitoring, modeling, land use/cover analysis, etc.)	Collection of data used in watershed, wasteload/load allocation, standards development, and other assessment analyses; development of watershed, wastewater treatment, stormwater management, or other models used to identify baseline conditions and predict changes in water, effluent, or runoff quality/quantity; development of tools to assist in future water quality/quantity planning (e.g., GIS maps, databases)
Improved watershed, water quality/quantity or ecosystem management through planning that identifies specific management practices and implementation strategies	Development of watershed management, stormwater management, areawide wastewater management, or other water resource plans that list needed management, process, or other practices tied to improving water or effluent quality. These projects generally included plans for implementing site-specific water quality/quantity improvements
Improved watershed, water quality/quantity or ecosystem management through enhanced program development (including organizational, regulations, standards, policies, etc.)	Project activities that create or update water quality standards, water resource management safeguards, organizational structures/processes, or intra/interagency policies, such as memoranda of agreement, joint organizational approaches to improving water quality, or internal program development; review/revision of regulations or ordinances to facilitate or incentivize improved water management
Improved watershed, water quality/quantity or ecosystem management through education, tech/info transfer, stakeholder engagement, outreach, etc.	Outreach, educational, stakeholder involvement, technical training, informational, and other activities targeted at developing or implementing watershed plans, stormwater management programs, wastewater treatment initiatives, or other water resource management initiatives
Improved watershed, water quality/quantity or ecosystem through implementation of BMPs	Direct implementation of BMPs, such as stream corridor restoration, agricultural or urban BMPs, or other structural practices designed to improve water quality. CWA section 604(b) projects in this category generally included pilot or demonstration-scale implementation supporting broader planning/capacity building projects
Improved climate change resilience, greenhouse gas emission reduction and energy efficiency	Activities intended to mitigate impacts from climate change, such as reducing energy use, greenhouse gas emissions, and similar activities
Other/Notes	Categories to note other environmental benefits that might not be included among other parameters, and notes regarding case study applicability or other issues

Media Focus Parameters

Media focus parameters identify the specific water media targeted by the proposed projects. Small, tightly focused localized projects typically involved one or two media; larger regional projects usually involved a broader range of water media. The media focus categories are summarized in Table 6.

Table 6. Media focus parameters and indicator data.

Media focus	Indicator data
Centralized Wastewater	Publicly owned treatment works, areawide waste management plans developed pursuant to CWA section 208, and other larger point sources of treated wastewater effluent discharged under an NPDES permit.
Decentralized Wastewater (Septic or Other)	Small (i.e., less than 100,000 gallons per day) wastewater treatment facilities discharging mostly to a subsurface infiltration system, including individual home *septic* systems, small clustered or community systems, and small aerobic package plants.
Stormwater MS4[1]	Municipal separate storm sewer systems permitted and regulated under Phase I or Phase II of the NPDES permit program.
Stormwater Industrial	Stormwater runoff from industrial facilities permitted and regulated under Phase I or Phase II of the NPDES permit program.
Stormwater Construction	Construction site stormwater runoff from sites with a disturbed area of one acre or more permitted and regulated under Phase I or Phase II of the NPDES permit program.
Ag Runoff-Crops	Runoff from cropland, including row crops and non-grazed hay land.
Ag Runoff-Livestock	Runoff from livestock pastures, pens, holding areas, feedlots, including concentrated animal feeding operations.
General Nonpoint Source[1]	Unspecified polluted runoff from non-MS4 urban, rural, and other areas.
General Surface Water	Unspecified rivers, lakes, streams, wetlands, coastal, and other surface waters, or applicability to a broad range of surface waters, such as developing or updating water quality standards (e.g., development of numeric nutrient criteria).
General Groundwater	Includes all groundwater impact projects, such as those targeting home septic systems, groundwater regulatory standards, wellhead protection programs, and other groundwater management initiatives.
Source Water	Water resources used as drinking water sources, including both surface and groundwater. Category checked only when source water was mentioned in the project narrative or supplemental materials.
Reclaimed/Reuse Water	Projects developing standards, plans, programs, or practices for reclaiming or reusing treated wastewater or process water.

[1] Projects in urbanized areas that listed improvements to the drainage system (e.g., bank stabilization, revegetation), detention/retention, green infrastructure, and similar planning efforts targeting runoff were categorized as having at least a partial stormwater focus. EPA did not assess whether or not the project related to activities required in an MS4 stormwater permit. Projects occurring outside of urbanized areas with MS4s were categorized under the nonpoint source heading.

Pollutant Focus Parameters

Pollutant focus parameters identify the specific pollutants targeted by the proposed projects. The pollutant focus categories are summarized in Table 7.

Table 7. Pollutant focus parameters and indicator data.

Pollutant focus	Indicator data
Nitrogen	Includes nitrate/nitrite, ammonia, ammonium, and all other nitrogen species. Checked as a relevant parameter when noted in project descriptions and for marine coastal water projects that included *nutrients* as a focus issue.
Phosphorus	Includes elemental, reactive, and all phosphorus species. Checked as relevant parameter when noted in project descriptions and for inland freshwater projects that included *nutrients* as a focus issue.
Sediment	Total suspended solids, settleable solids, river/stream sediment (including suspended and bedload sediment), and all other sediment.
Bacteria	All bacteria species, including fecal coliform, *Escherichia coli*, total coliforms, fecal streptococcus, etc.
Metals	Includes all metals, both elemental and compounds.
Other	Low dissolved oxygen, low flow, temperature, volatile and other organic compounds, and other pollutants not captured in the categories above.

Green Project Reserve Capacity Building Parameters

The *GPR capacity building* parameters include projects with elements that reflect priorities listed in the ARRA CWSRF GPR categories, as summarized in Table 8 below. GPR elements had to be explicitly stated in the work plan to merit coding in the database.

Table 8. GPR capacity building parameters and indicator data.

GPR capacity building	Indicator data
LID/Green Infrastructure	Low impact development (LID) and green infrastructure project elements, dealing mostly with stormwater management. (LID is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID works to preserve and recreate natural landscape features, minimize imperviousness, and create functional and appealing site designs that treat stormwater as a resource.)
Energy Efficiency	Reducing energy use through the use of more efficient pumps or equipment, better process controls, or other energy saving hardware, software, or strategies.
Water Efficiency	Reducing water use through the use of water-saving devices, planning, or other hardware, software, or strategies, including water reuse and water supply management/planning.
Climate Change	Project elements intended to mediate the impacts or plan for climate change, such as changes in water levels or availability, temperature impacts on stream biota, and so on.
Innovation—All	Innovative approaches to assessment, analyses, planning, or proposed implementation strategies, including application of new theoretical concepts or creative adaptations of existing tools.

However, note that just because a GPR element was mentioned in a work plan does not mean that it was necessarily a significant project element (that is true for any claims or statements made in project work plans). Likewise, it is anticipated that a significant number of projects that did not specifically mention these GPR elements could have had related benefits that fall into the GPR categories. If not stated in the work plan, however, EPA had no reason to assume that these GRP elements were included and, thus, did not capture them in the analysis.

Time Frame Parameters

Time frame refers to when the ultimate, expected water resource improvements associated with the planning projects are likely to be realized. The time frame categories are summarized in Table 9. Note that these time frames are not necessarily consistent with the time frame associated with the *environmental benefits* identified in the database. Because the *environmental benefits* category was defined to include only the immediate benefits realized by the planning projects, they will be realized (provided the projects follow the work plans provided) within the time frame for the funding (i.e., up to one year for non-ARRA, up to three years for ARRA funding), while the actual water resource improvements might take longer to be realized.

Table 9. Time frame parameters and indicator data.

Time frame	Indicator data
< 2 years	Water resource improvements accrued or realized in less than 2 years; such as projects with mostly administrative functions (e.g., data entry, filing) or other activities with short-term benefits (such as implementation projects).
2 to 10 years	Water resource improvements accrued or realized in 2 to 10 years, such as watershed, areawide wastewater management, or stormwater management planning; technical training; developing predictive models, etc.
> 10 years	Water resource improvements accrued or realized in more than 10 years, such as developing or revising water quality standards, developing new regulations, new long-term policies on wastewater management, and so on.

3.4 Comparison of ARRA and Non-ARRA Projects in Selected States

Table 10 indicates that 70 ARRA and 121 non-ARRA projects were supported by section 604(b) funding in the 15 states selected for comparative analyses. For the purposes of this study, individual projects were defined as designated in the state work plan. As previously noted, states appear to use section 604(b) funds for a wide variety of planning purposes, from centralized wastewater treatment regionalization efforts and basin-wide watershed planning to water quality standards development and refining environmental assessment metrics (e.g., indices of biotic integrity, mercury deposition/uptake characterization). In distributing section 604(b) ARRA funds, EPA provided guidance on possible new planning priorities, including the GPR, but did not restrict state 604(b) efforts funded by ARRA to those new initiatives. States were able to allocate ARRA funds to support their own priorities.

Table 10. Number of non-ARRA and ARRA projects in selected states.

State	Non-ARRA projects*	ARRA projects*
AZ	3	3
FL	8	3
HI	9	3
ID	30	4
IL	7	5
LA	6	3
ME	11	4
MA	15	14
MN	3	6
MT	3	7
NJ	3	1
NY	7	5
NC	8	9
WA	3	1
WY	5	2
Totals	121	70

* ARRA projects include FY09; non-ARRA projects include FY 08, FY09, and FY10 projects.

Some states used ARRA funds to support internal planning programs that faced reductions in funding, staffing or both, because of state budget cuts and staff layoffs spurred by lower revenues tied to the economic recession of 2007–2009 (Phillips et al. 2010; Environmental Council of the States 2011; Brown and Fishman 2010). Additionally, some state narratives reflect the need to use the new funding to continue vital, ongoing water resource management functions, such as collecting and disseminating ambient monitoring data, completing routine analyses and reports, updating water quality standards, interfacing with sister agencies, and other activities that were likely supported by general fund allocations in the recent past.

In other cases, ARRA funds appeared to support new projects designed to respond to unique water resource management needs, such as addressing stormwater impacts from new development, completing TMDLs, improving assessment or modeling efforts, or scaling down basin-wide plans to the watershed or subwatershed level. Maine's Long Creek Watershed Management District, for example, used section 604(b) ARRA funds to support development of critical, innovative project elements that bridged the gap between planning and implementing a comprehensive watershed restoration plan (see Maine's Long Creek Watershed Case Study Box in Appendix B).

Table 11 provides a summarized, overview comparison between ARRA and non-ARRA project types for the 15 comparison states using brief descriptive project titles. The table illustrates two overarching trends in how ARRA funds were used by states: (1) some states used ARRA to support existing water resource planning activities affected by staff or funding reductions or both; and (2) some states used ARRA support to develop needed or new planning functions. For example, Arizona used conventional (i.e., non-ARRA) section 604(b) funds to support the state's CWA section 208 planning program, but it launched green infrastructure/LID, TMDL, and water efficiency/reuse initiatives when ARRA funds became available. Illinois' non-ARRA projects included routine water resource planning and monitoring, but ARRA support allowed it to proceed with refining biotic indices, developing green infrastructure plans, and multistate nutrient control efforts.

Table 11. Summarized ARRA and non-ARRA project activities: comparisons by selected state.

State	Non-ARRA project activities*	ARRA project activities*
AZ	• Water program section 208 planning support	• Green infrastructure/LID for new construction • Monitoring for TMDL development • WQ management plans with efficiency/reuse
FL	• Water quality monitoring, various basins • Develop basin management plans • Develop model for river restoration	• Develop/implement basin management plans • Characterize nutrient pathways in springs/karst area • Validate retention pond design to reduce nitrogen
HI	• Continuous planning process support • Data/administrative/reporting support • Water quality standards revision • Water quality assessment and data analysis • Focused sediment/nutrient stream study	• Green infrastructure planning—public schools/parks • Water quality standards for targeted insecticides • Hydrography data management, analysis, use, QA/QC
ID	• Technical guidance for on-site systems • New rules for on-site system design/siting • Tech reviews for on-site system components • Septage pumper program development • On-site system installer/pumper training • Large capacity septic system tech support • Nutrient/pathogen study and report • Audit tool to assess local health agencies • Operating permit development for on-sites	• Study of phosphorus impacts from on-site systems • Comprehensive mercury source/fate database • Mercury deposition network support • Flow and metals monitoring on major river system
IL	• Water quality management planning • Volunteer lake WQ monitoring support	• Refine IBIs for macroinvertebrates and fish • Collect water quality and biota data statewide • Develop broad, statewide green infrastructure plan • Support multistate nutrient, WQS project for MS River • WQ monitoring, watershed planning for four rivers
LA	• Develop/update WLAs and LAs for TMDLs	• Fill data gaps, develop UAAs/TMDLs for some waters • Develop local water/wastewater emergency plans • Support local planning/implementation of GPR foci
ME	• Coastal waters/estuary monitoring support • Watershed-based plan for selected waters • Citizen watershed visual survey training • Local erosion/phosphorus stream surveys • Local NPS surveys with BMP suggestions	• Stormwater utility development and support • Watershed plan development for selected waterbodies • Watershed plan implementation support with SWCD
MA	• Tech support: monitoring, assessment, etc. • Estuary monitoring, WQ assessment • Ag nutrient BMP guide—cranberry farms • WQ, land use, fertilizer use/fate studies • Volunteer WQ monitoring program support • Stormwater BMP/pond retrofit analyses • Wellhead protection plans and implementation • Geomorph and habitat study of major river • Two stormwater management, mitigation and retrofit planning studies • Fish tissue monitoring for mercury	• Develop state probabilistic WQ monitoring program • Calibrate wetland/waterbody/lands assessment tool • Support statewide NPS and NPDES assessments • Local lake/river bacteria and nutrient source/load studies • Local stormwater mitigation studies, BMP design • Street dirt accumulation/wash-off modeling studies • Stormwater effects on stream erosion studies, BMPs • Nutrient source/transport/fate and mitigation studies • Drinking water reservoir sedimentation study and BMPs • Bacteria source tracking volunteer monitoring support

State	Non-ARRA project activities*	ARRA project activities*
MN	• WQ monitoring/assessment/data support	• Update section 303(e) continuous planning process • TMDL and watershed planning tracking and outreach • Agricultural watershed coordination and planning project • Support multistate nutrient, WQS project for MS River • Bi-state basin WQ monitoring, planning, and outreach
MT	• WQ monitoring ad reports for four major basins	• Aquatic biota baseline data collection in coal/gas area • Work with SWCDs, others to address ravine erosion • Various watershed assessments, watershed plans • Lake monitoring for TMDL development • Irrigation diversions inventory and efficiency measures • Statewide nutrient reduction strategy planning
NJ	• Consolidate local wastewater planning	• Develop consolidated plans for wastewater management
NY	• Outreach, TA, planning support for MS4s • Revise WQS for nutrients, groundwater • Develop TMDLs for 10 lakes	• Integrated regional plans for WQ, TMDLS, MS4s, GI • Development of WQ criteria for flow, metals, nutrients • Aquifer mapping, studies in hydrofracking region • Erie Canal watershed assessments, TMDLs, BMPs • USGS stream gage support, groundwater monitoring
NC	• Monitoring and assessment for 3 basin plans • River corridor greenway plan support • Stormwater/car washing educational kit • Watershed planning and partnership actions • Support for local stormwater mitigation	• Local watershed champions development program • Large river basin water quality/quantity mgmt plans • Water efficiency, conservation, drought mgmt plan • Nutrient reduction research and planning support • Integrated regional water supply plan support • Support for VA-NC water quantity/quality planning • Methodology for tracking ag land conversion, GI BMPs
WA	• Program data, tech, data, admin support • Policy, outreach, stakeholder support	• Develop eight bacteria, temperature, and dissolved oxygen TMDLs
WY	• WWTP feasibility study • On-site system WQ impacts study • General WQ programmatic, admin support • TMDL assessments and other support	• Develop 18 TMDLs in two river basins

* ARRA projects include FY09; non-ARRA projects include FY 08, FY09, and FY10 projects.

3.5 Analysis of Project Focus Shift under ARRA Funding

EPA investigated how state 604(b) project activities differed under ARRA compared to activities funded before ARRA. Table 11 in the previous subsection lists non-ARRA and ARRA project types. Table 12 provides a qualitative assessment of whether there were differences in non-ARRA versus ARRA projects, and if so, the type of differences observed and whether they were minor, moderate, or significant. For example, Arizona used ARRA funds to shift from general planning, administrative, and technical assistance functions to green infrastructure, TMDL support, and projects incorporating energy and water use efficiency elements. New Jersey, on the other hand, used ARRA funds to support a statewide transition to county-based wastewater management planning—an effort that had already been underway before ARRA. Assessments of whether the project focus shifts—if any—were minor, moderate, or significant are qualitative and based on state project descriptions. The determinations for the seven states listed below are used in Table 13 to further explore state uses of ARRA against the complex backdrop of staff reductions and budget cuts during 2009–2010 resulting from the 2007-2009 recession. EPA selected these states for the analysis because of the availability of staffing and budget data.

Table 12. Qualitative assessment of ARRA versus pre-ARRA activities in selected states.

State	Qualitative summary of ARRA versus pre-ARRA project activities[1]	Pre-ARRA vs ARRA 604b project shift[2]
HI	Shift from general planning, administrative, policy development, and technical support to green infrastructure development and higher level data management/analysis.	Moderate
IL	Expansion of general planning and monitoring to sophisticated biometrics development, comprehensive green infrastructure planning, and support for multistate efforts in the upper Mississippi River basin.	Moderate
ME	Pre-ARRA technical and programmatic support for coastal water projects and support for eight focused watershed studies; ARRA projects include comprehensive support for urban stormwater management, stormwater utility, and watershed management plans	Moderate
MA	Generally consistent focus from pre-ARRA to ARRA, including baseline water quality monitoring, assessment, and program planning; support of higher level probabilistic monitoring, stormwater management, and assessment tool development	Moderate
MT	Expansion of routine monitoring and assessment in four major river basins to more focused hydrological and geomorphological reach-level studies and assessment tool development	Moderate
NJ	Generally consistent approach before/during ARRA to consolidate wastewater management planning	Minor
NC	Pre-ARRA focused support for watershed planning and stormwater management complemented by ARRA pass-through funding to local government councils for nutrient reduction, stormwater, and water quality plans	Minor
WY	Shift from general water quality program staffing, planning, and administrative support to direct development of 18 TMDLs	Significant

[1] ARRA projects include FY09; non-ARRA projects include FY 08, FY09, and FY10 projects.

[2] Relative shift in ARRA-funded projects versus pre-ARRA project focus.

In Tables 11 and 12, EPA compared the focus of pre-ARRA 604(b) projects with those funded under ARRA and then used that information to determine whether states with substantial budget/staff reductions were more consistent in their pre-ARRA/ARRA project activities. Researchers expected to find that states suffering fewer budget cuts might be more expansive and creative in using 604(b) funds (i.e., for green infrastructure, energy efficiency, and similar projects) than states with higher levels of staff and budget losses, which would likely opt to use ARRA funds to replace lost resources and thus continue basic agency services.

Table 13 summarizes the relative shift in 604(b) projects in 8 of the 15 states selected for closer study. Staffing data for Table 13 were derived from a study conducted by Phillips et al. (2010) on staffing impacts of FY2010 budget reductions on state environmental agencies. Determinations on the shift in ARRA versus pre-ARRA project types are relative and qualitative and based on the state-specific project type listings in Table 11 and the qualitative assessments summarized in Table 12. The findings indicate a detectable pattern: states with high levels of vacant or lost staff positions (e.g., New Jersey, North Carolina) tended toward low or moderate shifts in ARRA versus pre-ARRA project types, whereas states with low levels of vacant/lost positions (e.g., Wyoming) increased the variety of 604(b) project types.

Table 13. FY2010 state agency budget impacts versus shift in 604(b) project focus.

State	Agency	FTE net loss[1]	Positions held vacant[2]	Total FTE loss + held vacant[3]	Pre-ARRA vs ARRA 604b project shift[4]
HI	Hawaii Dept. of Health	76	0	76	Moderate
IL	Illinois EPA	42	76	118	Moderate
MA	Massachusetts Dept. of Environmental Protection	93	0	93	Moderate
ME	Maine Dept. of Environmental Protection	0	20	20	Moderate
NJ	New Jersey Dept. of Environmental Protection	19	40	59	Minor
MT	Montana Dept. of Environmental Quality	0	30	30	Moderate
NC	North Carolina Dept. of Environment and Natural Resources	129	100	229	Minor
WY	Wyoming Dept. of Environmental Quality	5	3	8	Significant

Source: Phillips et al. 2010 (first five columns: Detailed State Listing of Staffing Impacts Due to Budget Reductions in FY10, Descending Order).

[1]. Full-time equivalent (FTE) staff from start of fiscal year to FTEs at time of survey – net losses.

[2] Vacant FTE positions held open (i.e., no hiring).

[3] Combined total of net losses and positions held vacant.

[4] Relative shift in FY 2009 ARRA funded projects versus FY 2008 and FY 2009 ARRA project focus.

Table 14 combines information from Table 11 with the level of funding increases provided through the ARRA support allocations. The annual increase from the non-ARRA 2009 allocations to the ARRA amounts ranged from a factor of 1.94 (for Idaho, Montana, Wyoming) to 5.76 (for Florida, Illinois, Massachusetts, Minnesota, New Jersey, New York, North Carolina, and Washington).

Table 14. ARRA versus pre-ARRA project types and funding increase factor.

State	Non-ARRA project types	ARRA project types	ARRA $ increase factor over pre-ARRA*
AZ	• Water program section 208 planning support	• Green infrastructure/LID for new construction • Monitoring for TMDL development • WQ management plans with efficiency/reuse	2.67
FL	• Water quality monitoring, various basins • Develop basin management plans • Develop model for river restoration	• Develop/implement basin management plans • Characterize nutrient pathways in springs/karst area • Validate retention pond design to reduce nitrogen	5.76
HI	• Continuous planning process support • Data/administrative/reporting support • Water quality standards revision • Water quality assessment and data analysis • Focused sediment/nutrient stream study	• Green infrastructure planning—public schools/parks • Water quality standards for targeted insecticides • Hydrography data management, analysis, use, QA/QC	3.07
ID	• Technical guidance for on-site systems • New rules for on-site system design/siting • Tech reviews for on-site system components • Septage pumper program development • On-site system installer/pumper training • Large-capacity septic system tech support • Nutrient/pathogen study and report • Audit tool to assess local health agencies • Operating permit development for on-sites	• Study of phosphorus impacts from on-site systems • Comprehensive mercury source/fate database • Mercury deposition network support • Flow and metals monitoring on major river system	1.94
IL	• Water quality management planning • Volunteer lake WQ monitoring support	• Refine IBIs for macroinvertebrates and fish • Collect water quality and biota data statewide • Develop broad, statewide green infrastructure plan • Support multistate nutrient, WQS project for Mississippi River • WQ monitoring, watershed planning for four rivers	5.76
LA	• Develop/update WLAs and LAs for TMDLs	• Fill data gaps, develop UAAs/TMDLs for some waters • Develop local water/wastewater emergency plans • Support local planning/implementation of GPR foci	4.35

State	Non-ARRA project types	ARRA project types	ARRA $ increase factor over pre-ARRA*
ME	• Coastal waters/estuary monitoring support • Watershed-based plan for selected waters • Citizen watershed visual survey training • Local erosion/phosphorus stream surveys • Local NPS surveys with BMP suggestions	• Stormwater utility development and support • Watershed plan development for selected waterbodies • Watershed plan implementation support with SWCD	3.06
MA	• Tech support: monitoring, assessment, etc. • Estuary monitoring, WQ assessment • Ag nutrient BMP guide—cranberry farms • WQ, land use, fertilizer use/fate studies • Volunteer WQ monitoring program support • Stormwater BMP/pond retrofit analyses • Wellhead protection plans and implementation • Geomorph and habitat study of major river • Two stormwater management, mitigation and retrofit planning studies • Fish tissue monitoring for mercury	• Develop state probabilistic WQ monitoring program • Calibrate wetland/waterbody/lands assessment tool • Support statewide NPS and NPDES assessments • Local lake/river bacteria and nutrient source/load studies • Local stormwater mitigation studies, BMP design • Street dirt accumulation/wash-off modeling studies • Stormwater effects on stream erosion studies, BMPs • Nutrient source/transport/fate and mitigation studies • Drinking water reservoir sedimentation study and BMPs • Bacteria source tracking volunteer monitoring support	5.76
MN	• WQ monitoring/assessment/data support	• Update section 303(e) continuous planning process • TMDL and watershed planning tracking and outreach • Agric watershed coordination and planning project • Support multistate nutrient, WQS project for Mississippi River • Bi-state basin WQ monitoring, planning, and outreach • Statewide nutrient reduction strategy planning	5.76
MT	• WQ monitoring and reports for 4 major basins	• Aquatic biota baseline data collection in coal/gas area • Work with SWCDs, others to address ravine erosion • Various watershed assessments, watershed plans • Lake monitoring for TMDL development • Irrigation diversions inventory and efficiency measures	1.94
NJ	• Consolidate local wastewater planning	• Develop consolidated plans for wastewater management	5.76
NY	• Outreach, TA, planning support for MS4s • Revise WQS for nutrients, groundwater • Develop TMDLs for 10 lakes	• Integrated regional plans for WQ, TMDLS, MS4s, GI • Development of WQ criteria for flow, metals, nutrients • Aquifer mapping, studies in hydrofracking region • Erie Canal watershed assessments, TMDLs, BMPs • USGS stream gage support, groundwater monitoring	5.76

State	Non-ARRA project types	ARRA project types	ARRA $ increase factor over pre-ARRA*
NC	• Monitoring and assessment for three basin plans • River corridor greenway plan support • Stormwater/car washing educational kit • Watershed planning and partnership actions • Support for local stormwater mitigation	• Local watershed champions development program • Large river basin water quality/quantity mgmt plans • Water efficiency, conservation, drought mgmt plan • Nutrient reduction research and planning support • Integrated regional water supply plan support • Support for VA-NC water quantity/quality planning • Methodology for tracking ag land conversion, GI BMPs	5.76
WA	• Program data, tech, data, admin support • Policy, outreach, stakeholder support	• Develop eight bacteria, temperature, and dissolved oxygen TMDLs	5.76
WY	• WWTP feasibility study • On-site system WQ impacts study • General WQ programmatic, admin support • TMDL assessments and other support	• Develop 18 TMDLs in two river basins	1.94

* Increase in funding represented by ARRA over pre-ARRA allocations (ARRA/pre-ARRA).

3.6 Discussion of Project Benefit Trends

This section analyzes trends in the *environmental benefits* linked to completion of the ARRA and Non-ARRA projects and, where applicable, pre-ARRA SRF funding (to compare whether ARRA and its respective guidance influenced subsequent rounds of 604(b) CWSRF funding). Where possible, overview or summary information is presented in tables or graphs to better convey the range of results/benefit types generated by the projects reviewed. The *environmental benefit* abbreviations defined in Table 15 are used in these tables and figures to optimize viewing and conserve space.

Table 15. Environmental benefit abbreviations used in subsequent tables and figures.

Abbreviated name	Full benefit description
Assessment	Improved ability to assess or predict water quality/quantity changes (baseline water quality/watershed assessment data, monitoring, modeling, land use/cover analysis, etc.)
Planning	Improved watershed, water quality/quantity or ecosystem management through planning that identifies specific management practices and implementation strategies
Program	Improved watershed, water quality/quantity or ecosystem management through enhanced program development (including organizational, regulations, standards, policies, etc.)
Education	Improved watershed, water quality/quantity or ecosystem management through education, tech/info transfer, stakeholder engagement, outreach, etc.
Implementation	Improved watershed, water quality/quantity or ecosystem by implementing BMPs
Climate Change	Improved climate change resilience, greenhouse gas emission reduction and energy efficiency

EPA's flexible framework for ARRA funding resulted in a mix of projects—many of them new initiatives—that varied by state. Of the 417 total 604(b) projects assessed, 77 percent (320) were classified as new efforts, most of which were funded under ARRA (i.e., 263 new projects under ARRA versus 57 projects supported by non-ARRA funding). The remaining 23 percent (97 projects) provided support for ongoing state planning efforts. Of these 97 projects supporting ongoing efforts, 33 were funded under ARRA and 64 were funded under non-ARRA. Clearly, while ARRA funding helped to maintain vital program services, it also provided a needed boost for new initiatives.

Table 16 provides a simple listing of the numbers and percentages of FY09 ARRA, non-ARRA (i.e., FY08, FY09, FY10), and FY08 pre-ARRA projects coded for each *environmental benefit* category. Note that each project was coded for at least one *environmental benefit*, although many projects featured more than one *environmental benefit*. The table shows that *climate change* initiatives were not among the *project types* supported by states until their inclusion among the ARRA focus areas. A key finding of this study is the documented shift – somewhat subtle, but clearly evident – toward green infrastructure, climate change, and environmentally innovative projects through ARRA.

Figure 2 displays the percentage values is Table 16 to illustrate the proportion of *environmental benefits* associated with all ARRA projects (top), non-ARRA projects (middle) and pre-ARRA projects (bottom). The numbers in the pie slices indicate the percentage of projects featuring the associated *environmental benefit*.

Table 16. Summary of ARRA, non-ARRA, and pre-ARRA[1] project benefits.

	ARRA & non-ARRA (417 projects total)		ARRA only (296 projects total)		Non-ARRA only (121 projects total)		Pre-ARRA only (44 projects total)	
Environmental Benefits	Projects (#)	Proportion of Total Benefits Assigned[2]	Projects (#)	Proportion of Total Benefits Assigned[2]	Projects (#)	Proportion of Total Benefits Assigned[2]	Projects (#)	Proportion of Total Benefits Assigned[2]
Assessment	240	24%	177	24%	63	24%	19	21%
Planning	237	24%	173	23%	64	24%	20	22%
Program	171	17%	130	17%	41	16%	15	17%
Education	339	34%	244	33%	95	36%	35	39%
Implementation[3]	4	0%	4	1%	0	0%	0	0%
Climate Change	16	2%	16	2%	0	0%	0	0%
Total Benefits Assigned	1,007	--	744	--	263	--	89	--

[1] ARRA projects include FY09; non-ARRA include FY08, FY09, and FY10; pre-ARRA include FY08.

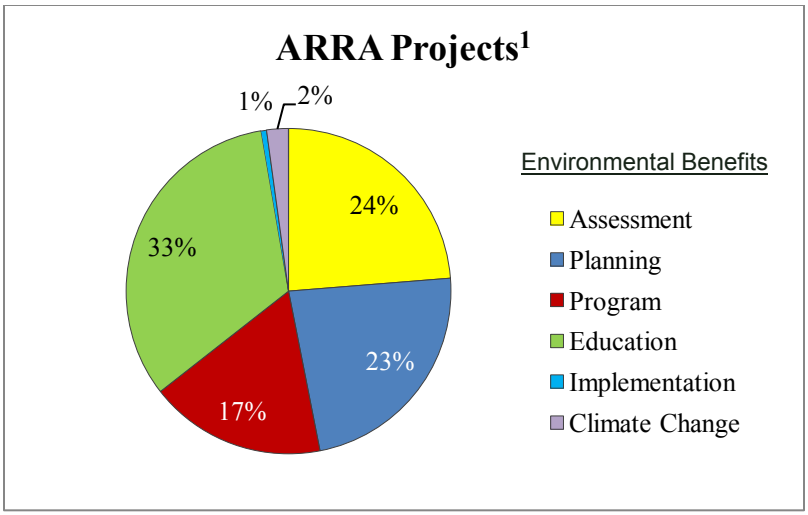
[2] Proportion of Total Benefits Assigned = Projects associated with an Environmental Benefit / Total Benefits Assigned

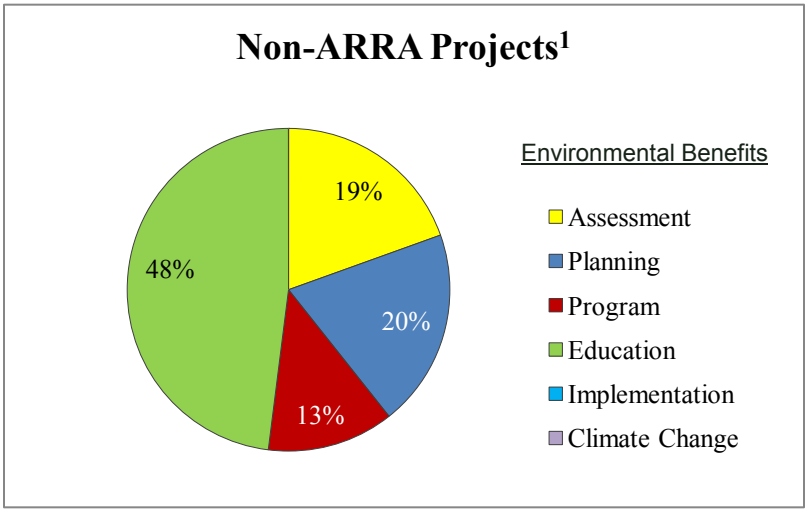
[3] Implementation projects included pilot or demonstration-scale projects that contributed directly to planning or capacity building.

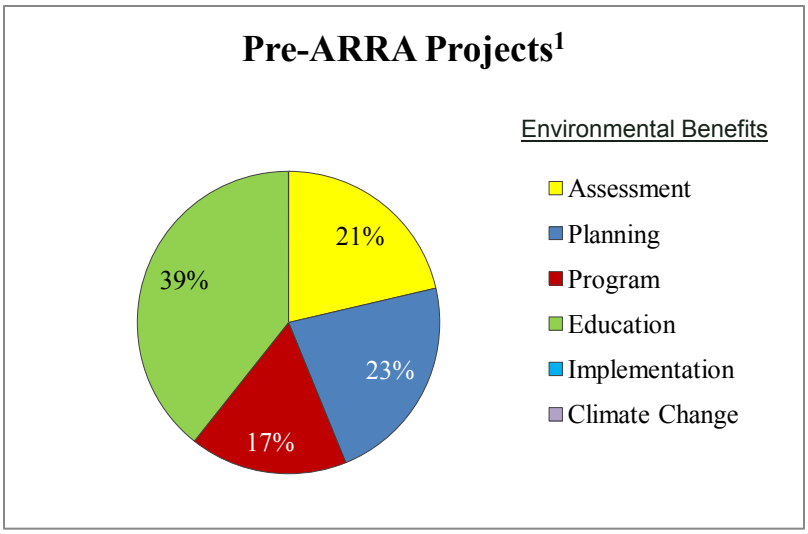
Figure 3 shows proportionally the number of *environmental benefits* associated with ARRA, Non-ARRA and pre-ARRA projects. No single project was associated with more than five benefits. As illustrated in the legend for the figure, the numbers 1, 2, 3, 4, 5, represent the possible numbers of *environmental benefit* types a single project may feature. In other words, all projects have at least one *environmental benefit*, some have two, some have three, and so on. For example, for the ARRA projects pie chart in Figure 3, 11% of the projects had only one *environmental benefit*, 36% had two, 43% had three, and so on. The three pie charts in Figure 3 show proportionally the number of *environmental benefits* associated with all ARRA projects (top), non-ARRA projects (middle) and pre-ARRA projects (bottom). The number in the pie slices represents the percentage of projects that include the corresponding number of *environmental benefits*.

A comparison of the pie charts in Figure 2 shows that ARRA projects covered a somewhat wider and more evenly distributed range of environmental benefits than non-ARRA and pre-ARRA projects. Non-ARRA projects predominantly rendered *education/outreach* benefits, while ARRA projects were more evenly distributed among the environmental benefits. Additionally, the population of ARRA projects included several benefits that were not represented at all in non-ARRA projects: *implementation* (which included several projects that involved pilot- or field-scale demonstration installations that contributed directly to planning or capacity building), and *climate change* (which follows from an increased emphasis on GPR project elements for ARRA projects).

Similarly, Figure 3 shows that the ARRA projects tended to have more benefits, on average, and that a greater percentage of non-ARRA and pre-ARRA projects focus on a single benefit. Comparison of the pre-ARRA and non-ARRA pie charts can provide some insight as to whether ARRA influenced future CWSRF projects. Figure 2 indicates little appreciable difference between pre-ARRA and ARRA project benefit distribution, whereas Figure 3 appears to show that ARRA and non-ARRA projects generally included a broader suite of environmental benefits than pre-ARRA projects.

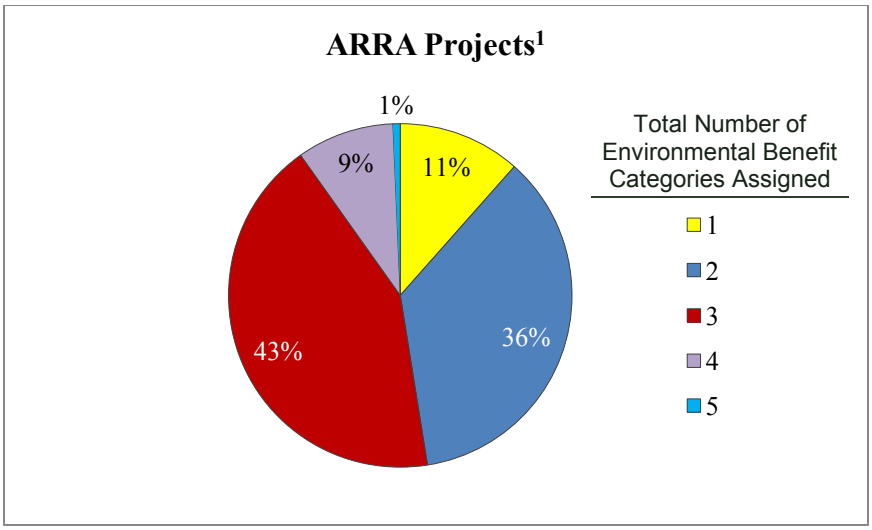


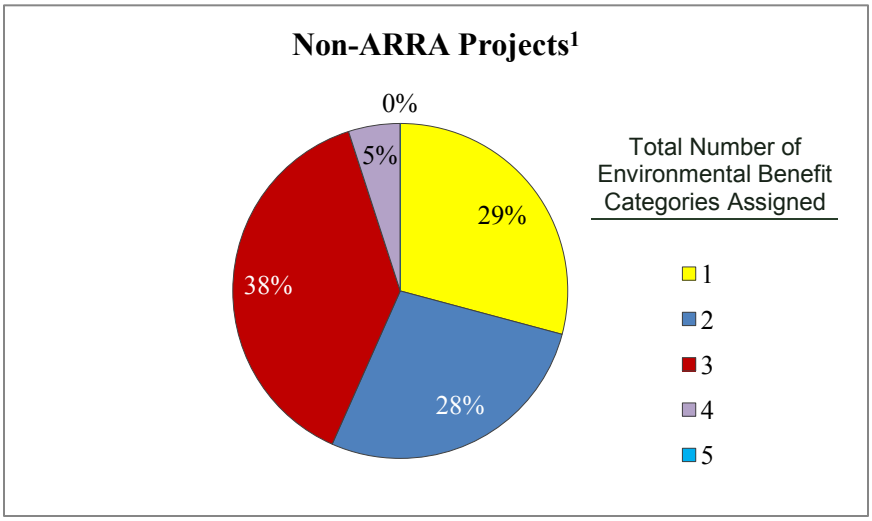


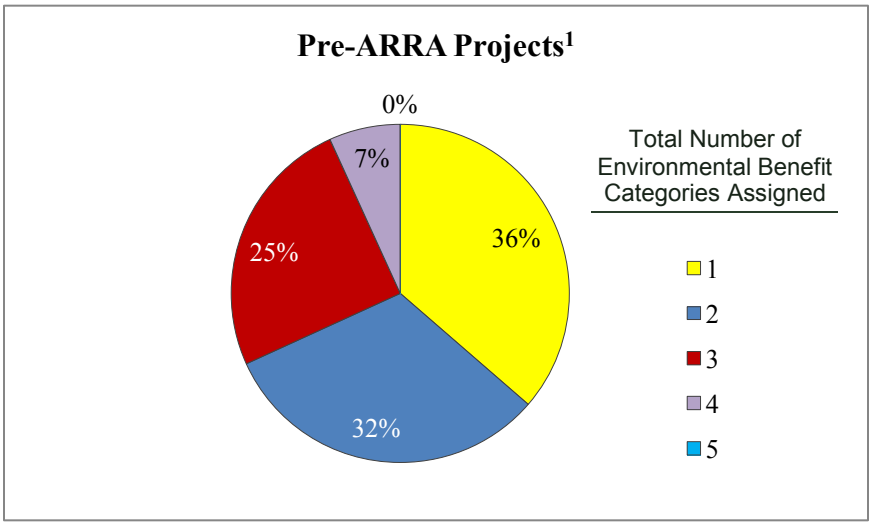


[1] *ARRA includes FY09; non-ARRA includes FY08, FY09, and FY10; pre-ARRA includes FY08.*

Figure 2. Type of environmental benefits associated with ARRA, non-ARRA, and pre-ARRA projects.







[1] *ARRA includes FY09; non-ARRA includes FY08, FY09, and FY10; pre-ARRA includes FY08.*

Figure 3. Number of environmental benefits associated with ARRA, non-ARRA, and pre-ARRA projects.

Table 17 and Figure 4 provide a detailed breakdown of *project type* versus *environmental benefits* for the combined population of ARRA and non-ARRA projects reviewed. The table and figure show clear relationships between *project type* and *environmental benefit(s).* For example, ecosystem information collection is mostly related to environmental assessment benefits, with related planning and education benefits. Water quality and watershed-based planning projects include mostly planning and educational benefits, while water policy / regulation / ordinance development projects primarily benefit state environmental agency programmatic functions. Table 17 and Figure 4 illustrate proportionally how environmental benefits are distributed for the various *project types.*

Table 17. ARRA and non-ARRA project types versus environmental benefits.

	Environmental benefits/results					
Project type category	**Assessment**	**Planning**	**Program**	**Education**	**Implementation**	**Climate Change**
1. Ecosystem Information Collection and Assessment	223	153	95	210	3	6
2. Water Quality Planning or Watershed-based Planning	95	141	60	146	1	8
3. Project Elements That Qualify as Green Project Reserve						
a. Green Infrastructure	45	72	39	81	1	7
b. Water Efficiency	8	14	5	16	0	6
c. Energy Efficiency	4	9	3	10	0	5
d. Environmentally Innovative Projects	12	17	11	20	0	7
4. Nonpoint Source BMPs	37	47	13	39	1	2
5. Water Policy, Regulation, or Ordinance Development/Revision	16	31	40	42	1	3
6. Development of Technical Guidance or Local (e.g., Watershed) Project Reports	29	39	32	56	1	5
7. Consensus Building/ Coordination	53	58	44	88	1	4
8. Public Outreach, Training, and Educational Information Transfer	81	98	65	154	1	6
9. Water Program Support	57	41	66	76	0	1
Totals	660	720	473	938	10	60

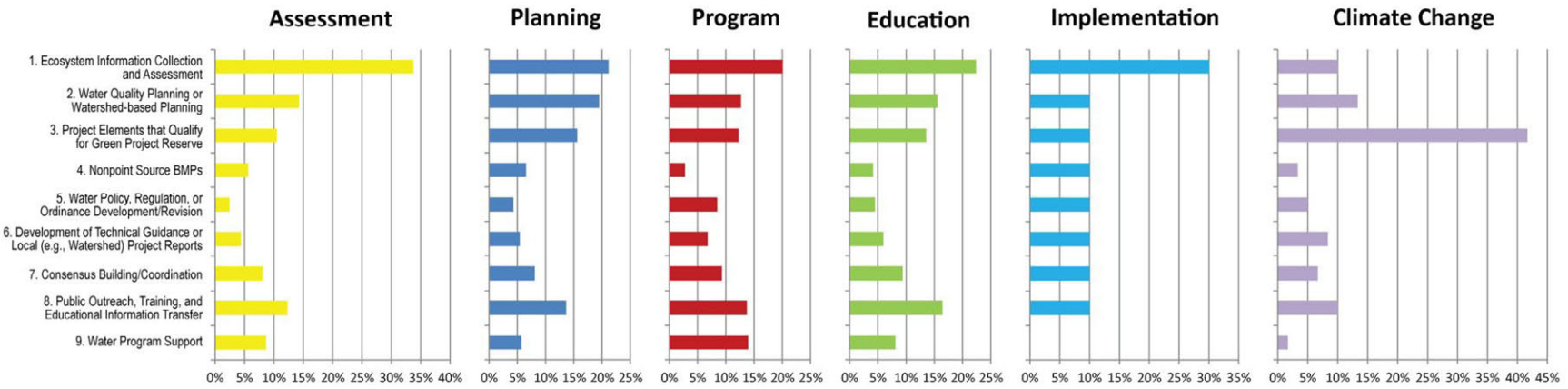
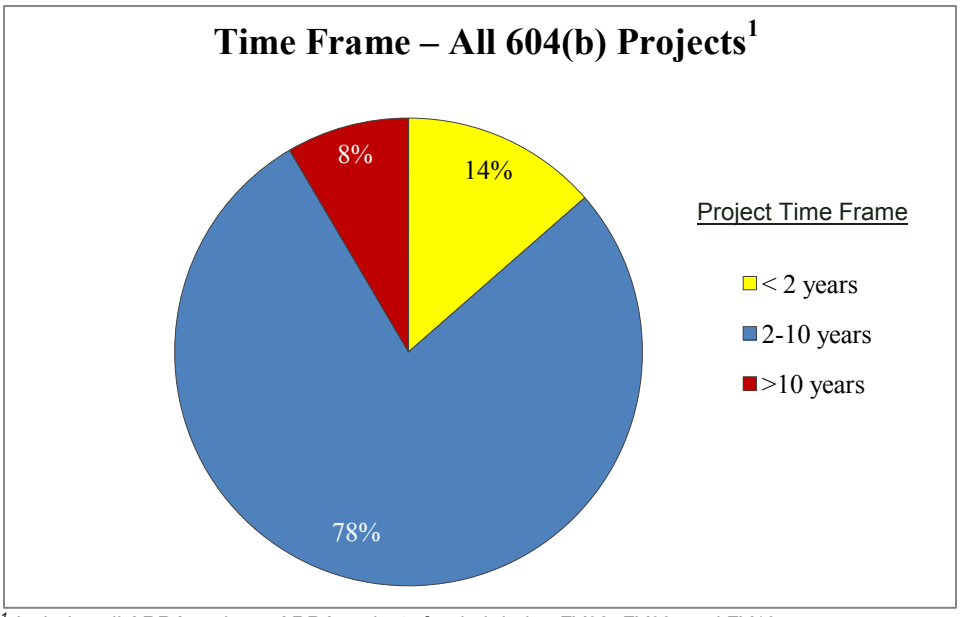


Figure 4. Breakdown of *environmental benefits* associated with different *project types.*

Figure 5 provides a pie chart of the *time frame* for water resource improvements associated with all the projects reviewed, both ARRA and non-ARRA. The pie slices represent proportionally the number of projects whose environmental benefits will be realized within the time periods indicated in the legend. Given the nature of these planning type projects, it is not surprising that the majority (i.e., 78%) of the ARRA and non-ARRA projects assessed have *environmental benefits* that are realized within 2 to 10 years (see Figure 5).

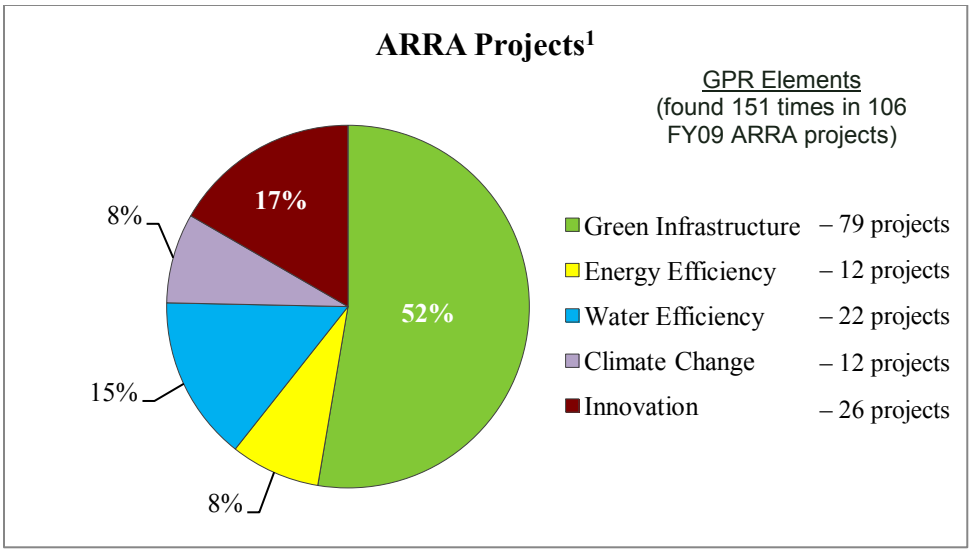


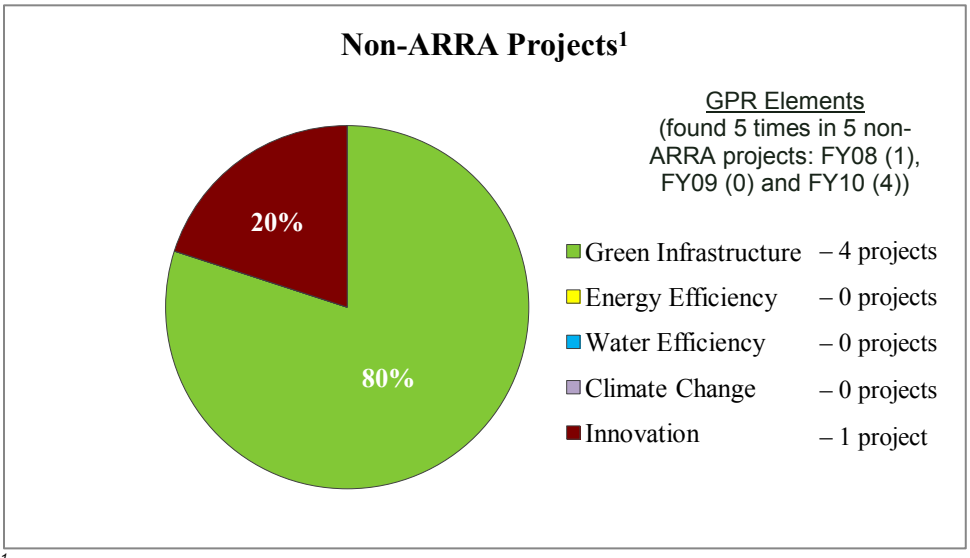
[1] *Includes all ARRA and non-ARRA projects funded during FY08, FY09, and FY10.*

Figure 5. Time frame for *environmental benefits* realized for all 604(b) projects.

Figures 6 and 7 illustrate the distribution of *GPR features* in ARRA, non-ARRA, and pre-ARRA projects. The pie charts in Figure 6 illustrate the distribution of *GPR features* – where they existed – in projects associated with the ARRA, non-ARRA and pre-ARRA categories. In this case, there were only 5 non-ARRA projects and 1 pre-ARRA project that specified *GPR features,* reflecting the almost non-existent focus on these benefit categories prior to the availability of ARRA funding. The numbers in the pie charts represent the number of projects out of the total for each of the two pie charts presented.

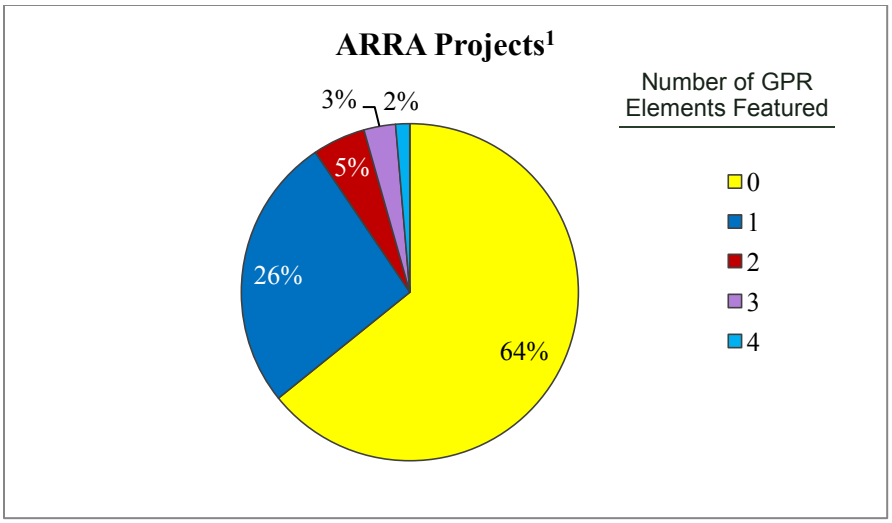
Figure 7 provides proportional data for the number of *GPR features* included in ARRA, non-ARRA, and pre-ARRA projects. As illustrated in the legend for this figure, there are five choices for the number of *GPR features*: 0, 1, 2, 3, 4, which represent the possible numbers of *GPR features* a project may include. In other words, projects may have zero GPR features, or one, two, three, or four. The numbers in the pie slices represent the percentages in each category. As in Figure 6, the extremely low priority placed on *GPR features* in the non-ARRA and pre-ARRA is evident: only 5 non-ARRA projects and 1 pre-ARRA project had more than one *GPR feature,* and the overall number of those features was low compared to the ARRA group. More than a third of the ARRA projects had more than one *GPR feature* listed.

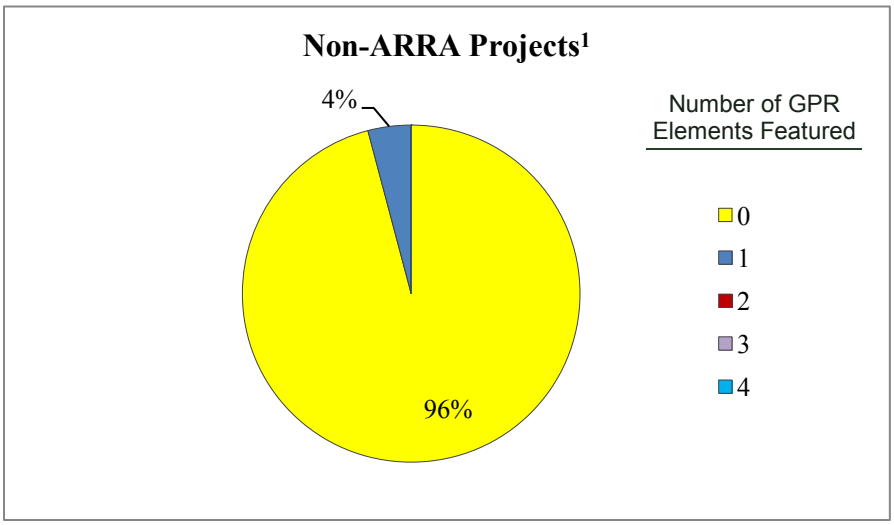


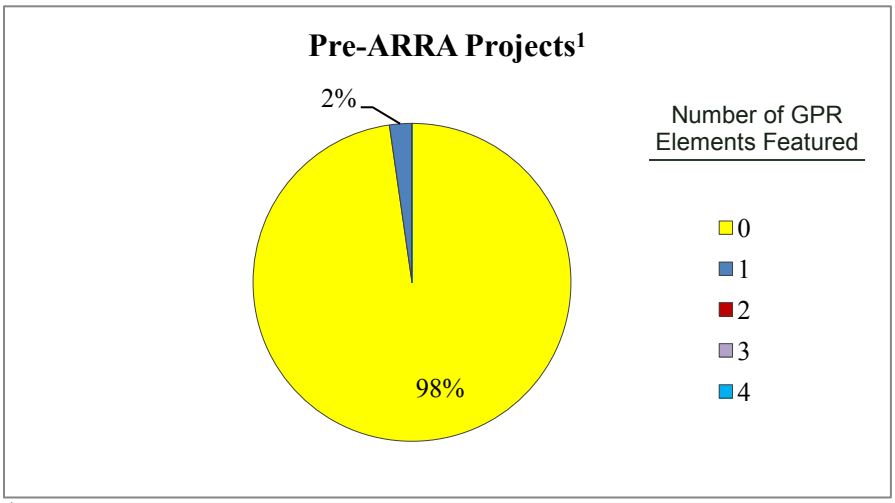


[1] *ARRA includes FY09; non-ARRA includes FY08, FY09, and FY10. Numbers represent applicable category totals out of the total number of projects listing GPR elements.*

Figure 6. Breakdown of GPR elements associated with ARRA and non-ARRA projects.





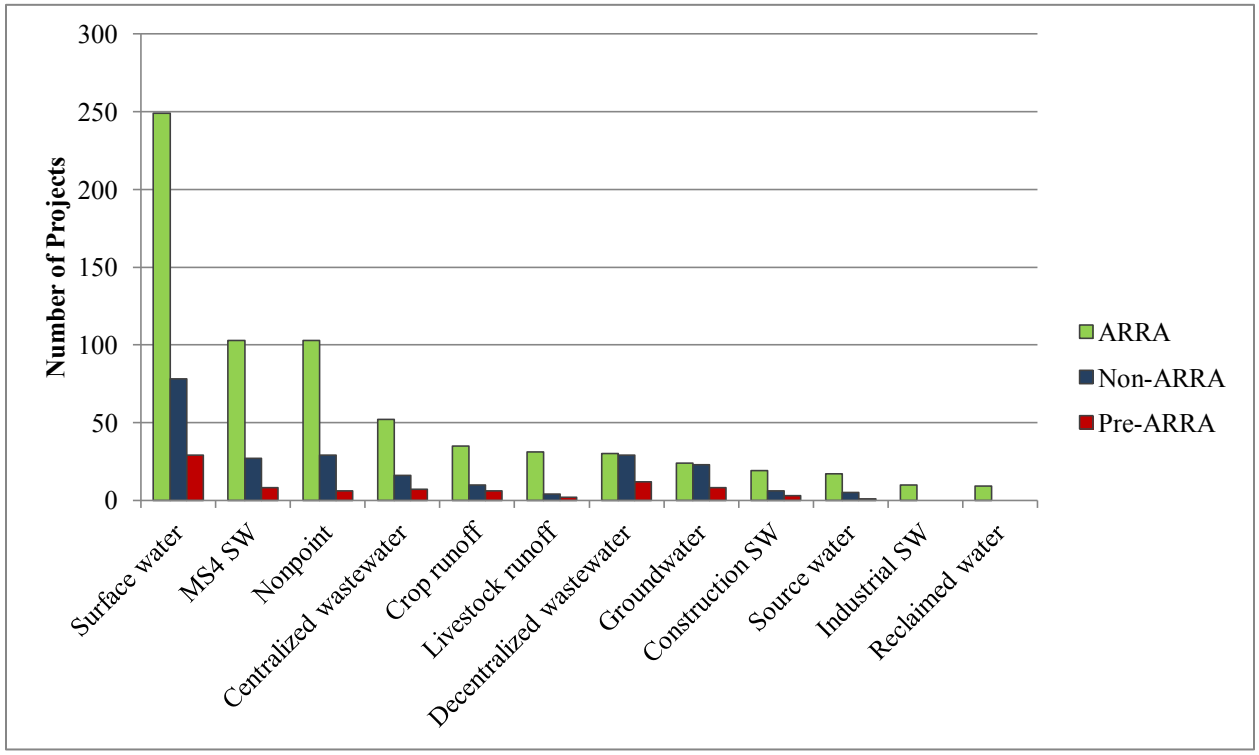


[1] *ARRA includes FY09; non-ARRA includes FY08, FY09, and FY10; pre-ARRA includes FY08.*

Figure 7. Proportion of GPR elements associated with ARRA, non-ARRA, and pre-ARRA projects.

Consistent with the previous figures, it is clear that the ARRA projects included a much greater range of GPR features than non-ARRA projects. In fact, per Figure 7, only 5 of the non-ARRA projects (which include 1 project in FY08, 0 projects in FY09 and 4 projects in FY10) and only 1 of the pre-ARRA projects (FY08 only) featured a GPR element, whereas 106 ARRA projects did. A comparison of the pre-ARRA and non-ARRA pie charts in Figures 6 and 7 shows that ARRA appeared to have a small effect on the GPR focus of subsequent CWSRF 604(b)-funded projects. However, as noted above, a very small increase in GPR elements appears in the post-ARRA (FY10 only) projects.

Figure 8 provides a breakdown of the *media focus* attributes for ARRA, non-ARRA and pre-ARRA projects. In general, the *media focus* trends are similar between ARRA and non-ARRA projects, with the exception of *decentralized wastewater* and *groundwater*, which constituted a greater percentage of the non-ARRA projects; however, this observation is essentially an artifact associated with a large number of decentralized wastewater capacity building projects associated with Idaho's non-ARRA project population (Idaho was one of the 15 states randomly selected for non-ARRA comparison).



** ARRA includes FY09; non-ARRA includes FY08, FY09, and FY10; pre-ARRA includes FY08.*

Figure 8. Media focus for ARRA projects, non-ARRA projects and pre-ARRA projects.

3.7 State and Regional Comparison of ARRA Projects

This section summarizes EPA's analysis of differences in ARRA project characteristics by state or territory and EPA Region. Figure 9 presents the number of ARRA projects that were reviewed for this project, sorted by state or territory (i.e., each bar represents one state/territory), showing a maximum of 24 projects for one state/territory and a minimum of one project for seven states/territories.

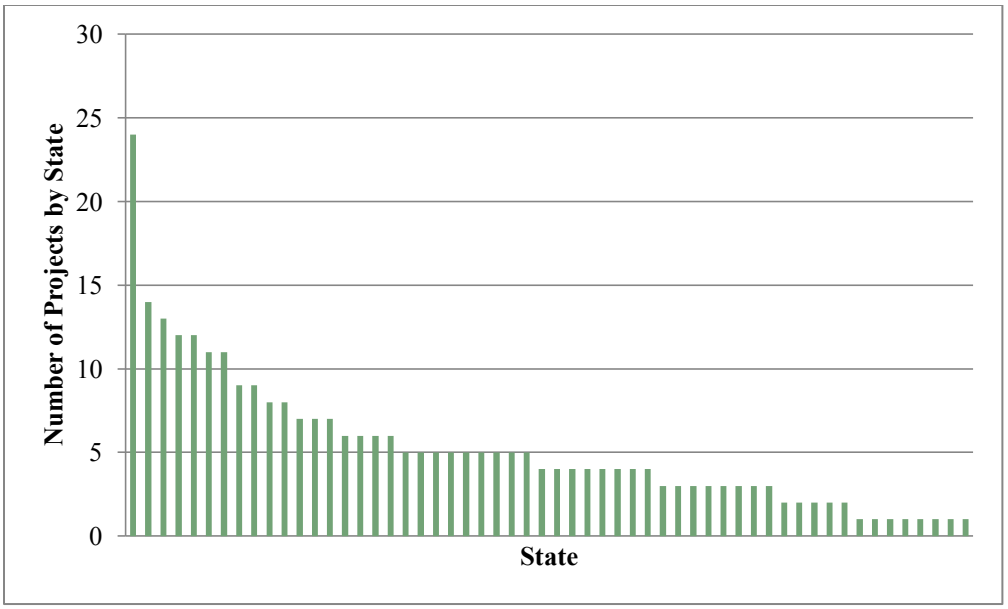


Figure 9. Number of ARRA projects reviewed, sorted by state/territory.

Figure 10 presents each state as a separate column, this time showing the average number of benefits for the ARRA-funded 604(b) projects in that state. State values represent the total number of benefits divided by the total number of ARRA projects in that state (i.e., the averages for each state). The majority of states featured ARRA projects averaging two to three benefits each.

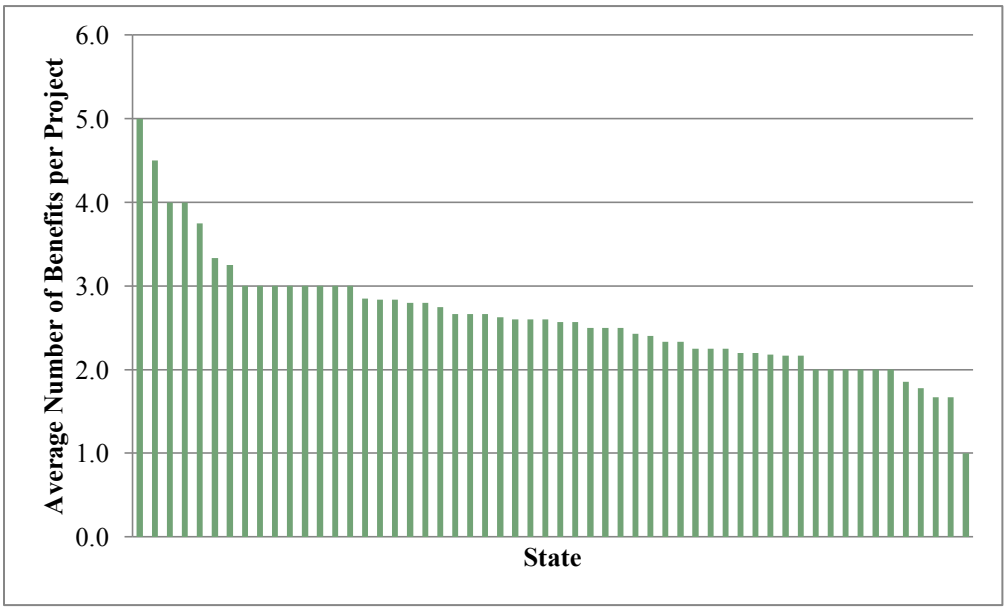


Figure 10. Average number of benefits per ARRA project, sorted by state/territory.

Figures 11 and 12 use cumulative frequency diagrams to graphically illustrate the percentage of new projects and the percentage of pass-through projects, by state. Figure 11 shows that more than half of the states used ARRA funding to fund all new projects, with only four funding all existing projects. Figure 12 shows a more even distribution of pass-through projects, with a median percentage of about 40 percent pass-through projects, although about 30 percent of the states provided no pass-through funds.

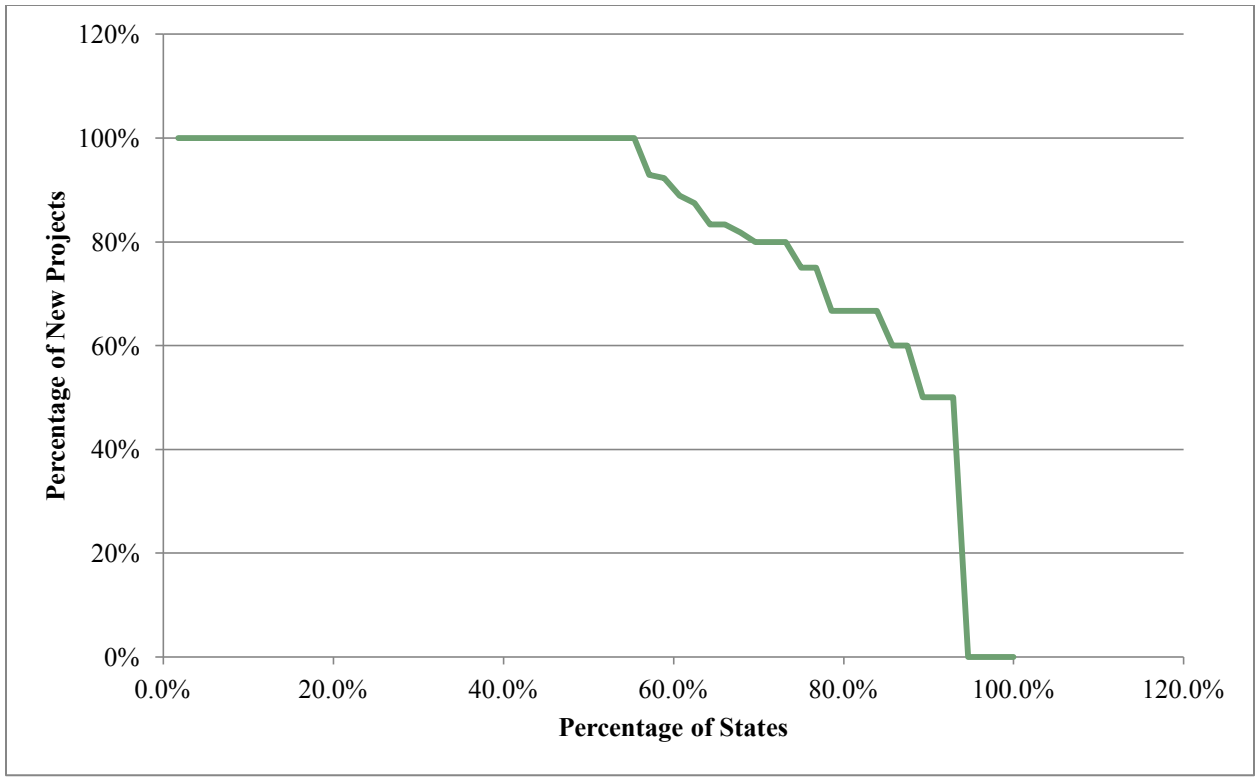


Figure 11. Frequency diagram of percentage of new projects by state/territory for ARRA funding cycle.

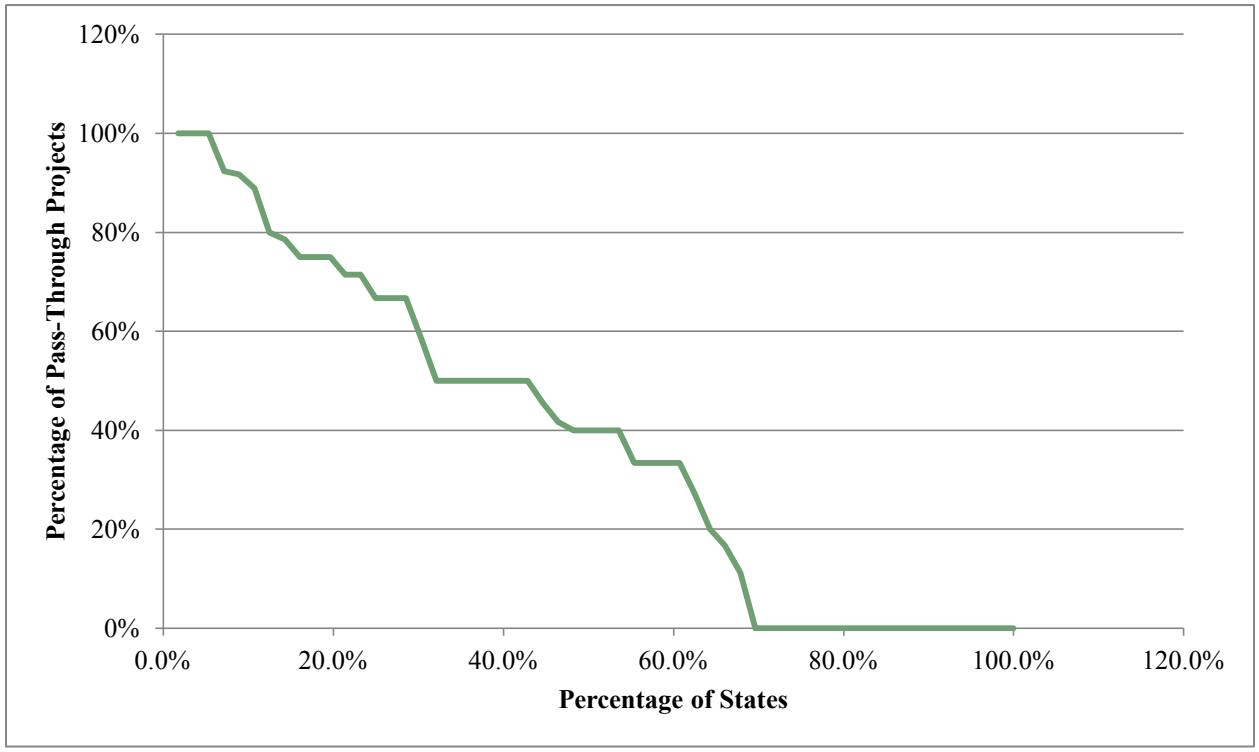


Figure 12. Frequency diagram of percentage of pass-through projects by state/territory for ARRA funding cycle.

Table 18 and Figures 13 and 14 provide a series of graphics that summarize an analysis of regional trends in ARRA projects, sorted by EPA Region. Few meaningful trends can be discerned by casual observation of the graphics. Per Table 18, there appears to be little correlation between an EPA Region's benefit average and its GPR activity or percentage of pass-through or new projects.

Figures 13 and 14 shows several features of interest:

- Region 1 features almost all pass-through projects, while Region 8 features few. That could reflect a greater capacity for local groups in the New England (i.e., Region 1) area to execute 604(b) projects versus other EPA Regions. However, regional outreach and training could also be influencing the mix of pass-through versus state-executed projects. The mix of pass-through versus state-executed projects could be influenced by other factors as well, including (1) whether a state had a previously strong pass-through program structure established prior to the receipt of the ARRA funds and (2) whether the state conducted regional outreach and strongly promoted the use of 604(b) funds.
- All states have at least some non-pass-through projects; Maine and New Jersey passed through all of their ARRA 604(b) funding.
- Most states used ARRA funding to support new planning initiatives, while only a few used the funding for all existing projects.

In spite of the findings noted above, it appears that there is more variety from state to state than from region to region (Table 18), where the average number of project benefits ranged from 2.08 to 2.83.

Table 18. Regional breakdown of ARRA projects.

Region	Avg. no. project benefits	Avg. no. of GPR elements per project	Pass-through	New projects	Total projects
Region 1	2.52	0.60	81%	92%	52
Region 2	2.08	0.92	17%[1]	100%	12
Region 3	2.39	0.44	42%	97%	36
Region 4	2.47	0.68	58%	89%	38
Region 5	2.71	0.24	56%	80%	45
Region 6	2.39	0.50	29%	96%	28
Region 7	2.28	0.17	33%	72%	18
Region 8	2.77	0.38	38%	88%	26
Region 9	2.48	0.86	28%	79%	29
Region 10	2.83	0.33	25%	100%	12

Region 2 conducted a large ARRA project that included, ultimately, passing all ARRA funds to counties. Because of work plan structural constraints, these projects could not be recorded individually. Therefore, Region 2's recorded pass-through rate is lower than actual.

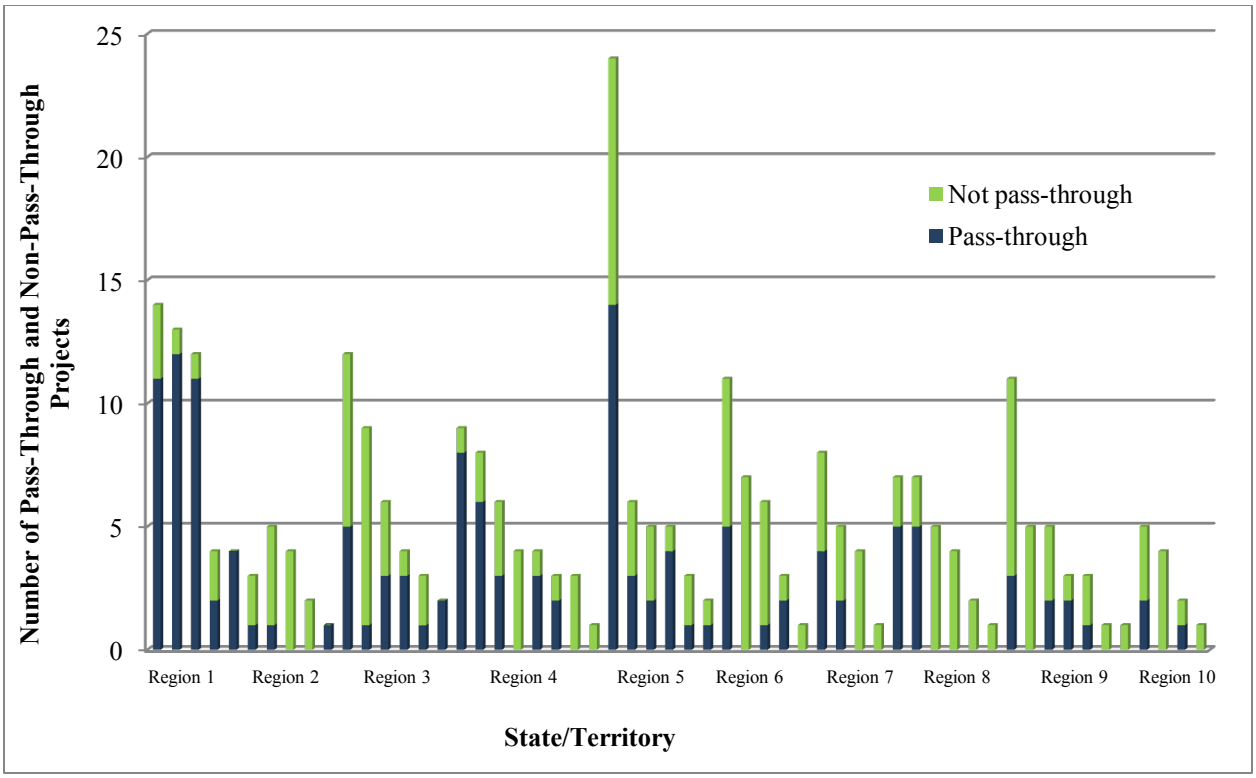


Figure 13. Pass-through versus non-pass-through projects by state/region under ARRA funding.

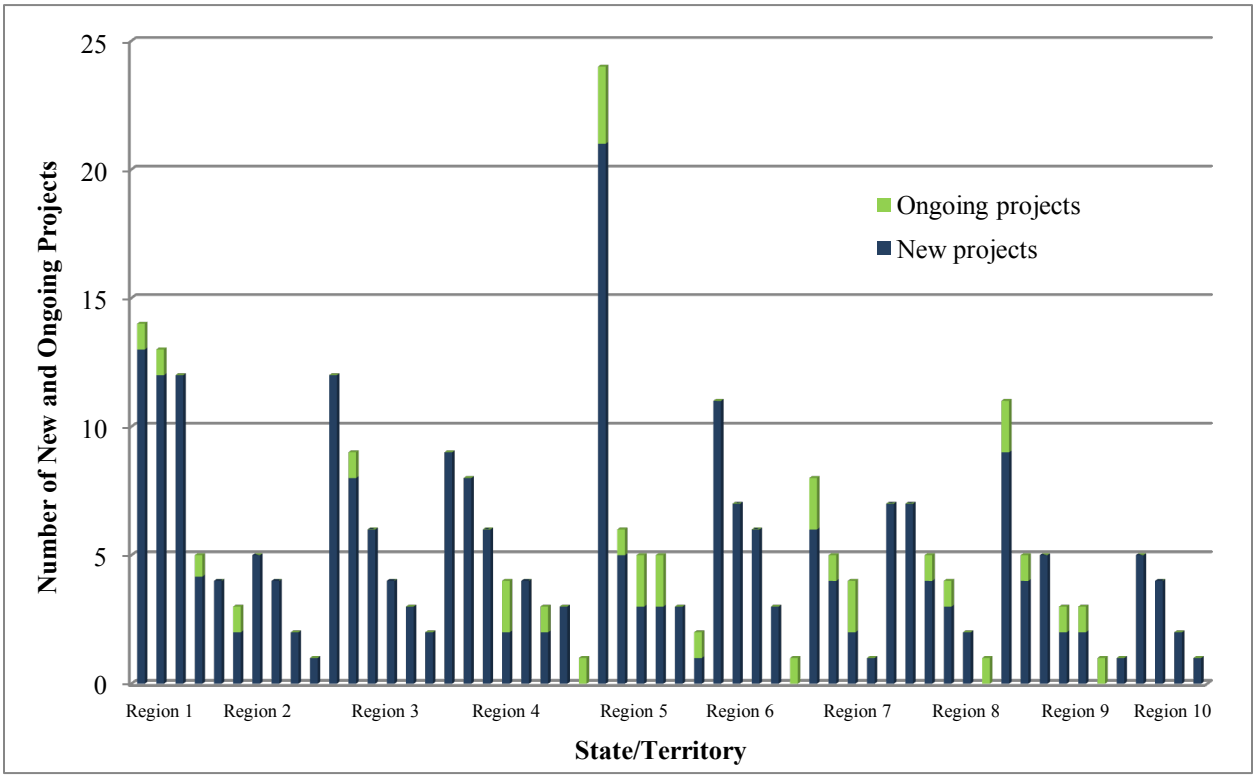


Figure 14. New versus ongoing project breakdown by state/region for ARRA funding cycle.

3.8 Comparison by ARRA Project Funding and State Allotment Range

EPA also analyzed how ARRA funding levels influence the types of projects pursued. State allotments ranged from $100,000 to more than $4,000,000, with just under 80 percent of the states receiving $1,000,000 or less.

Table 19 divides states into four ARRA allotment range categories with relatively even representation. No real trends are discernible except that, as expected, states with higher funding tended to fund more projects and provide higher average funding per project. Likewise, Table 20 shows similar data for the non-ARRA funding for the 15 comparison states. Refer to Appendix C for more specific data tables and figures on state ARRA allotment levels versus environmental benefits, media types, pollutant types, GPR elements, timeframes and project types.

Table 19. Summary of ARRA projects by state allotment range.

Allotment range	# States	Average allotment	Average no. project benefits	Average no. GPR elements per project	Pass-through projects	New projects	Average # Projects/ state	Average $/project
< $200K	14	$167,357	2.52	0.63	41%	95%	4.5	$39,350
$200K–$500K	18	$334,180	2.69	0.72	47%	84%	4.1	$80,452
$500K–$1M	12	$689,150	2.43	0.43	54%	92%	5.3	$134,750
> $1M	12	$1,896,990	2.43	0.32	48%	86%	8.0	$244,752

Table 20. Summary of non-ARRA projects by state allotment range.

Allotment range (total FY 08, 09, 10)	# States	Average allotment	Average no. project benefits	Average no. GPR elements per project	Pass-through projects	New projects	Average # projects/ state	Average $/project
< $325K	3	$303,353	1.95	0.03	0%	18%	12.7	$23,492
$325K–$500K	4	$405,105	2.28	0.03	34%	62%	7.3	$41,986
$500K-$1M	3	$720,243	2.64	0.00	36%	57%	4.7	$117,362
> $1M	5	$1,786,269	2.15	0.08	58%	60%	8.0	$199,122

Table 21 divides project costs (across all states) into five ARRA funding categories with relatively even representation. Trends are more discernible and consistent than those associated with state allotments, showing an increasing average number of benefits with cost, as well as decreasing percentages of pass-through and new projects with increasing cost. In other words, higher cost projects tend to feature a broader range of benefits. Additionally, those higher cost projects are more likely to be conducted internally by the state, compared with lower cost projects, which are more likely to be passed through. Although the trend is not completely consistent, it does appear that the higher cost projects are somewhat more likely to be existing projects; however, note that new projects dominate all ranges of project cost in this analysis. Table 22 shows similar data for the non-ARRA funding for the 15 comparison states.

Table 21. Summary of ARRA projects by cost range.

Project cost	# Projects	Average cost	Average no. project benefits	Average no. GPR elements	Pass-through projects	New projects
< $25,000	56	$15,621	2.41	0.48	70%	95%
$25–$50K	58	$37,418	2.45	0.47	50%	93%
$50–$100K	58	$72,975	2.52	0.45	48%	88%
$100K–$200K	50	$136,434	2.52	0.42	38%	84%
> $200K	43	$522,337	2.77	0.65	30%	81%

Table 22. Summary of non-ARRA projects by cost range.

Project cost	# Projects	Average cost	Average no. project benefits	Average no. GPR elements	Pass-through projects	New projects
< $25K	51	$10,968	2.14	0.04	35%	49%
$25K-–$50K	19	$37,057	1.89	0.16	47%	53%
$50K–$100K	15	$70,432	2.33	0.00	27%	60%
$100K–$200K	18	$116,513	2.17	0.00	6%	17%
> $200K	15	$452,364	2.53	0.00	33%	53%

The next series of figures (Figures 15–24) compare ARRA and non-ARRA project funding levels versus environmental benefits, media focus, pollutant focus, Green Project Reserve elements, project time frame, and overall project type. Comparisons between ARRA and non-ARRA projects regarding each of the parameters listed can be made quickly by noting differences in the bar graphs in the figures. In most cases, the differences are subtle – however, the notable shift toward Green Project Reserve project types under ARRA is clearly evident, as is the higher funding level associated with centralized wastewater treatment planning. Appendix C contains the raw data tables used for the figures displayed on the following pages.

Environmental benefits

The addition of ARRA funding to state 604(b) budgets allowed states to expand the range of environmental benefits, moving from an approach where assessment, planning, and education dominated to one which spread environmental benefit types more broadly. The appearance of climate change benefits under ARRA is notable – this type of benefit was virtually absent under non-ARRA activities (Figures 15 and 16).

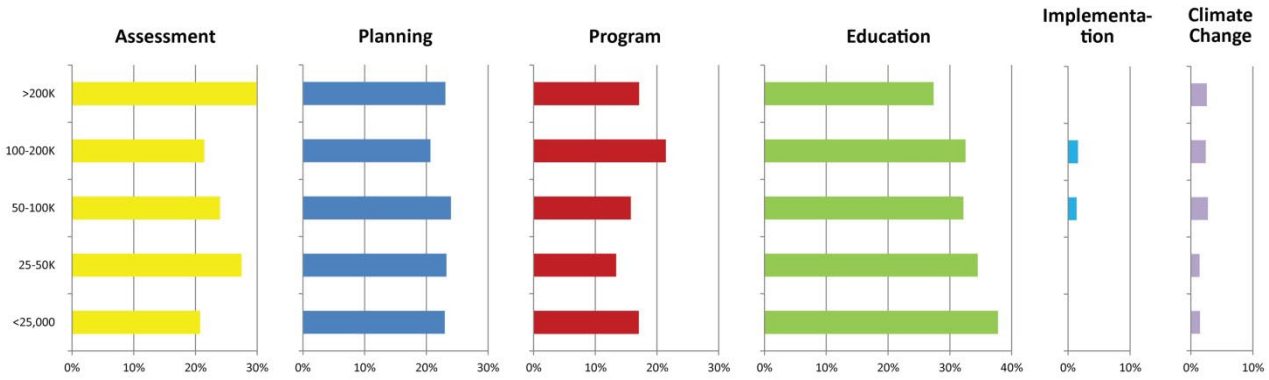


Figure 15. ARRA project funding level versus *environmental* benefits.

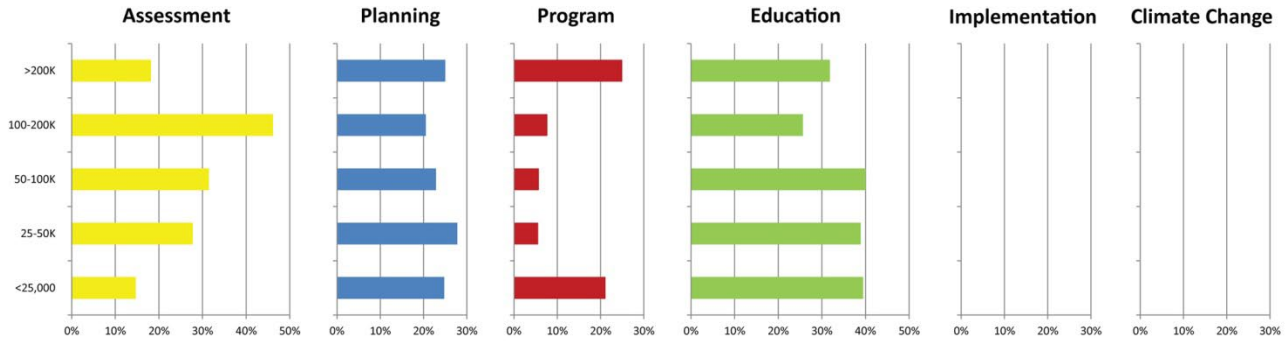


Figure 16. Non-ARRA project funding level vs *environmental benefits*.

Media focus

The dual thrust provided by *Green Project Reserve* priorities and regulatory mandates increased funding overall for stormwater MS4 projects under ARRA (Figures 17 and 18). Agricultural runoff projects also increased under ARRA, while general surface water and general nonpoint source focused projects decreased.

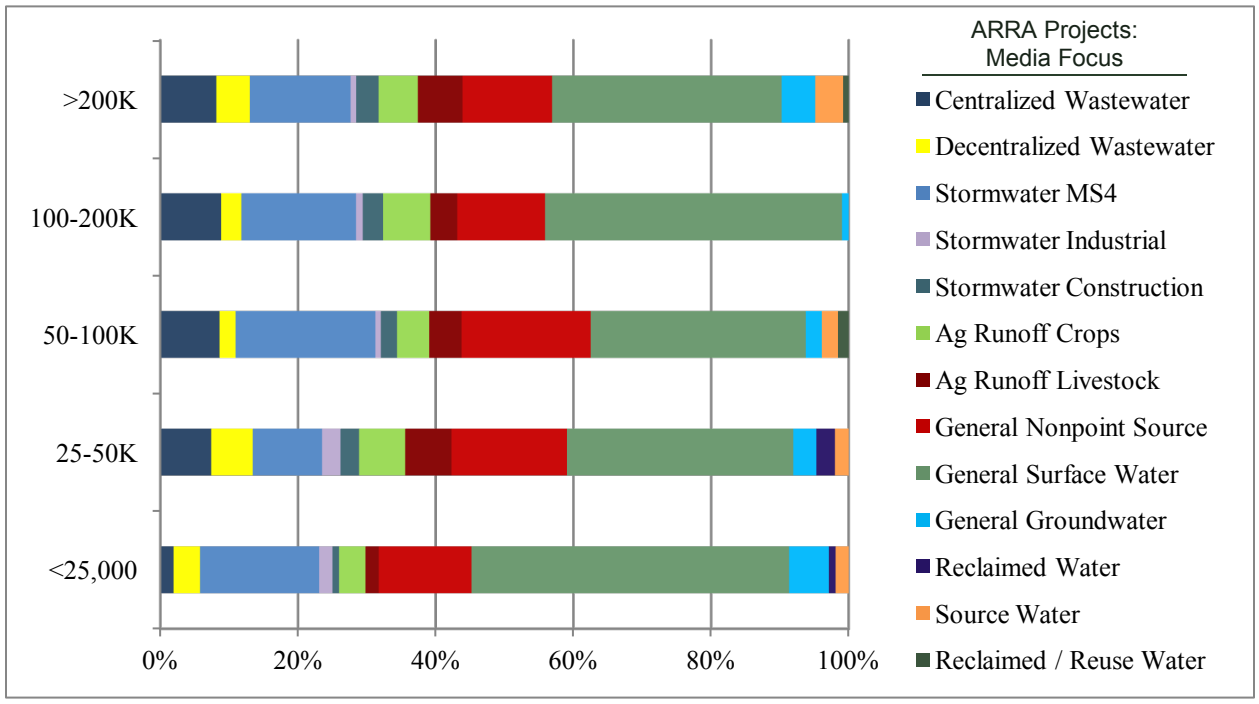


Figure 17. ARRA project funding level versus *media focus.*

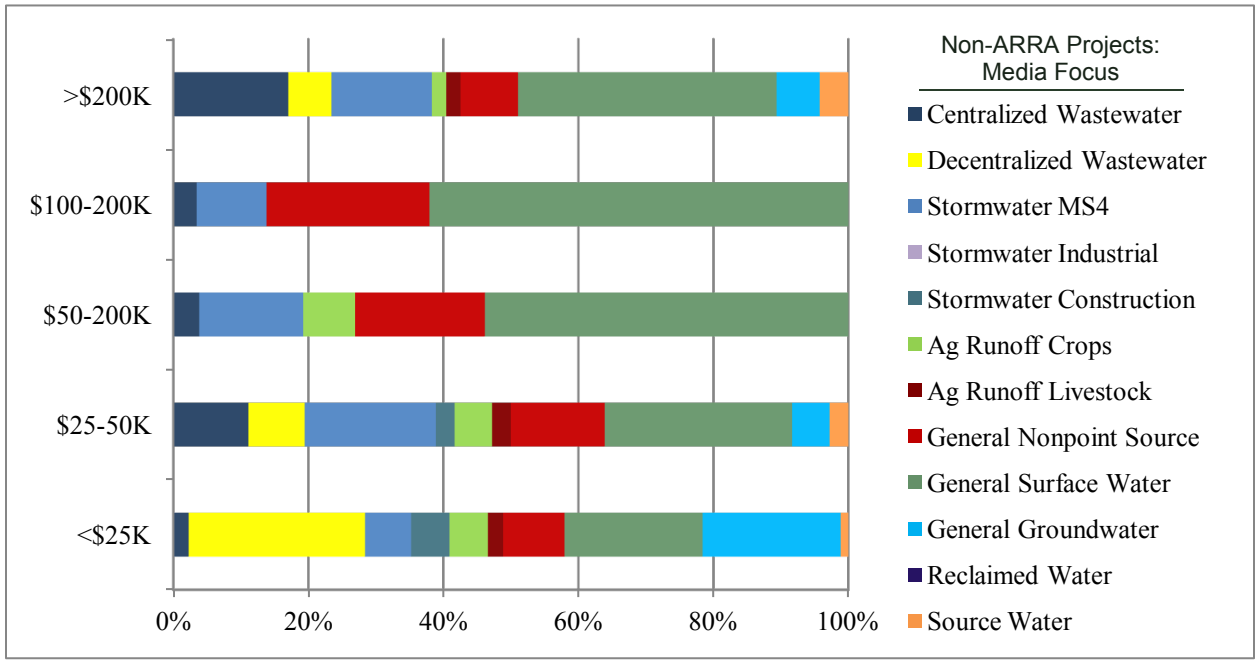


Figure 18. Non-ARRA project funding level versus *media focus.*

Pollutant focus

States generally were consistent in the pollutant focus of their CWA 604(b) planning efforts in both ARRA and non-ARRA funded projects (Figures 19 and 20), and across all funding levels. There appears to be a slightly greater focus on planning projects that address nutrients (i.e., nitrogen and phosphorus) under ARRA, with a lesser emphasis on bacteria – especially at the higher funding levels.

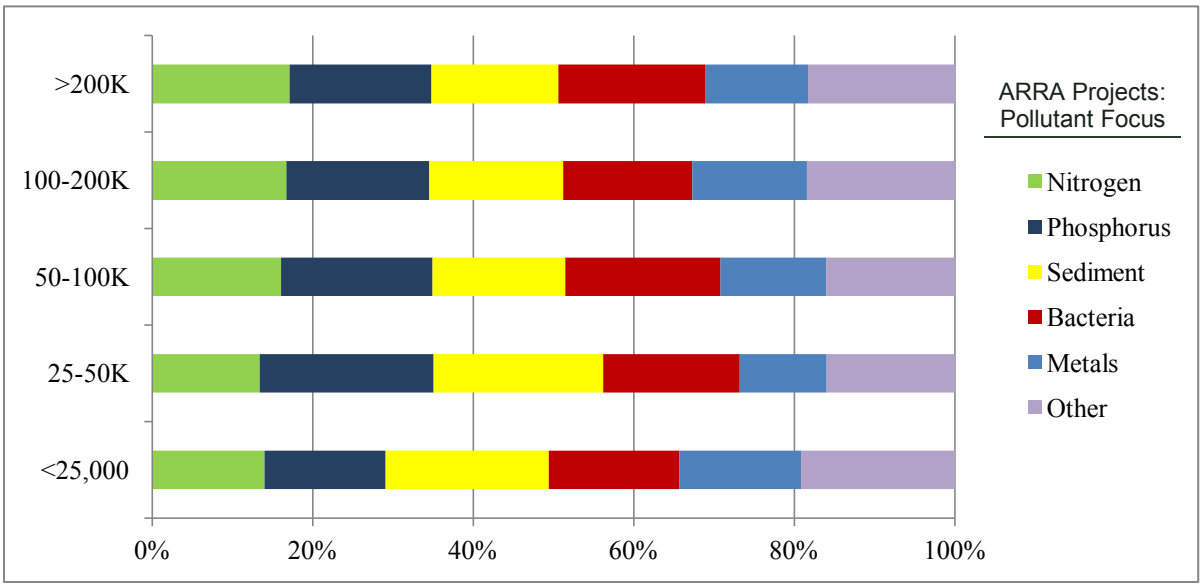


Figure 19. ARRA project funding level versus *pollutant focus*.

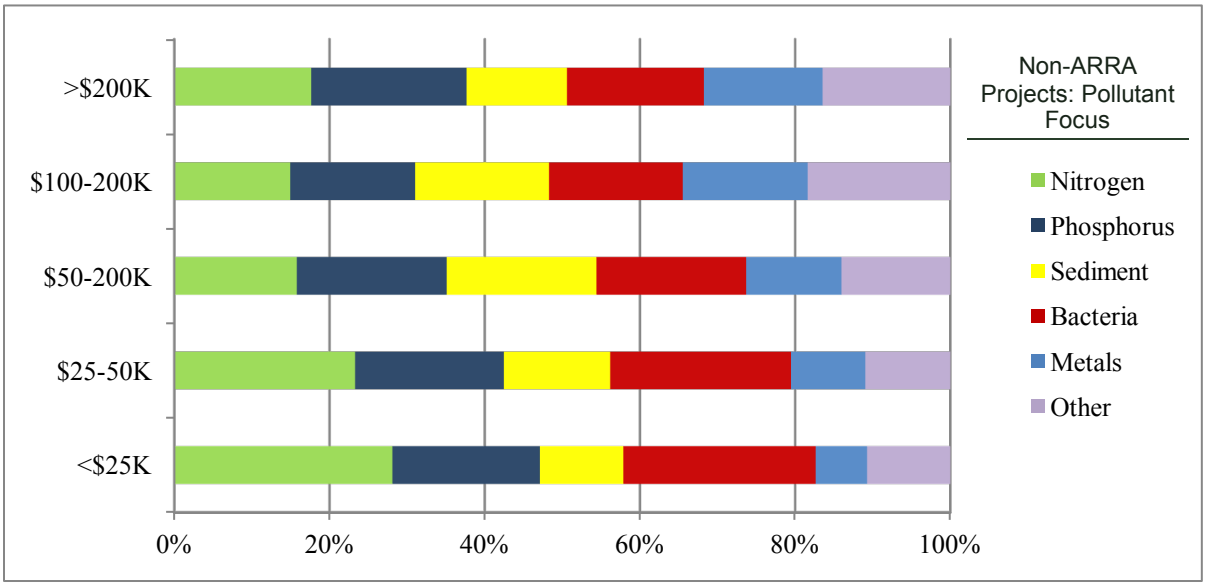


Figure 20. Non-ARRA project funding level versus *pollutant focus*.

Green Project Reserve elements

The most notable difference between ARRA and non-ARRA projects is in the environmental benefits category of Green Project *Reserve* program elements (Figures 21 and 22). Prioritization of low impact development, green infrastructure, energy efficiency, water efficiency, climate change, and other GPR elements is manifested clearly in the bar charts below, across all funding levels. Non-ARRA GPR projects were very small in number, representing only about a half-dozen projects that mostly focused on identifying sites that would be suitable for implementing LID practices (e.g., bioretention facilities, rain gardens, vegetated rooftops, rain barrels, permeable pavements) to control stormwater as part of larger watershed planning projects. (See the data tables in Appendix C for details.)

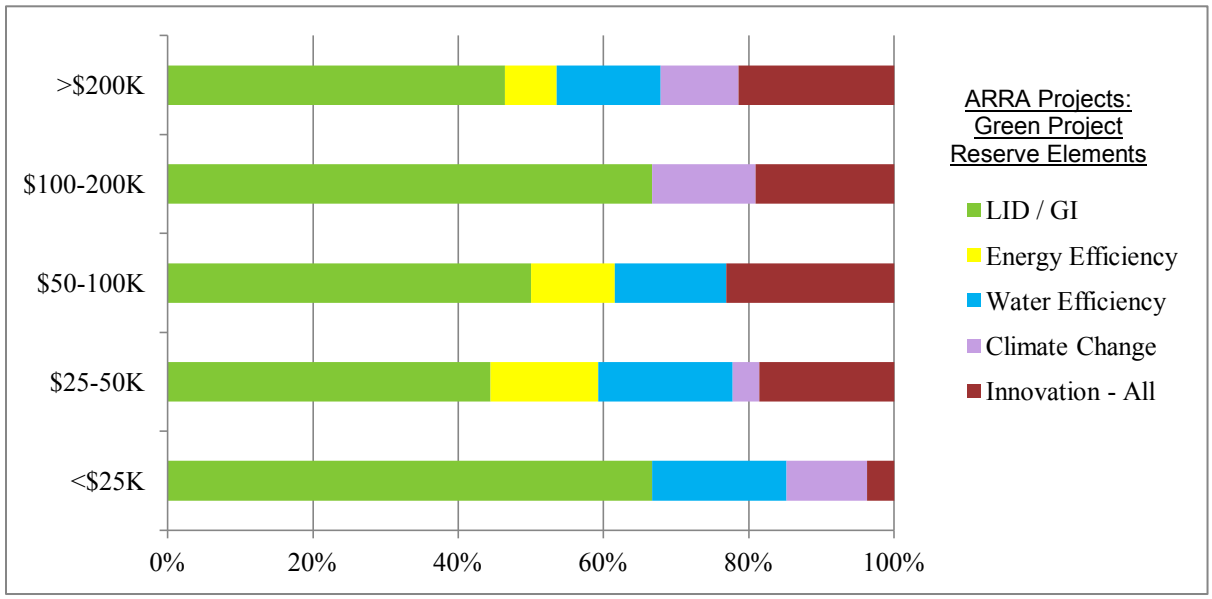


Figure 21. ARRA project funding level versus *Green Project Reserve* elements.

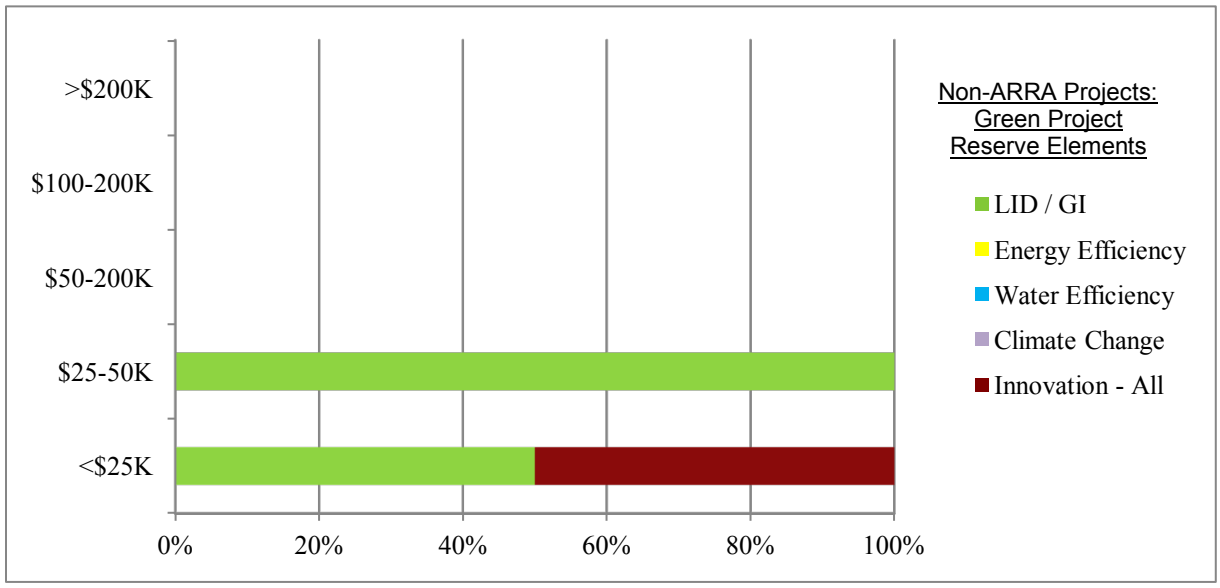


Figure 22. Non-ARRA project funding level vs *Green Project Reserve* elements.

Project time frame

ARRA projects were somewhat more focused on longer time frames for attainment of environmental benefits than non-ARRA projects (Figures 23 and 24), especially at the higher funding levels. Planning projects involving long-term centralized wastewater and stormwater management infrastructure, LID, and development of new water quality standards for nutrients tended to push time frames outward for ARRA funded efforts. Non-ARRA projects at the higher funding levels were shorter-term efforts overall, with virtually no projects geared toward achieving environmental benefits over more than 10 years.

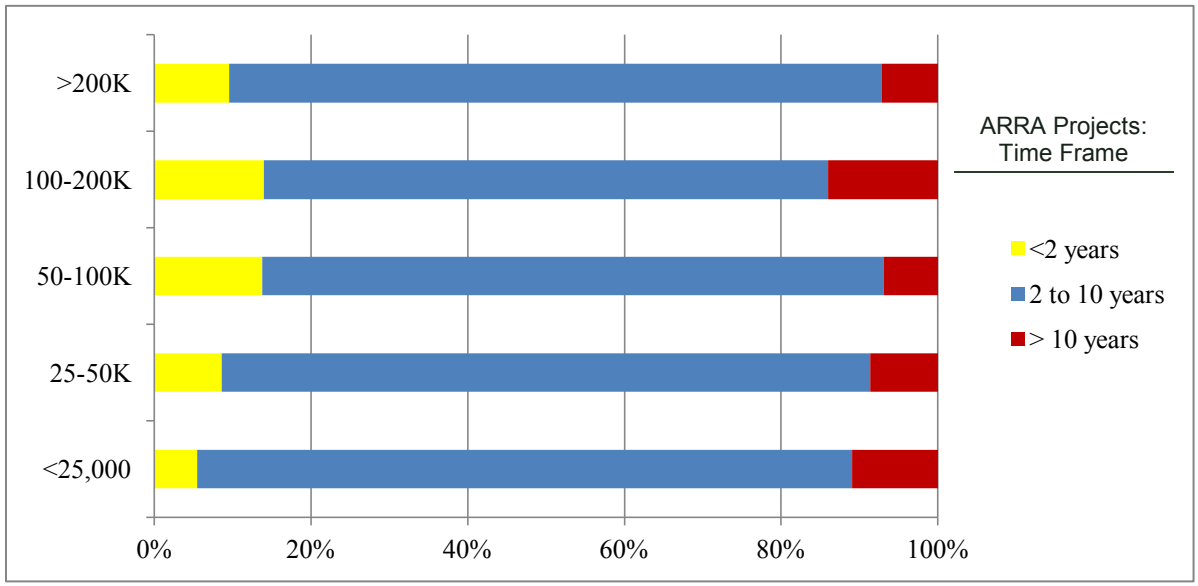


Figure 23. ARRA project funding level versus project time frame.

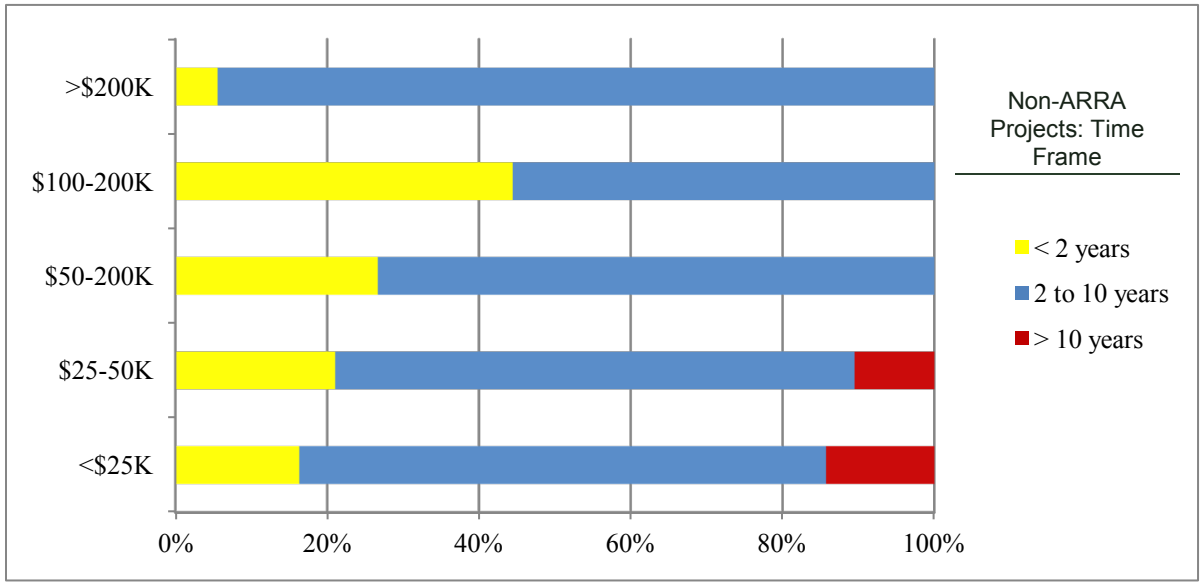


Figure 24. Non-ARRA project funding level versus project time frame.

4.0 Conclusions and Summary of Observations

The results presented in this section illustrate that the enhanced guidance associated with the ARRA-funded 604(b) program yielded projects that (based on their work plan description) were more diverse, comprehensive and broadly focused than previous (i.e., non-ARRA) funding cycles, representing a great leap forward for state water resource planning efforts. The ARRA funding allowed states to implement important new initiatives likely to have broader environmental (and non-environmental) benefits.

In some cases, however, ARRA funding was used to continue existing programs and close programmatic gaps and significant losses in institutional capacity (water quality standards review and revision, administrative functions, tool development, assessment, and the like) resulting from state funding decreases; it also represented an opportunity to address issues/projects languishing in the wings for some states. Such a use of funds is, just as important as new initiatives; however, it does illustrate a trade-off, where future funding initiatives might not necessarily build new programmatic capacity but rather fill funding shortfalls.

The following overarching observations were made with respect to the types of projects funded under ARRA versus non-ARRA projects:

- ARRA funding was distributed at a time when many states were facing significant reductions in agency staffing because of decreased tax revenues tied to the economic recession of 2007–2009, and some states were prompted to use the funds to maintain existing water resource planning and planning support functions.
- Past planning and water resource management efforts in some states had created an environment and *project-ready* operational framework that could support intensive, focused watershed and subwatershed planning initiatives. Those states leveraged ARRA funds to hire watershed planning coordinators, complete watershed assessments, and produce TMDLs and watershed plans to address water quality impairments and threats.
- States with densely populated areas regulated as MS4s under the NPDES Stormwater program used ARRA funds to address planning needs for two key underdeveloped components of their stormwater management programs: retrofitting existing drainage and detention/retention infrastructure to reduce receiving water impacts, and developing ordinances and requirements to ensure that newly built developments do not cause or contribute to water quality impairments.
- Unaddressed, widespread, and highly focused pollutant sources in some states (e.g., mines, septic systems, streambank erosion) were targeted by ARRA projects through broad-based, high-visibility planning projects that maximized stakeholder involvement, technology transfer, and developing new training, technical, programmatic, regulatory, and other tools. Such efforts are generally limited in the non-ARRA projects reviewed, which mostly reflect conventional and relatively modest planning efforts.
- EPA also reviewed the pollutant focus of ARRA and non-ARRA 604(b) projects versus the leading causes of water quality impairment in each of the 15 states studied, as reported in their CWA section 303(d) reports (see Table C19 in Appendix C). In general, state 604(b) projects addressed key causes of impairment with relatively minor variations. In addition, the pollutant focus mix between ARRA and non-ARRA projects was consistent; i.e., states did not significantly alter the pollutant focus of their projects when ARRA funds became available, indicating an overall “stay the course” approach in addressing their priority water quality issues.
- The ARRA 604(b) GPR priority categories (energy efficiency, water efficiency, green infrastructure, and environmental innovation) generated broad interest, with green infrastructure planning activities leading the group because of the MS4 stormwater management issues noted

above. Innovative projects to track BMP performance, improve assessment metrics, refine assessment methodologies, and improve predictive modeling were also well-represented.

- The increase in section 604(b) funding provided an opportunity for many states to revise outdated areawide or regional plans to manage wastewater from areas served by centralized or decentralized treatment facilities, including projects that streamlined and improved the allocation of wasteloads to surface waters, significantly reduced overlap and redundancy in wastewater planning, and greatly lowered the number of localities conducting planning activities to emphasize regional approaches.

References

Brown, R.S, and A. Fishman. 2010. *Status of State Environmental Agency Budgets, 2009 – 2011.* Green Report. Environmental Council of the States, Washington, DC.

Environmental Council of the States. 2011. *The State Environmental Agencies' Statement of Need And Budget Proposal for EPA's 2013 Categorical Grants STAG Budget (State and Tribal Assistance Grants)*. Prepared by The Environmental Council of the States with the cooperation of the Association of State Drinking Water Administrators, Association of State and Interstate Water Pollution Control Administrators, Association of State and Territorial Solid Waste Management Officials, National Association of Clean Air Agencies. V3.1. June 2011.

NBER (National Bureau of Economic Research). 2012. *The NBER's Business Cycle Dating Procedure: Frequently Asked Questions.* National Bureau of Economic Research, Cambridge, MA. <http://www.nber.org/cycles/recessions_faq.html>. Accessed January 30, 2012.

Phillips, V., D. Emme, and B. Graves. 2010. *Impacts of Reductions in FY 2010 on State Environmental Agency Budgets*. Ecos Green Report. Environmental Council of the States, Washington, DC.

Roose, R. 2011. Water Quality Planning: EPA Nonpoint Source Managers Meeting. Presentation on March 4, 2011, to U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds, Washington, DC.

Schwartz, S. 2009. Award of Water Quality Management Planning Grants with Funds Appropriated by PL11-5, the American Recovery and Reinvestment Act of 2009. March 12, 2009 Memo from Acting Director, U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds, to Water Management Division Directors, Regions I–X.

Appendix A. Random Number Generator Results for Selection of 15 States for Review of Non-ARRA Projects

Random number	State	Region
0.002706116	**Montana**	**8**
0.00770184	**Washington**	**10**
0.048182036	**Arizona**	**9**
0.075533278	**Massachusetts**	**1**
0.082929072	**North Carolina**	**4**
0.126457993	**Hawaii**	**9**
0.131809969	**Wyoming**	**8**
0.146080342	**New York**	**2**
0.164715229	**Illinois**	**5**
0.18141266	**Louisiana**	**6**
0.183837929	**Idaho**	**10**
0.184412102	**Minnesota**	**5**
0.215295397	**Maine**	**1**
0.226437894	**Florida**	**4**
0.232760698	**New Jersey**	**2**
0.238545174	Alaska	10
0.252007376	Rhode Island	1
0.262758519	Nevada	8
0.292092386	Delaware	3
0.293138488	Texas	6
0.316363741	Oregon	10
0.317830335	Tennessee	4
0.321082547	Alabama	4
0.321179359	California	10
0.331301921	Michigan	5
0.355285788	Kansas	7
0.378750742	South Dakota	8
0.384574936	Ohio	5
0.396382647	District of Columbia	3
0.407936273	North Dakota	8
0.41402209	Missouri	7
0.41855834	Indiana	5

Random number	State	Region
0.419865495	New Hampshire	1
0.420181929	Utah	8
0.462967793	Iowa	5
0.605526603	Virginia	3
0.606355499	Wisconsin	5
0.618013358	New Mexico	6
0.618374443	Arkansas	6
0.687023428	West Virginia	3
0.69986986	Georgia	4
0.732672172	Nebraska	7
0.784192077	Mississippi	4
0.79552916	Maryland	3
0.823286344	Oklahoma	6
0.923063726	Connecticut	1
0.923359463	Pennsylvania	3
0.934131248	Colorado	8
0.93683556	Kentucky	4
0.944115863	Vermont	1
0.969684925	South Carolina	4

Appendix B. Project Case Studies

Alabama: Water Quality Assessment near Active Surface Coal Mining Facilities

Alaska: Green Infrastructure Alternatives and Climate Change Adaptation Strategy

California: TMDL Action Plan and Water Quality Improvement Accounting and Tracking Program

Florida: Silver Springs Nutrient Pathway Characterization Project

Maine: Long Creek Watershed Property Evaluations and Program Development

Minnesota: Continuing Planning Process Updates

New Jersey: Statewide Transition to County-based Wastewater Treatment Plans

Texas: Long-range Watershed Protection Strategy for Water Supply Reservoirs in Texas

Virginia: TMDL and Permit Tracking Program

Assessing Water Quality Near Active Surface Coal Mining Facilities

Project Goal
Collect data to support recommendations regarding monitoring and permit conditions for surface coal mines

Percent Complete
More than 50% complete; ARRA funds are expended. The remaining project activities will be covered by other sources of funding.

Project Cost
A portion of $442,600

Pass-through Recipient
Not applicable

Project Contact
ADEM: 334-271-7700
www.adem.alabama.gov/MoreInfo/stimulus.cnt

Project Highlights
Alabama used some of its CWA section 604(b) ARRA funds to collect data about a growing area of concern—the potential water quality and aquatic life impacts caused by surface mining activities. The study results could influence surface mining management throughout the state. Project elements included

- Hiring CWA section 604(b) program manager
- Developing a study plan
- Purchasing monitoring equipment and training monitoring staff
- Collecting and analyzing surface water monitoring data

Introduction
The Alabama Department of Environmental Management (ADEM) used a portion of its $442,600 in CWA section 604(b) ARRA funds to conduct detailed water quality assessments near active surface coal mining facilities. The ARRA funds enabled Alabama to investigate whether activities associated with surface mining are having a negative effect on surrounding water quality and aquatic life. The results of the study, still underway, might affect the future planning and management of surface mining facilities and activities statewide.

Project Background
Recent EPA studies in Kentucky and Virginia coal mining regions indicate that mountaintop and valley-fill surface mining practices are degrading water quality and the health of aquatic communities more significantly than previously thought.

According to Black Warrior Riverkeeper (http://blackwarriorriver.org/coal-mining.html), approximately 95 active surface mines exist in the Black Warrior River watershed in central Alabama (Figure 1). Because of heightened awareness and public concern about coal mining impacts in other states, Alabama believes that additional monitoring or changes to permit requirements might be necessary to better protect aquatic life near Alabama's active mines.

Figure 1. Alabama's Black Warrior River watershed (highlighted in dark green) is underlain by extensive coal beds.

Section 604(b) Funds at Work
Alabama used a portion of its CWA section 604(b) funds to build on the information gathered about the effects of surface mines in Kentucky and Virginia. In partnership with the Alabama Surface Mining Commission, the Alabama Coal Association, EPA Region 4 and EPA's Office of Research and Development, ADEM examined water quality and biological communities upstream and downstream of several active surface coal mines in the Black Warrior River watershed (Figure 2) and began assessing potential water quality impacts associated with the mines.

Assessing Water Quality Near Active Surface Coal Mining Facilities

Photo courtesy of http://blackwarriorriver.org/

Figure 2. A strip mining site in Alabama's Black Warrior River watershed is adjacent to a surface waterway.

ADEM procured equipment, trained staff and collected surface water monitoring data at four sites in the watershed. Two of the monitoring sites are in Walker County, Alabama (Locust Fork River watershed), and two are in Jefferson County, Alabama (Mulberry Fork River watershed). The facilities in Locust Fork watershed include Surface Mine No. 1 and Manchester Mine (two outfalls per facility were inventoried); the two facilities in the Mulberry Fork watershed are the Praco Mine and Maxine Pratt Mine, each with a single monitored outfall. Mining-related pollution has impaired segments in both the Locust Fork River watershed (phosphorous and sediment impairments) and in the Mulberry Fork River watershed (nitrogenous and carbonaceous biological oxygen demand, fecal coliform, total phosphorous, ammonia and sediment impairments). Data collected will support further water quality analyses in those impaired segments.

CWA section 604(b) ARRA funds allowed Alabama to

- Hire an environmental engineer to oversee and manage the 604(b) grant program.
- Procure training and monitoring equipment in 2009.
- Develop and complete a study plan in the fourth quarter of 2010.
- Purchase and deploy three rain gauges with data loggers in 2010.
- Collect continuous measurements of water quality parameters using instrument probes at sites beginning in January 2011.
- Conduct habitat and macroinvertebrate community assessments.
- Collect and analyze sediment samples.
- Evaluate sites using aerial photography.

ADEM is partnering with Auburn University to analyze the data and develop a final report. Ramifications of the study could be significant, possibly influencing future permit or monitoring requirements for surface mining facilities. ADEM anticipates that the project will ultimately allow the state to more effectively and efficiently manage surface mining practices, thereby reducing the negative effects of surface mining on surface waters and biota in surrounding areas. The study results also have the potential to influence surface mine management over a broader geographic area as the partners will review data from several different facilities representing various geological conditions and mining practices. ADEM expects that the lessons learned from its study could apply to facilities in other states that share similar geological conditions or similar surface mining practices.

Key Project Benefits
• Improved ability to assess or predict water quality/quantity changes
• Improved watershed, water quality/quantity and ecosystem management through – Planning that identifies specific management practices and implementation strategies – Enhanced program development – Education, tech/info transfer, stakeholder engagement, outreach, etc.

Green Infrastructure Alternatives Assessment and Planning

Project Goal
Assess green infrastructure alternatives and placement options for urban communities in cold, wet climates

Percent Complete
Project expected to be 100% complete, with all ARRA funds expended, by 12/31/2011

Project Cost
$108,307 in section 604(b) ARRA funds

Pass-through Recipient
Alaska Department of Natural Resources, with sub-grants awarded to the cities of Fairbanks and Soldotna

Project Contact
ADNR: 907-269-8465
http://forestry.alaska.gov/community

Project Highlights
Section 604(b) ARRA funds supported Alaska's efforts to begin planning for and implementing green infrastructure. Project elements included

- Identifying the types of green infrastructure that are suitable for urban areas and function well in cold, wet climates
- Implementing demonstration projects in two municipalities to gain public acceptance
- Identifying and mapping areas in the city of Soldotna that would be suitable for incorporating green infrastructure elements

Introduction
Alaska used a portion ($108,307) of its CWA section 604(b) ARRA funds to launch an effort to enable and encourage municipalities and individual homeowners to begin incorporating green infrastructure (GI) elements into new and existing development. Alaska had not conducted much GI planning previously because of a lack of available funding. The ARRA funds allowed Alaska to identify GI elements that function well in cold, wet regions and to identify and map areas that might be suitable for incorporating GI elements. Small demonstration projects supported broader planning efforts by testing GI effectiveness. Thanks to the CWA section 604(b) ARRA projects, interest in GI is gaining momentum in Alaska.

Project Background
The Alaska Department of Environmental Conservation (ADEC) passed CWA section 604(b) funds to the Alaska Department of Natural Resources' (ADNR's) Division of Forestry (Community Forestry Program). ADNR issued sub-grants to the cities of Fairbanks and Soldotna to conduct separate GI education, planning and implementation projects.

Section 604(b) Funds at Work
City of Soldotna
The city partnered with the nonprofit Kenai Watershed Forum to implement a GI planning and demonstration project. Using a geographic information system to assess the city's stormwater infrastructure, the partners created a map identifying high-priority areas that would most benefit from future on-site stormwater retention projects (Figure 1). The partners also developed a demonstration project on a 0.85-acre historic property in a sensitive location at the confluence of Soldotna Creek and the Kenai River. The partners researched available green parking technologies and best management practices (BMPs) for stormwater management and created and implemented a site-specific landscape design that provides 100 percent on-site stormwater retention. The green parking test area is the first of its kind on the Kenai Peninsula and serves as a model to encourage other property

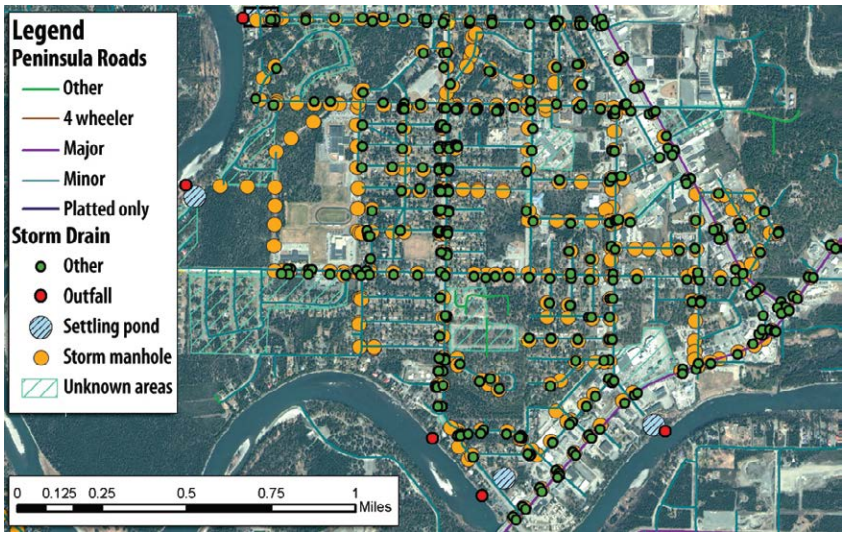


Figure 1. Green shading (labeled as *Unknown areas*) on a stormwater infrastructure map of Soldotna shows areas with no existing stormwater controls and where future stormwater retention projects would be ideal.

Figure 2. A Kenai Watershed Forum staff member applies the last layer of gravel on a new GravelPave2 system in front of the historic Soberg House at the confluence of Soldotna Creek and the Kenai River.

owners within Soldotna to mitigate stormwater runoff through on-site retention and permeable surface parking designs (Figure 2).

City of Fairbanks

The city partnered with the Cold Climate Housing Research Center (CCHRC), GW Scientific and the Fairbanks Soil and Water Conservation District (SWCD) to develop a GI guide for homeowners (Figure 3). The partners compiled data and literature related to the use of GI BMPs in Alaska and other cold-climate regions. They selected 10 BMPs—rain barrels, rain gardens, tree pits, infiltration and flow-through planters, dry wells, swales and berms, green roofs, permeable pavers, grass reinforcement mesh, and riparian buffers—that are appropriate for residential use because of the feasibility, cost-effectiveness, ease of installation and level of maintenance.

In 2010 the partners implemented six small-scale demonstration projects of the selected BMPs to test their effectiveness and educate the public. The project reimbursed the homeowners for materials or contractual labor costs up to $500 per residence. The city will follow up with the homeowners to evaluate the new BMPs over time.

The city has also been focusing on educating its residents. The partners conducted workshops to show homeowners how to construct some of the simpler GI applications such as rain barrels. In the fall of 2011, the city is planning to map areas where certain green building techniques (e.g., green roofs

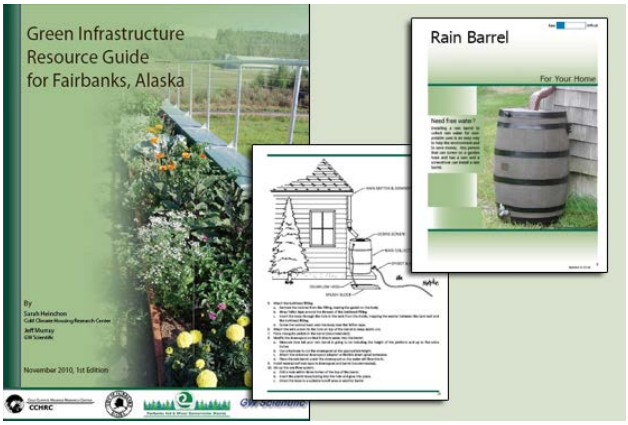


Figure 3. The Fairbanks GI resource guide (http://forestry.alaska.gov/pdfs/communitygrants/GI_Resource_Guide122710.pdf) provides homeowners with detailed installation instructions.

and snowmelt/rainwater capture and reuse) might be beneficial and to conduct a workshop for the business community to introduce the concept of green building techniques and solicit feedback.

The momentum created by the ARRA-funded GI projects has prompted municipalities and other organizations to continue with GI planning efforts. In late 2011, for example, the city of Soldotna received a grant from the U.S. Fish and Wildlife Service to install two rain gardens and help educate the public about GI. ADNR recently submitted a GI-focused grant proposal to the U.S. Forest Service on behalf of CCHRC, Fairbanks, Fairbanks North Star Borough, University of Alaska, Fairbanks SWCD and others. The project would fund a team of experts to examine developed areas in the lower Chena River basin within the Fairbanks North Star Borough to identify and map high-priority areas for GI applications and natural area protection.

Key Project Benefits
• Improved ability to assess or predict water quality/quantity changes
• Improved watershed, water quality/quantity and ecosystem management through – Planning that identifies specific management practices and implementation strategies – Enhanced program development – Education, tech/info transfer, stakeholder engagement, outreach, etc.
• Improved climate change resilience, greenhouse gas emission reduction and energy efficiency

Klamath River Basin Water Quality Improvement Tracking and Accounting Program

Project Goal
Develop a tracking program to coordinate restoration efforts, and reduce the cost and accelerate the pace of improving Klamath Basin water quality.

Percent Complete
90% of ARRA funds expended. Scoping and initial program development is almost complete; full implementation is dependent on future funding.

Project Cost
$200,000, supported by section 604(b) ARRA funds

Pass-through Recipient
Not applicable

Project Contact
California North Coast Regional Water Quality Control Board
www.waterboards.ca.gov/northcoast

Project Highlights
Section 604(b) ARRA funds enabled California to develop the essential element of a framework to guide coordinated implementation of multistate TMDL action plans. Project elements included

- Assessing the program's feasibility and identifying essential stakeholder participants.
- Identifying appropriate metrics and available tools to track temperature and nutrient improvements from restoration actions throughout the basin.
- Developing standardized tools, protocols, and a centralized registry to quantify and track water quality benefits from both small- and large-scale restoration projects.

Introduction
California used $200,000 of its $2,830,700 in CWA section 604(b) ARRA funds to develop the Klamath River Basin Water Quality Improvement Tracking and Accounting Program (or Klamath TAP). The funds became available at the perfect time to allow California to develop Klamath TAP, which serves as the central part of a framework integrating total maximum daily load (TMDL) action plans and coordinating efforts to leverage resources and improve water quality on a basinwide scale.

Project Background
The Klamath River is classified as impaired by temperature, dissolved oxygen, nutrients, organic matter and microcystin (algal blooms). Approximately 36 percent of the Klamath River Basin is within southern Oregon, and 64 percent is within northern California (Figure 1). Nonpoint sources significantly influence water quality throughout the basin.

EPA Regions 9 and 10 have played a key role in overseeing the coordinated development of the states' numerous Klamath Basin TMDLs because of the transboundary nature of the basin and court-ordered deadlines. EPA and the states have worked with basin stakeholders to develop a framework that supports coordinated implementation of the TMDL action plans.

Figure 1. The Klamath River Basin spans portions of both California and Oregon.

When section 604(b) ARRA funds became available, California launched an effort to develop Klamath TAP—a collection of protocols, a centralized registry, and other tools that will link benefits from restoration actions to TMDL goals for eutrophic pollutant and temperature improvements. Klamath TAP will be

central to the coordination framework because it will allow stakeholders in California and Oregon to collaborate on common projects and earn credit toward TMDL-related regulatory requirements and other mandated programs. Klamath TAP will also help quantify and track water quality benefits realized from voluntary restoration efforts.

Section 604(b) Funds at Work

Section 604(b) ARRA funds supported the first two phases of the Klamath TAP effort—scoping and initial program development. First, the California North Coast Regional Water Quality Control Board worked closely with Oregon Department of Environmental Quality, EPA Regions 9 and 10, PacifiCorp and other stakeholders to form a representative Interagency Workgroup. The partners evaluated the feasibility of creating Klamath TAP and identified additional critical participants to help guide program development.

In the program design stage, project partners refined metrics to track water quality improvement and the types of credits that might be assigned for implementing best management practices or other restoration efforts, selected initial tools to quantify these metrics, developed criteria for pilot project selection, and drafted a Protocol Handbook to provide the framework for program development.

The partners have been working with Oregon's Willamette Partnership to adapt water quality trading concepts being used in the Willamette River Basin to meet specific temperature-related TMDL objectives. The project has also benefitted from the consultants' experience in developing the Lake Tahoe Crediting Program for tracking fine sediment reductions mandated by California and Nevada TMDLs.

When the design is complete, Klamath TAP will integrate numerous programs and policies, and will offer

- Defined pollutant load reduction metrics and water quality credits that address the specific pollutants of concern in the Klamath River Basin.
- A standardized set of tools and procedures to estimate load reductions from restoration activities.
- A publicly accessible registry that tracks quantified benefits from projects and reports progress toward achieving individual permit requirements, specific conservation program goals and TMDL milestones.
- Clear, consistent operating protocols to validate projects and estimate, certify, register and transfer credits.
- A program infrastructure would allow the scope of Klamath TAP to be expanded to address a broader array of ecosystem services such as water flow and habitat availability.

As of November 2011, the Interagency Workgroup had completed the scoping phase and nearly finished initial program design. A draft operational protocols document is being refined. The workgroup is establishing a pilot program to register projects already being funded for restoration, quantify the temperature and nutrient benefits using water quality trading tools adapted from the Willamette Partnership, and link the benefits to overall water quality goals. Partners are actively seeking additional funding to support the third phase—implementing the program—in 2012.

Once implemented, Klamath TAP will help to identify, prioritize and implement water quality improvement opportunities for improving water quality in Oregon and California and coordinate funding resources for large-scale opportunities. Because Klamath TAP will track water quality benefits derived from restoration projects, people and organizations will be able to confidently invest in restoration projects. Klamath TAP will provide a transparent process and robust tools that can be adapted to incorporate the best available scientific information. Finally, the program will enable water quality trading to allow regulated entities to purchase water quality offsets from entities capable of cost-effectively creating water quality improvements.

Key Project Benefits

- Improved watershed, water quality/quantity and ecosystem management through
  - Planning that identifies specific management practices and implementation strategies
  - Enhanced program development
  - Education, tech/info transfer, stakeholder engagement, outreach, etc.

Silver Springs Nutrient Pathway Characterization Study

Project Goal
Identifying groundwater nutrient pathways in Florida's Silver Springs Group

Percent Complete
100% complete

Project Cost
$465,000, supported by section 604(b) ARRA funds

Pass-through Recipient
St. Johns Water Management District

Project Contact
FDEP: 850-245-8479
www.dep.state.fl.us/springs/

Project Highlights

Section 604(b) ARRA funds enabled Florida to complete a previously cost-prohibitive study that provided groundwater flow pathway information essential for TMDL and BMAP development. Project elements included

- Evaluating hydrogeology and potential nutrient sources in the Silver Springs area
- Conducting a groundwater dye trace effort to identify karst pathways and estimate groundwater travel times
- Assessing the risk of nutrient sources reaching the springs

Introduction

Florida used its $1,336,300 in CWA section 604(b) ARRA funds to both fill funding gaps and support new planning efforts. The Florida Department of Environmental Protection (FDEP) applied more than $810,000 to help support its ongoing obligations to develop Basin Management Action Plans (BMAPs)—Florida's version of a total maximum daily load (TMDL) implementation plan. FDEP passed $70,000 to the St. Johns Water Management District (SJWMD) to cover a funding shortfall in an ongoing study assessing whether the design of retention ponds could influence the amount of nitrate that infiltrates to groundwater. The state also passed $465,000 to the SJWMD to support a new, previously cost-prohibitive dye tracing effort that provided groundwater flow pathway information essential for TMDL and BMAP development for the Silver Springs Group (SSG).

Project Background

The SSG, one of Florida's 33 first-magnitude springs, forms the headwaters of the Silver River in central Marion County. The clear waters of the SSG draw tourists for glass-bottom boat rides at Florida's Silver Springs Nature Theme Park (Figure 1). FDEP recently designated the SSG as impaired by nutrients (specifically nitrates, or nitrates plus nitrites). The SSG is part of a karst system, where groundwater can flow quickly and unpredictably through cavities and cracks in limestone bedrock and emerge through vents into surface springs. The SSG includes two large main vents and 28 smaller vents. Before developing a TMDL for the SSG area, FDEP needed information about the source areas of nutrients that are discharging from the vents. However, little detailed research had been conducted on the nature and extent of the groundwater flow pathways controlling SSG discharge or their relationship to potential source locations of nutrients. Existing information about the SSG pathways had been limited to within a few hundred feet from the main vents.

FLDEP, Division of Environmental Assessment and Restoration

Figure 1. The Silver Springs theme park is built around one of the springs' main discharge vents.

Section 604(b) Funds at Work

SJWMD used CWA section 604(b) ARRA funds (under contract with FDEP) to collect groundwater information to support TMDL and BMAP planning efforts for the SSG area. The objectives of the project included (1) identifying dominant groundwater pathways and travel times between specific locations

and the SSG using dye tracing, and (2) identifying the potential sources of groundwater nutrient contamination that might be directly connected to the SSG discharge vents. The project included three main tasks:

- Task 1—a hydrogeologic evaluation of the SSG area that included compiling existing data, collecting new data, and identifying potential groundwater nutrient sources with respect to their potential for supplying nutrients to the SSG.
- Task 2—a long-term qualitative groundwater dye trace effort to assess potential karst pathways and estimate groundwater travel times within the SSG basin.
- Task 3—a risk assessment for which the potential pathways and travel times determined by Task 2 were compared with the potential nutrient sources identified in Task 1.

Although drought conditions hampered some of the dye tracing efforts in Task 2, the SJWMD's study confirmed that that groundwater travels much faster within the SSG system than was previously estimated by porous media models (Figure 2). Results show that nutrients entering the groundwater within about 5 miles of the SSG vents can be discharged from the vents into the springs within a week to several months. Nutrient travel times from more distant portions of the SSG system would be on the order of months to years, rather than decades or longer as would be predicted by a typical porous media flow model. The potential nutrient sources compiled during Task 1 were compared with the dominant groundwater pathways to identify potential direct connections to the SSG discharge vents. Much about this unpredictable karst system remains unknown; however, the new information identified during the study will benefit FDEP's impending development of a TMDL and BMAP for the SSG.

Key Project Benefits
• Improved ability to assess or predict water quality/quantity changes
• Improved watershed, water quality/quantity and ecosystem management through education, tech/info transfer, stakeholder engagement, outreach, etc.

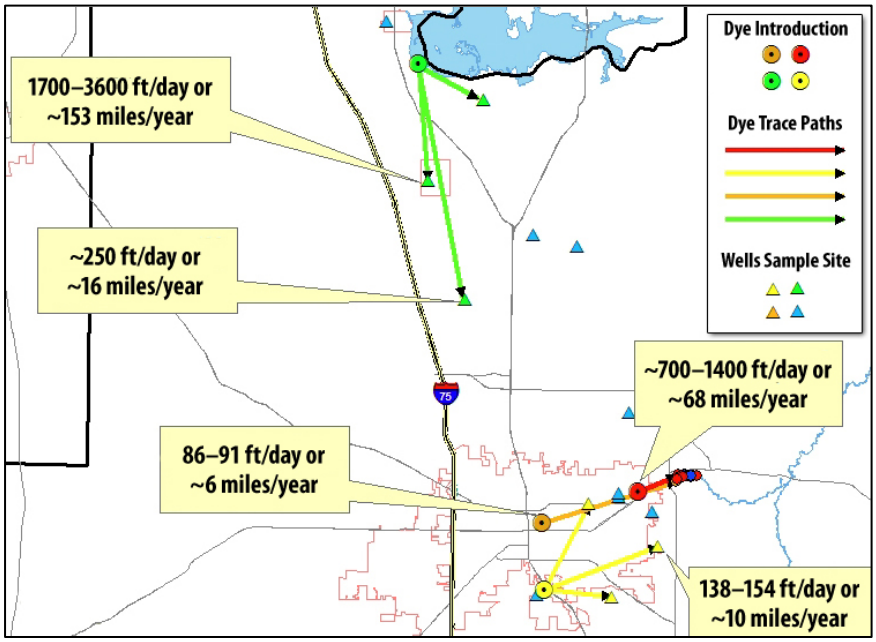


Figure 2. The dye tracing study identified a series of previously unknown groundwater pathways (green, red, orange and yellow lines). Although drawn as straight lines from the point of dye insertion to the point of emergence, the pathways likely follow more circuitous route, as shown by the widely varying travel times recorded.

Property Evaluations and Program Development in the Long Creek Watershed

Project Goal
Restore impaired waters by establishing legal and institutional structures necessary to support the implementation of an existing management plan

Percent Complete
100% complete

Project Cost
$136,000 total, including $90,000 section 604(b) and $46,000 cash match from municipalities

Pass-through Recipient
Cumberland County Soil and Water Conservation District (CCSWCD)

Project Contact
CCSWCD: 207-892-4700
http://cumberlandswcd.org

Project Highlights
Section 604(b) ARRA funds supported communication and programmatic efforts that bridged the gap between planning and implementation. Project elements included

- Assessing fees according to the stormwater runoff potential of designated properties, which provides an ongoing funding source to finance watershed plan implementation
- Developing financial controls
- Engaging property owners and offering incentives to participate
- Securing landowner commitments
- Establishing a water quality monitoring program to assess the success of plan implementation

Introduction
Maine passed 100 percent of its CWA section 604(b) ARRA funds on to local organizations. In Maine's impaired Long Creek watershed, the funds arrived at the perfect time to provide support for critical project elements that bridged the gap between planning and implementation.

Project Background
Nonpoint source pollution in the 3.45-square-mile Long Creek watershed (Figure 1) contributed to violations of water quality standards for degraded habitat, dissolved oxygen, biological criteria, heavy metals and chlorides. Land use in the watershed includes commercial development, a golf course, light industrial facilities, office parks and some forest (Figure 2). In 2007 stakeholders began developing a Long Creek Watershed Plan. The Plan outlines activities designed to allow the creek to meet state water quality standards within 10 years. The Cumberland County Soil and Water Conservation District (CCSWCD) worked with four watershed municipalities to establish the Long Creek Watershed Management District (LCWMD) to support implementation of the watershed plan. In October 2009, independent of the watershed planning effort, EPA Region 1 used the residual designation authority under CWA section 402(p) to designate properties in the Long Creek watershed as subject to National Pollutant Discharge Elimination System (NPDES) permit requirements for stormwater discharges (applies to properties that discharge from one or more acres of impervious surface). The Maine Department of Environmental Protection (MEDEP) administers the NPDES program in Maine.

The timing of the watershed plan development and the residual designation, along with availability of CWA section 604(b) ARRA funds, provided an opportunity for MEDEP, LCWMD and other partners to launch an innovative, collaborative watershed restoration approach. MEDEP and its partners recognized that

Figure 1. The Long Creek watershed is in southern Maine's Cumberland County.

Property Evaluations and Program Development in the Long Creek Watershed

Photo: Jeff Varricchione, MEDEP

Figure 2. The Long Creek watershed includes some forested areas.

implementing a coordinated watershed restoration plan to meet the new regulatory requirements would be more effective and efficient than regulating them parcel by parcel. Efforts to implement the Long Creek Watershed Plan include MEDEP's November 2009 issuance of a general permit for properties subject to the residual designation. Property owners could either seek coverage under the general permit or apply for an individual permit.

Section 604(b) Funds at Work

CCSWCD used the ARRA funds to build the legal and institutional structures necessary to link the general permit requirements with watershed plan implementation. First, CCSWCD worked with the Casco Bay Estuary Partnership (CBEP) to develop a fee structure for property owners operating under the general permit. Fees were based on the existing stormwater runoff potential of designated properties; potential was determined by measuring the area of impervious surface, accounting for existing on-site stormwater control practices and identifying good housekeeping practices in place at the time.

CCSWCD entered information about each property's stormwater runoff potential into a database, which calculated the final fee (a baseline impervious-surface based fee, minus the value of credits received for existing stormwater control and good practices) for that property. CCSWCD and CBEP estimated that the annual fee for participation under the general permit would be between $2,500 and $3,000 per acre of impervious area for a landowner who receives no credit for on-site stormwater treatment and wishes to have LCWMD perform required maintenance, pavement sweeping, inspection and reporting on the landowner's behalf. Fees generated by the permits support implementation of the watershed plan; property owners covered by the general permit could reduce fees by adding on-site stormwater treatment or performing some of the maintenance and reporting work themselves. CCSWCD and CBEP estimated that a landowner covered under an individual permit might expect to pay as much as four times more per acre of impervious area annually because that landowner must retrofit all sites (rather than only installing priority retrofits under the general permit) and would not benefit from the economies-of-scale cost savings of maintenance, monitoring and reporting that is gained through the general permit approach.

After establishing the fee structure, CCSWCD spoke with all 110 designated landowners to discuss regulatory options, explain the coordinated plan approach, review landowner contracts, and answer questions. Finally, CCSWCD worked with CBEP and MEDEP to establish a monitoring program that tracks water quality in Long Creek.

Key Project Benefits
• Improved ability to assess or predict water quality/quantity changes
• Improved watershed, water quality/quantity and ecosystem management through – Planning that identifies specific management practices and implementation strategies – Enhanced program development – Education, tech/info transfer, stakeholder engagement, outreach, etc.

The section 604(b)-funded portion of the project is complete, and the coordinated restoration program has been underway since 2010. The program "is operating better than we could have imagined," notes Tamara Lee Pinard, LCWMD director. "We needed 50 percent participation for the LCWMD to work; we are currently at 97 percent participation of the designated acreage." Fees from permitted landowners are expected to generate $1,400,000 cash or in-kind equivalent each year for a 10-year time frame. The fees will support restoration project priorities and can serve as matching funds to help secure future grants and loans.

Update Continuing Planning Process and Monitoring Strategy Documents

Project Goal
Update agency's planning and monitoring documents to support TMDL and watershed planning efforts; improve communication of data.

Percent Complete
ARRA funds will be 100% expended by 12/30/2011; other funds will support remaining project elements

Project Cost
$436,440, supported by section 604(b) ARRA funds

Pass-through Recipient
Not applicable

Project Contact
MPCA: 800-657-3864
www.pca.state.mn.us/

Project Highlights
Minnesota used section 604(b) ARRA funds to update its Continuing Planning Process (CPP) document and improve communication of watershed data. Project elements include

- Coordinating with state, federal and local partners to update CPP and incorporate information from a 10-year monitoring strategy.
- Updating CPP to reflect new water policies and pollution prevention emphases.
- Developing a Web portal to transmit watershed-based data to the public.

Introduction

The Minnesota Pollution Control Agency (MPCA) used $436,440 of its $727,600 in CWA section 604(b) ARRA funds to support state projects to improve water quality management planning and communication efforts. ARRA funds enabled MPCA to update its Continuing Planning Process (CPP), update associated CPP and 10-year monitoring strategy documents, and to develop a Web-based communication portal to share watershed information with the public. MPCA also passed 40 percent of the ARRA funding (totaling $291,160) to regional public comprehensive planning organizations and appropriate interstate organizations for water management planning activities.

Project Background

CWA section 303(e) requires states to develop a CPP report describing the processes and procedures that they will use in their water quality planning activities to carry out the requirements of the CWA. Before the ARRA funds had become available in 2009, MPCA had determined that it must update its CPP to

- Reflect the completion of the state's 10-year water monitoring strategy in 2004 and the passage of the state Clean Water Legacy Act in 2006.
- More explicitly include pollution prevention activities in the CPP as an integral part of Minnesota's water management framework.
- Better integrate groundwater monitoring activities into the CPP.

MPCA also determined that its 10-year monitoring strategy (originally completed in 2004) should be updated to reflect the agency's 2007 transition to using the watershed approach (eight-digit hydrologic unit code scale) and recent developments in groundwater monitoring, wetlands policy and MPCA stormwater programs. As a result, those changes would also be reflected in the CPP.

Section 604(b) Funds at Work

Updating the CPP and Monitoring Strategy

MPCA used $300,000 in section 604(b) ARRA funding to support CPP activities, including $90,000 to support revision of the CPP and 10-year monitoring strategy documents. MPCA coordinated with other Minnesota agencies and federal and local partners to gather stakeholder input. The partners updated the CPP and 10-year monitoring strategy text to include new Minnesota water legislation, policies and programs. One of the most significant changes made to the CPP and the monitoring strategy was to incorporate the agency's shift to a watershed-based approach. That shift will have both programmatic and environmental ramifications because the use of the watershed approach affects how all of MPCA's water program components are carried out. When incorporating information from the 10-year monitoring strategy into the CPP, MPCA established a goal of assessing the condition of all Minnesota watersheds on a 10-year cycle, followed by developing and implementing protection and restoration strategies. MPCA's updated CPP (www.pca.state.mn.us/index.php/view-document.html?gid=15647) and

Update Continuing Planning Process and Monitoring Strategy Documents

10-year monitoring strategy (www.pca.state.mn.us/index.php/view-document.html?gid=10228) were finalized in May 2011. The newly revised CPP addresses the 10-year water monitoring strategy and better aligns with other water quality efforts; however, more in-depth revisions are still needed and will be completed with other funding sources in the near future.

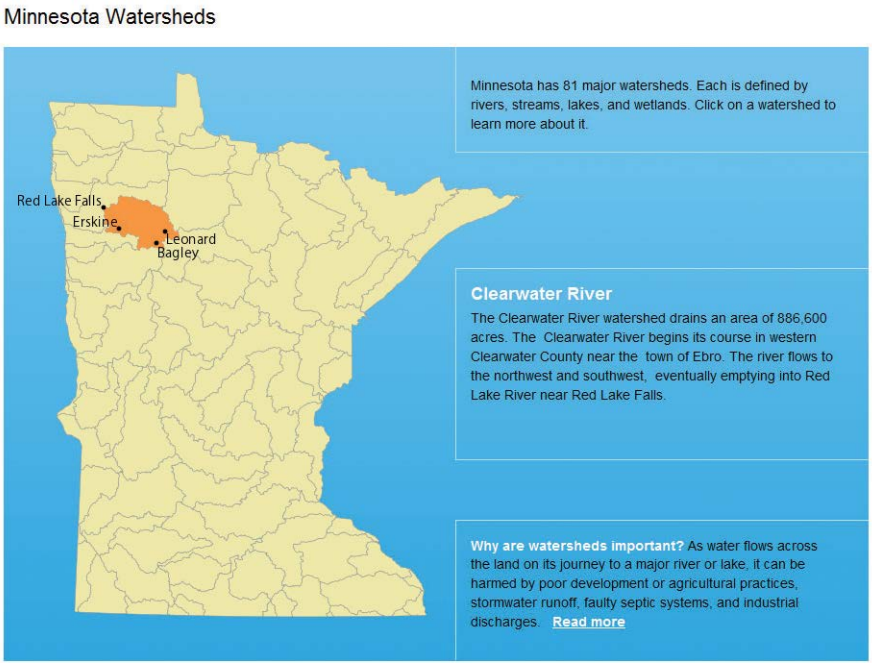


Figure 1. Visitors enter MPCA's new Web portal by selecting their watershed of interest.

As required by CWA section 303(e), Minnesota's updated CPP outlines the state's process for developing each of the following:

1. Effluent limitations and schedules of compliance.
2. Elements of area-wide waste treatment plans and basin plans.
3. TMDLs and individual water quality-based effluent limitations for pollutants.
4. Updating and maintaining water quality management plans.
5. Adequate authority for intergovernmental cooperation for implementing the state water quality management program.
6. Adequate implementation of new or revised water quality standards.
7. Adequate controls over the disposition of all residual waste from any water treatment processing.
8. An inventory and ranking of needs for construction of waste treatment works.
9. Determining the priority of permit issuance.

Developing a Communication Web Portal

MPCA will communicate the wide-reaching water program changes highlighted in its CPP through a new publicly accessible Web portal, also developed using CWA section 604(b) ARRA funds. Found at www.pca.state.mn.us/jsrid8f, the site draws from numerous existing MPCA data systems to serve as a one-stop shop for watershed-based information. From the main Web portal page (Figure 1), a visitor can select any major (HUC-8) watershed of interest to learn more about TMDLs and other water-related activities occurring there. Each watershed's information page includes an overview of the watershed and tabs linking to information about existing or scheduled TMDLs, watershed plans, restoration and implementation efforts, watershed contacts, and maps of monitoring sites and impaired waters. The Web portal will communicate progress on TMDL development and watershed plans, and show, through specific case studies and stories, how those elements of the state's water quality management plan are working at the local and state level.

Key Project Benefits
• Improved ability to assess or predict water quality/quantity changes
• Improved watershed, water quality/quantity and ecosystem management through – Planning that identifies specific management practices and implementation strategies – Enhanced program development – Education, tech/info transfer, stakeholder engagement, outreach, etc.

Statewide Transition to More Effective County-Based Wastewater Management Plans

Project Goal
Work to develop 15 county-based wastewater management plans (WMPs) across the state

Percent Complete
ARRA funding is 100% expended; individual WMPs vary widely in degree of completion and will continue to be supported using other federal 604(b), state, and local funding sources.

Project Cost
Each eligible county received a portion of the $1,617,700 in section 604(b) ARRA funds.

Pass-through Recipient
County governments

Project Contact
NJDEP: 609-984-6888
www.nj.gov/dep/watershedmgt/wqmps.htm

Project Highlights
Section 604(b) ARRA funds supported New Jersey's statewide transition to county-based wastewater management plans. Project elements included

- Updating wastewater service area and zoning maps
- Determining wastewater treatment capacities
- Conducting build-out analyses
- Assessing adequacy of wastewater treatment and water supply capacity under build-out conditions
- Identifying priority areas to target for public infrastructure investment and green solutions

Introduction

New Jersey allocated all $1,617,700 of its CWA section 604(b) ARRA funds to support a statewide program to update outdated wastewater management plans (WMPs), including a transition from 161 individual plans to 21 county-based WMPs. The ARRA funds provided a welcome influx of funds to the counties that allowed the transition to proceed much more rapidly than it would have otherwise.

Project Background

Since before 1990, New Jersey's continuing planning process has required that WMPs be updated on a 6-year basis. However, fewer than 10 percent of the original 161 designated wastewater management planning agencies (including a variety of governmental and quasi-governmental offices) have met that requirement.

In 2008 the New Jersey Department of Environmental Protection (NJDEP) revised its Water Quality Management Planning (WQMP) Rules to facilitate more regional environmental management by placing a major planning and coordination role on the counties—transitioning the 161 outdated WMPs to 21 updated county-based WMPs. WMPs will serve as a cornerstone of New Jersey's continuing planning process; counties will use them to integrate NJDEP's environmental protection objectives (i.e., stormwater control, wetland protection), regional land use plans, and local master plans; determine the appropriate wastewater treatment options consistent with those plans; and ensure that future demand does not exceed the capacity to treat the wastewater that will be generated.

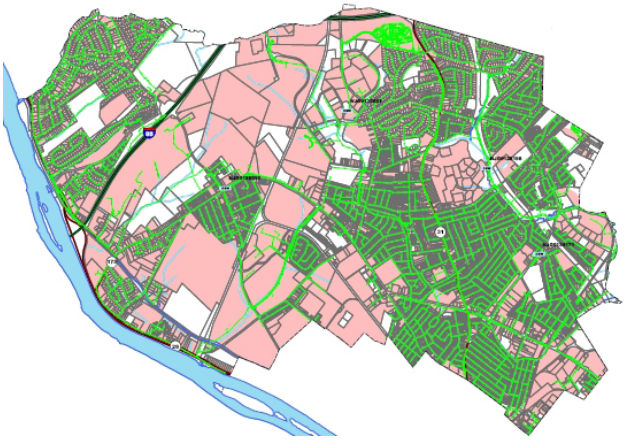


Figure 1. This Ewing Township sewer service area map (pink = sewered areas; green = sewer pipes) is one of numerous mapping layers from 11 municipalities that Mercer County is using when developing its WMP.

Section 604(b) Funds at Work

NJDEP passed all of its CWA section 604(b) ARRA funds to 15 counties to begin transitioning away from smaller-area WMPs to county-based WMPs. Three additional counties already had acceptable WMPs in place, and WMPs for remaining counties are being developed by other entities. The tasks

involved in the transition are similar for all counties and include delineating updated wastewater service area (Figure 1) and zoning maps using a geographic information system (GIS), determining wastewater treatment capacity, conducting a build-out analysis, and determining adequacy of wastewater treatment and water supply capacity under build-out conditions. The county also develops a narrative WMP that summarizes the results of the analyses.

All counties have used the ARRA funds to provide critical supplementary support for developing the WMPs. Although ARRA funds have been exhausted, the work continues using non-ARRA CWA section 604(b) and other state and county funding sources. As would be expected when coordinating among multiple entities and data sources, some counties have experienced data processing or other project delays. Despite delays, NJDEP expects participating counties to make progress towards developing a draft WMP.[1] Once a draft is finalized, each WMP will undergo an extended public review process before being adopted. Each county is required to update its WMP every 6 years.

Developing WMPs has been an extremely informative experience for both the counties and NJDEP. Because advanced GIS technology now allows parcel-by-parcel analyses, NJDEP and the counties have been able to hold public meetings to share mapping results and to invite property owners to submit additional site-specific information. While such public meetings have extended the process, it ensures that the WMP includes the most accurate information available and allows for a transparent public process.

In several counties, the build-out analyses showed that future wastewater or water supply capacity would be insufficient. Fortunately, the WMP information can also direct public infrastructure investment and green solutions including stormwater retrofits to promote recharge and beneficial reuse of reclaimed water (those projects would receive priority funding by the Clean Water State Revolving Fund in the future); the process also helps protect groundwater quality by requiring counties to develop septic management programs for those areas to remain unsewered. The WMPs also begin to address the secondary water quality impacts from development by promoting dense development in areas with existing infrastructure and setting groundwater quality-based limits in areas served primarily by individual septic systems.

Having WMPs in place will positively influence the pattern of future development throughout New Jersey by reducing development pressure in environmentally sensitive areas and protecting water resources over time. The WMPs are already providing a realistic look at what development can and cannot happen in each county and will ultimately curb the tendency to approve multiple small projects without considering the collective impact.

Key Project Benefits
• Improved ability to assess or predict water quality/quantity changes
• Improved watershed, water quality/quantity and ecosystem management through – Planning that identifies specific management practices and implementation strategies – Enhanced program development – Education, tech/info transfer, stakeholder engagement, outreach, etc.
• Improved climate change resilience, greenhouse gas emission reduction and energy efficiency

1 Legislation enacted by the New Jersey Legislature on January 9, 2012 and signed by the Governor on January 17, 2012 modifies portions of New Jersey's 2008 WQMP Rules and among other things, extends the process and timeline for development of wastewater management plans by two years.

Incorporating a Long-Range Watershed Protection Strategy for Water Supply Reservoirs

Project Goal
Incorporate a long-range watershed protection strategy for water supply reservoirs into a regional ecosystem framework for the Dallas-Fort Worth area

Percent Complete
ARRA-funded portion is 100% complete

Project Cost
$292,805, supported by section 604(b) ARRA funds

Pass-through Recipient
North Central Texas Council of Governments (NCTCOG)

Project Contact
NCTOG: 817-695-9213
www.nctcog.org/watershed

Project Highlights
Texas used section 604(b) ARRA funds to support a long-range watershed planning and protection project. Project elements included

- Assessing opportunities and challenges from future development in watersheds of water supply reservoirs
- Creating a vision for future growth, identifying conservation priorities and developing a plan to protect the area's natural resources (through a community-based approach)
- Developing a written long-range watershed protection strategy document

Introduction

The Texas Commission on Environmental Quality passed CWA section 604(b) ARRA funds to the North Central Texas Council of Governments (NCTCOG) to support a long-range watershed protection project. This project aligns with EPA's Healthy Watersheds Initiative, which recommends augmenting the watershed approach with proactive, holistic aquatic ecosystem conservation and protection.

Project Background

The population in the Dallas-Fort Worth area is expected to reach almost 12 million people by 2050. If current trends continue, much of the new development will occur in watersheds surrounding the area's drinking water reservoirs. To protect water supplies, NCTCOG initiated a pilot project to develop tools to incorporate a long-range watershed protection strategy into a regional ecosystem framework being developed through a Federal Highway Administration (FHWA) grant.

In 2008 NCTCOG received FHWA funding to conduct an integrated planning effort and to develop an ecosystem framework following the approach described in *Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects* (see http://environment.fhwa.dot.gov/ecological/). That approach helps partners understand potential effects of proposed infrastructure, identifies areas most in need of protection, assesses cumulative resource

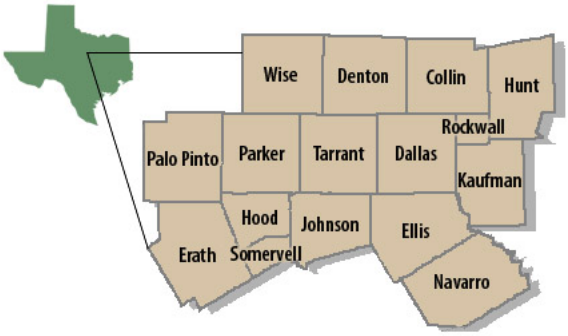


Figure 1. NCTCOG includes 16 counties.

effects and identifies mitigation opportunities before new projects are initiated. In short, the ecosystem framework will help NCTCOG evaluate significant regional transportation or similar construction projects (e.g., large pipeline projects) and identify potential environmental conflicts in advance. NCTCOG has been working to adapt the framework to more than 400 subwatersheds in the 16-county north-central Texas region (Figure 1).

Section 604(b) Funds at Work

NCTCOG used section 604(b) ARRA funding to develop tools to help create a comprehensive watershed protection strategy for the north-central Texas region and to integrate that strategy into the regional ecosystem framework being developed concurrently. First, NCTCOG organized key

Incorporating a Long-Range Watershed Protection Strategy for Water Supply Reservoirs

geographical information system data into appropriate layers for analysis and worked with local stakeholders to assess opportunities for protection and identify challenges expected from future development in watersheds of water supply reservoirs.

Next, NCTCOG worked with the Trust for Public Land (a nonprofit group already under contract with NCTCOG) to create a vision for future growth, identify conservation priorities and develop a plan to protect the area's natural resources. That process, known as *Greenprinting*, used an interactive, community-based process that identified land areas in the Lake Arlington and Lewisville Lake East watersheds that, if maintained as undeveloped, would offer significant benefit for water quality protection (Figure 2). NCTCOG's greatest challenge during the project included generating involvement from small communities and balancing participating stakeholders' priorities and opinions.

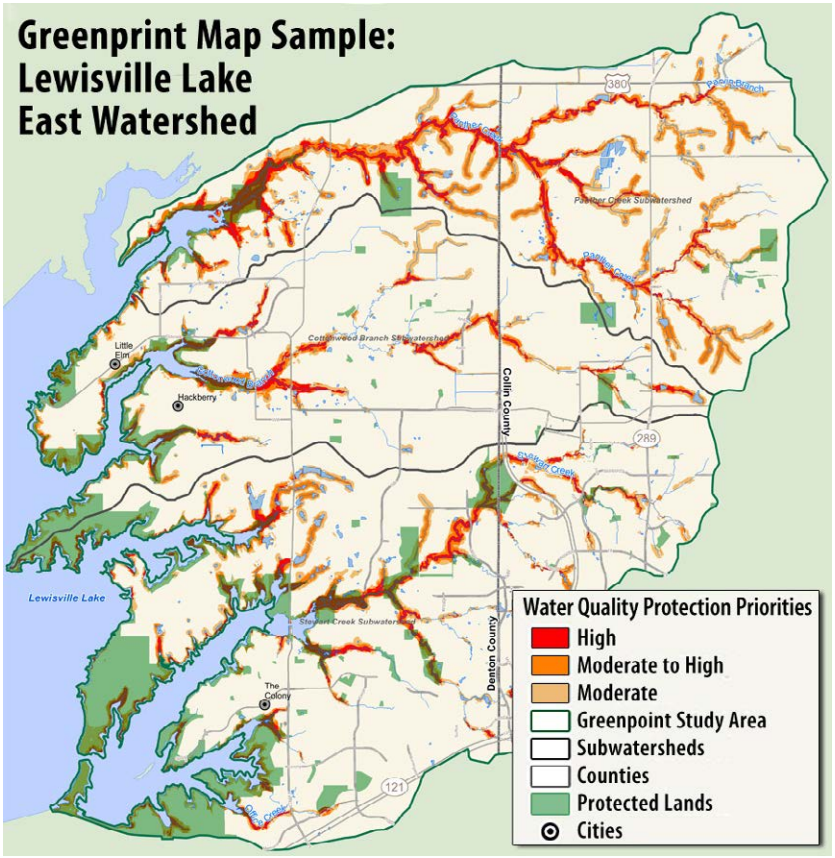


Figure 2. The Lewisville Lake East Watershed Greenprinting map shows the areas prioritized for protection during the Greenprinting process.

Finally, NCTCOG developed a long-range watershed protection strategy document (in draft form and being refined by NCTCOG's water resource agencies) that incorporates information from the first two project elements. Once finalized, the strategy document will guide watershed communities in their efforts to target future green infrastructure investments; implement regulatory protection of critical resources; and identify priority areas for mitigation, low impact development or acquisition of conservation easements. When using the regional ecosystem framework to evaluate regional-impact projects, NCTCOG will use the details in the new watershed protection strategy to guide decisions affecting those watersheds.

This pilot project will serve as a foundation for launching similar work in the region's other watersheds (and beyond), including using Greenprinting and possibly adapting and adopting the watershed protection strategy.

Key Project Benefits

- Improved ability to assess or predict water quality/quantity changes
- Improved watershed, water quality/quantity and ecosystem management through
  - Planning that identifies specific management practices and implementation strategies
  - Enhanced program development
  - Education, tech/info transfer, stakeholder engagement, outreach, etc.

Total Maximum Daily Load and Permit Tracking Application

Project Goal
Develop a Web-based tool to more effectively manage water quality permits, impaired waters and TMDLs.

Percent Complete
100% complete

Project Cost
$200,000 in CWA section 604(b) ARRA funds

Pass-through Recipient
Not applicable

Project Contact
VADEQ: 804-698-4324
www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs.aspx

Project Highlights
Section 604(b) ARRA funds supported developing a Web-based module to streamline and centralize planning, tracking and reporting efforts. Project elements included

- Creating consistent spatial maps for TMDL watersheds
- Upgrading to an enterprise geographical information system (GIS), which allows connectivity with other applications; linking the GIS to a centralized database.
- Creating a "What If?" calculator and "What's Nearby?" query option to improve management and planning.

Introduction

Virginia used $200,000 of its CWA section 604(b) ARRA funds to create a Web-based module that improves the consistency and efficiency of storing, tracking, analyzing and disseminating statewide TMDL and permit data. Virginia had identified the TMDL/Permit Tracking Application project as high priority, but had been unable to finance the project before the influx of ARRA funds.

Project Background

The Virginia Department of Environmental Quality (VADEQ) manages 800 approved waste-load allocations (WLAs) covering more than one thousand water quality permits. VADEQ anticipates managing an additional 1,200 TMDLs and WLAs over the coming years.

In the past, VADEQ had no centralized system for tracking TMDL, WLA and permit information, nor any mechanism for providing that information to interested parties. Region-specific data were tracked and managed by different VADEQ offices using separate spreadsheets and databases. When WLAs changed or new sources were added in an area, VADEQ was legally obligated to update every affected TMDL individually, creating a work backlog. A more coordinated and consistent system was needed to improve the efficiency of storing, tracking, analyzing and disseminating statewide TMDL and permit data.

Section 604(b) Funds at Work

Using CWA section 604(b) ARRA funds, VADEQ partnered with Worldview Solutions, Inc., to develop a Web-based TMDL module that incorporates both spatial and non-spatial data relevant to TMDLs and permits. First, a contractor identified polygons for every TMDL watershed statewide, creating consistent spatial information (Figure 1). At the same time, VADEQ upgraded to an enterprise geographic information system (GIS), which allows the GIS to be easily integrated with other applications. TMDL and permitting data from various spreadsheets and databases, previously housed in the separate VADEQ offices, were combined into one Oracle database and made accessible to all offices through a secure Web browser connection. The GIS system links the spatial TMDL watershed information to the TMDL and permit data.

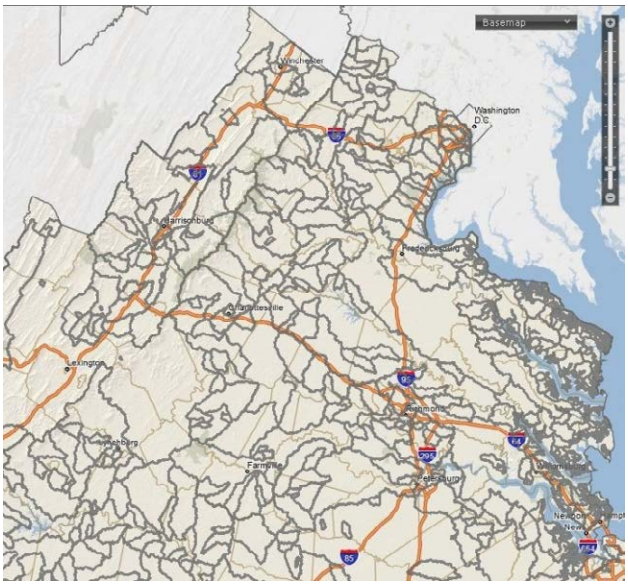


Figure 1. This map shows a snapshot of the TMDL watersheds delineated in the eastern portion of Virginia for the TMDL module.

Total Maximum Daily Load and Permit Tracking Application

The new VADEQ TMDL/Permit application has strengthened Virginia's TMDL program, making it one of the most innovative in the nation. The new program

- Provides storage and easy access to the most meaningful TMDL and WLA data, including relevant geographic information.
- Distributes TMDL, WLA and GIS data to other VADEQ data applications that manage permitting, compliance, monitoring and assessments.
- Enhances program coordination, allowing staff to efficiently plan for developing future TMDLs (Figure 2) and individual permits.
- Supports data sharing and collaboration among VADEQ staff.
- Integrates data visualization tools that answer questions regarding TMDL and assessment impairments within minutes instead of days.
- Offers a *"What If?"* calculator that allows staff to quickly assess the impact of a new permit or an expanded permit on an existing WLA.
- Includes a *"What's Nearby?"* tool, that identifies features that are within a specified distance of a selected point or area. For example, users can identify all impaired rivers or permits that are within a given TMDL watershed, pinpoint all residences that are within a given distance of an environmental emergency, or establish an appropriate-sized buffer around a stream to protect water quality.

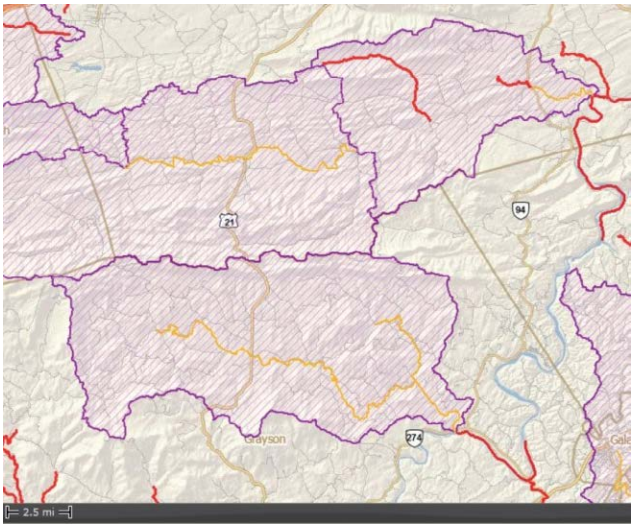


Figure 2. This map shows the current TMDL boundaries, the 2010 bacteria impairments and the classification of the impairments for an area in southern Virginia. Orange lines represent impaired waters with a TMDL in place. Red lines represent new impairments for which TMDL must be developed or adapted. This mapping capability allows VADEQ to prioritize its TMDL development efforts.

By using a Web-based platform that offers a package of data editing, querying and analytical tools, VADEQ resource managers can now efficiently execute the permit process, maintain approved TMDLs and plan for future TMDLs, while also maintaining links to other VADEQ data applications. VADEQ contractors and TMDL partners (including the Virginia Department of Conservation and Recreation) can access the application, thereby increasing data sharing among state agencies. VADEQ is working to integrate other state agency databases into the application, including water monitoring and implementation data. VADEQ intends to make the TMDL, permit and other state data publicly available for viewing online in the future.

VADEQ's new TMDL/Permit Tracking Application is attracting attention nationwide as a model for other states' TMDL integration efforts. In the fall of 2011, the nonprofit Environmental Council of the States (ECOS)—a nonprofit group composed of state and territorial environmental agency leaders—presented VADEQ with an ECOS State Program Innovation Award, which recognizes outstanding state initiatives.

Key Project Benefits

- Improved ability to assess or predict water quality/quantity changes
- Improved watershed, water quality/quantity and ecosystem management through
  - Planning that identifies specific management practices and implementation strategies
  - Enhanced program development
  - Education, tech/info transfer, stakeholder engagement, outreach, etc.

Appendix C. Supplemental Tables and Figures

Appendix C presents the raw data used to develop figures in the main document and offers supplemental figures and tables. Tables C1-C6 present the ARRA information shown in Figures 15, 17, 19, 21, and 23. Note that these tables do not reflect 31 ARRA projects for which funding levels were not clearly specified in the work plans. Tables C13-C18 present the non-ARRA information shown in Figures 16, 18, 20, 22, and 24. Note that these tables do not reflect 3 non-ARRA projects for which funding levels were not clearly specified in the work plans. Supplemental figures showing funding levels versus project types are seen in Figure C1 (ARRA) and Figure C8 (non-ARRA).

This appendix also includes data tables (Tables C7-C12) and figures (Figure C2-C7) showing state ARRA allotment levels versus environmental benefits, media types, pollutant types, GPR elements, timeframes and project types. These were compiled during the data analysis process but were not included in the main document.

Finally, Table C-13 shows a review of the pollutant focus of both ARRA and non-ARRA 604(b) projects as compared to the leading causes of water quality impairment in each of the 15 states studied, as reported in their CWA section 303(d) reports.

Some of the tables in this appendix present environmental benefit data. Please note that the tables include the following abbreviated names:

- **Education**: Improved watershed, water quality/quantity and/or ecosystem management through education, tech/info transfer, stakeholder engagement, outreach, etc.
- **Planning**: Improved watershed, water quality/quantity and/or ecosystem management through planning that identifies specific management practices and implementation strategies
- **Assessment**: Improved ability to assess or predict water quality/quantity changes (baseline water quality/watershed assessment data, monitoring, modeling, land use/cover analysis, etc.)
- **Program**: Improved watershed, water quality/quantity and/or ecosystem management through enhanced program development (incl. organizational, regulations, standards, policies, etc.)
- **Implementation**: Improved watershed, water quality/quantity and/or ecosystem through implementation of best management practices

Analyses of ARRA-Specific Projects: Supplemental Data

Table C1. ARRA project funding level versus *environmental benefits.*

<$25K (56 Projects)		$25-50K (58 Projects)		$50-100K (58 Projects)		$100-200K (50 Projects)		>$200K (43 Projects)	
Education	38%	Education	35%	Education	32%	Education	33%	Assessment	30%
Planning	23%	Assessment	27%	Assessment	24%	Assessment	21%	Education	27%
Assessment	21%	Planning	23%	Planning	24%	Program	21%	Planning	24%
Program	17%	Program	13%	Program	16%	Planning	21%	Program	17%
Climate Change	1%	Climate Change	1%	Climate Change	3%	Climate Change	2%	Climate Change	3%
Implementation	0%	Implementation	0%	Implementation	1%	Implementation	2%	Implementation	0%

Table C2. ARRA project funding level versus *media focus.*

<$25K (56 Projects)		$25-50K (58 Projects)		$50-100K (58 Projects)		$100-200K (50 Projects)		>$200K (43 Projects)	
General Surface Water	46.2%	General Surface Water	32.9%	General Surface Water	31.3%	General Surface Water	43.1%	General Surface Water	33.1%
Stormwater MS4	17.3%	General Nonpoint Source	16.8%	Stormwater MS4	20.3%	Stormwater MS4	16.7%	Stormwater MS4	14.2%
General Nonpoint Source	13.5%	Stormwater MS4	10.1%	General Nonpoint Source	18.8%	General Nonpoint Source	12.7%	General Nonpoint Source	13.4%
General Groundwater	5.8%	Centralized Wastewater	7.4%	Centralized Wastewater	8.6%	Centralized Wastewater	8.8%	Centralized Wastewater	7.9%
Decentralized Wastewater	3.8%	Ag Runoff Crops	6.7%	Ag Runoff Crops	4.7%	Ag Runoff Crops	6.9%	Ag Runoff Livestock	6.3%
Ag Runoff Crops	3.8%	Ag Runoff Livestock	6.7%	Ag Runoff Livestock	4.7%	Ag Runoff Livestock	3.9%	Decentralized Wastewater	5.5%
Centralized Wastewater	1.9%	Decentralized Wastewater	6.0%	Decentralized Wastewater	2.3%	Decentralized Wastewater	2.9%	Ag Runoff Crops	5.5%
Stormwater Industrial	1.9%	General Groundwater	3.4%	Stormwater Construction	2.3%	Stormwater Construction	2.9%	General Groundwater	5.5%
Ag Runoff Livestock	1.9%	Stormwater Industrial	2.7%	General Groundwater	2.3%	Stormwater Industrial	1.0%	Source Water	3.9%
Source Water	1.9%	Stormwater Construction	2.7%	Source Water	2.3%	General Groundwater	1.0%	Stormwater Construction	3.1%
Stormwater Construction	1.0%	Reclaimed Water	2.7%	Reclaimed / Reuse Water	1.6%	Reclaimed Water	0.0%	Stormwater Industrial	0.8%
Reclaimed Water	1.0%	Source Water	2.0%	Stormwater Industrial	0.8%	Source Water	0.0%	Reclaimed / Reuse Water	0.8%
Reclaimed / Reuse Water	0.0%	Reclaimed / Reuse Water	0.0%	Reclaimed Water	0.0%	Reclaimed / Reuse Water	0.0%	Reclaimed Water	0.0%

Table C3. ARRA project funding level versus *pollutant focus.*

<$25K (56 Projects)		$25-50K (58 Projects)		$50-100K (58 Projects)		$100-200K (50 Projects)		>$200K (43 Projects)	
Sediment	20.3%	Phosphorus	21.6%	Bacteria	19.3%	Other	18.5%	Bacteria	18.6%
Other	19.2%	Sediment	21.1%	Phosphorus	18.9%	Phosphorus	17.9%	Phosphorus	18.0%
Bacteria	16.3%	Bacteria	17.0%	Sediment	16.5%	Nitrogen	16.7%	Other	18.0%
Phosphorus	15.1%	Other	16.0%	Nitrogen	16.0%	Sediment	16.7%	Nitrogen	17.4%
Metals	15.1%	Nitrogen	13.4%	Other	16.0%	Bacteria	16.1%	Sediment	15.6%
Nitrogen	14.0%	Metals	10.8%	Metals	13.2%	Metals	14.3%	Metals	12.6%

Table C4. ARRA project funding level versus *GPR elements.*

<$25K (56 Projects)		$25-50K (58 Projects)		$50-100K (58 Projects)		$100-200K (50 Projects)		>$200K (43 Projects)	
LID / GI	66.7%	LID / GI	44.4%	LID / GI	50.0%	LID / GI	66.7%	LID / GI	46.4%
Water Efficiency	18.5%	Water Efficiency	18.5%	Innovation - All	23.1%	Innovation - All	19.0%	Innovation - All	21.4%
Climate Change	11.1%	Innovation - All	18.5%	Water Efficiency	15.4%	Climate Change	14.3%	Water Efficiency	14.3%
Innovation - All	3.7%	Energy Efficiency	14.8%	Energy Efficiency	11.5%	Energy Efficiency	0.0%	Climate Change	10.7%
Energy Efficiency	0.0%	Climate Change	3.7%	Climate Change	0.0%	Water Efficiency	0.0%	Energy Efficiency	7.1%

Table C5. ARRA project funding level versus *time frame.*

<$25K (56 Projects)		$25-50K (58 Projects)		$50-100K (58 Projects)		$100-200K (50 Projects)		>$200K (43 Projects)	
2 to 10 years	83.6%	2 to 10 years	82.8%	2 to 10 years	79.3%	2 to 10 years	72.0%	2 to 10 years	83.7%
> 10 years	10.9%	< 2 years	8.6%	< 2 years	13.8%	< 2 years	14.0%	< 2 years	9.3%
< 2 years	5.5%	> 10 years	8.6%	> 10 years	6.9%	> 10 years	14.0%	> 10 years	7.0%

Table C6. ARRA project funding level versus *project type.*

<$25K (56 Projects)		$25-50K (58 Projects)		$50-100K (58 Projects)		$100-200K (50 Projects)		>$200K (43 Projects)	
Ecosystem Information Assessment	22.2%	Ecosystem Information Assessment	30.1%	Ecosystem Information Assessment	26.3%	Ecosystem Information Assessment	26.4%	Ecosystem Information Assessment	31.5%
Public Outreach	18.5%	Water Quality Planning	17.5%	Water Quality Planning	16.2%	Public Outreach	12.4%	Water Quality Planning	16.5%
Water Quality Planning	14.1%	Public Outreach	9.8%	Public Outreach	13.8%	Water Quality Planning	11.6%	Water Program Support	13.4%
Green Infrastructure	13.3%	Water Program Support	8.4%	Nonpoint Source BMPs	9.6%	Technical Guidance	11.6%	Green Infrastructure	10.2%
Consensus Building	7.4%	Green Infrastructure	7.0%	Green Infrastructure	8.4%	Green Infrastructure	10.1%	Public Outreach	7.9%
Water Policy	5.9%	Nonpoint Source BMPs	6.3%	Consensus Building	7.2%	Consensus Building	9.3%	Consensus Building	6.3%
Water Program Support	5.9%	Consensus Building	5.6%	Water Program Support	6.0%	Water Program Support	8.5%	Technical Guidance	3.9%
Technical Guidance	4.4%	Environmentally Innovative	4.9%	Water Policy	3.6%	Water Policy	7.0%	Water Policy	3.1%
Environmentally Innovative	3.7%	Water Policy	3.5%	Energy Efficiency	3.0%	Environmentally Innovative	2.3%	Water Efficiency	2.4%
Water Efficiency	2.2%	Water Efficiency	2.8%	Technical Guidance	3.0%	Nonpoint Source BMPs	0.8%	Environmentally Innovative	2.4%
Nonpoint Source BMPs	1.5%	Technical Guidance	2.8%	Water Efficiency	2.4%	Water Efficiency	0.0%	Nonpoint Source BMPs	1.6%
Energy Efficiency	0.7%	Energy Efficiency	1.4%	Environmentally Innovative	0.6%	Energy Efficiency	0.0%	Energy Efficiency	0.8%

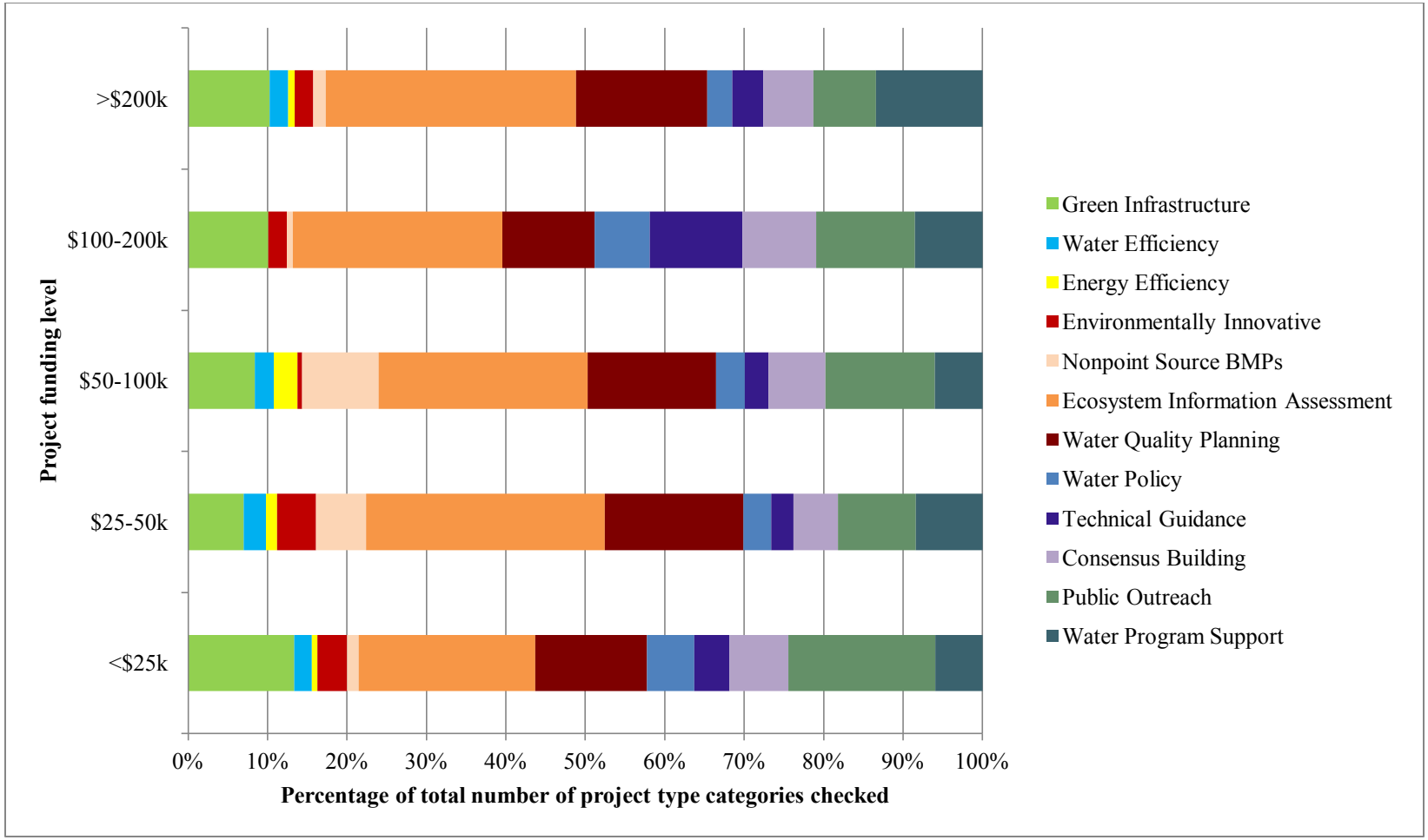


Figure C1. ARRA project funding level versus *project type.*

Table C7. State ARRA allotment level versus *environmental benefits.*

<$200K		$200-500K		$500K-1M		>$1M	
Education	33.3%	Education	33.2%	Education	37.3%	Assessment	32.2%
Planning	24.5%	Planning	24.6%	Planning	22.9%	Education	29.2%
Assessment	23.9%	Program	20.1%	Program	20.9%	Planning	21.5%
Program	15.1%	Assessment	18.6%	Assessment	17.6%	Program	14.6%
Climate Change	3.1%	Climate Change	3.0%	Implementation	0.7%	Climate Change	1.7%
Implementation	0.0%	Implementation	0.5%	Climate Change	0.7%	Implementation	0.9%

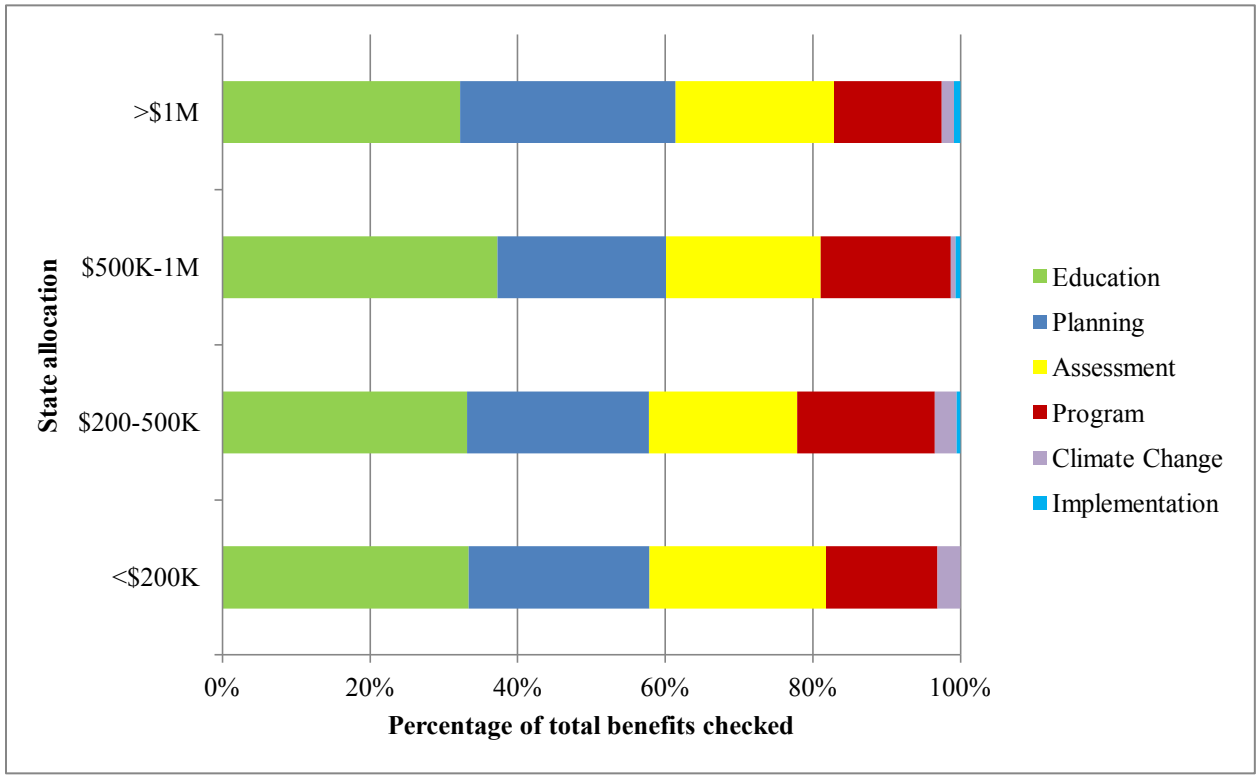


Figure C2. State ARRA allotment level versus *environmental benefits.*

Table C8. State ARRA allotment level versus *media focus*.

<$200K		$200-500K		$500K-1M		>$1M	
General Surface Water	38.8%	General Surface Water	33.3%	General Surface Water	31.3%	General Surface Water	42.1%
Stormwater MS4	16.5%	General Nonpoint Source	15.3%	Stormwater MS4	14.5%	Stormwater MS4	14.9%
General Nonpoint Source	16.5%	Stormwater MS4	14.8%	General Nonpoint Source	13.9%	General Nonpoint Source	14.9%
Decentralized Wastewater	6.5%	Centralized Wastewater	10.4%	Centralized Wastewater	7.8%	Centralized Wastewater	6.2%
Centralized Wastewater	5.8%	Decentralized Wastewater	5.5%	Ag Runoff Livestock	7.8%	Ag Runoff Crops	5.1%
Ag Runoff Crops	5.0%	General Groundwater	4.4%	Ag Runoff Crops	6.6%	Ag Runoff Livestock	4.1%
Ag Runoff Livestock	4.3%	Ag Runoff Crops	3.8%	Decentralized Wastewater	4.8%	Source Water	4.1%
Stormwater Construction	2.2%	Stormwater Construction	2.7%	Stormwater Construction	3.6%	General Groundwater	3.6%
General Groundwater	2.2%	Source Water	2.7%	General Groundwater	3.6%	Stormwater Construction	2.6%
Reclaimed Water	1.4%	Stormwater Industrial	2.2%	Stormwater Industrial	3.0%	Decentralized Wastewater	1.5%
Stormwater Industrial	0.7%	Ag Runoff Livestock	2.2%	Source Water	3.0%	Reclaimed Water	0.5%
Source Water	0.0%	Reclaimed Water	1.6%	Reclaimed Water	0.0%	Reclaimed / Reuse Water	0.5%
Reclaimed / Reuse Water	0.0%	Reclaimed / Reuse Water	1.1%	Reclaimed / Reuse Water	0.0%	Stormwater Industrial	0.0%

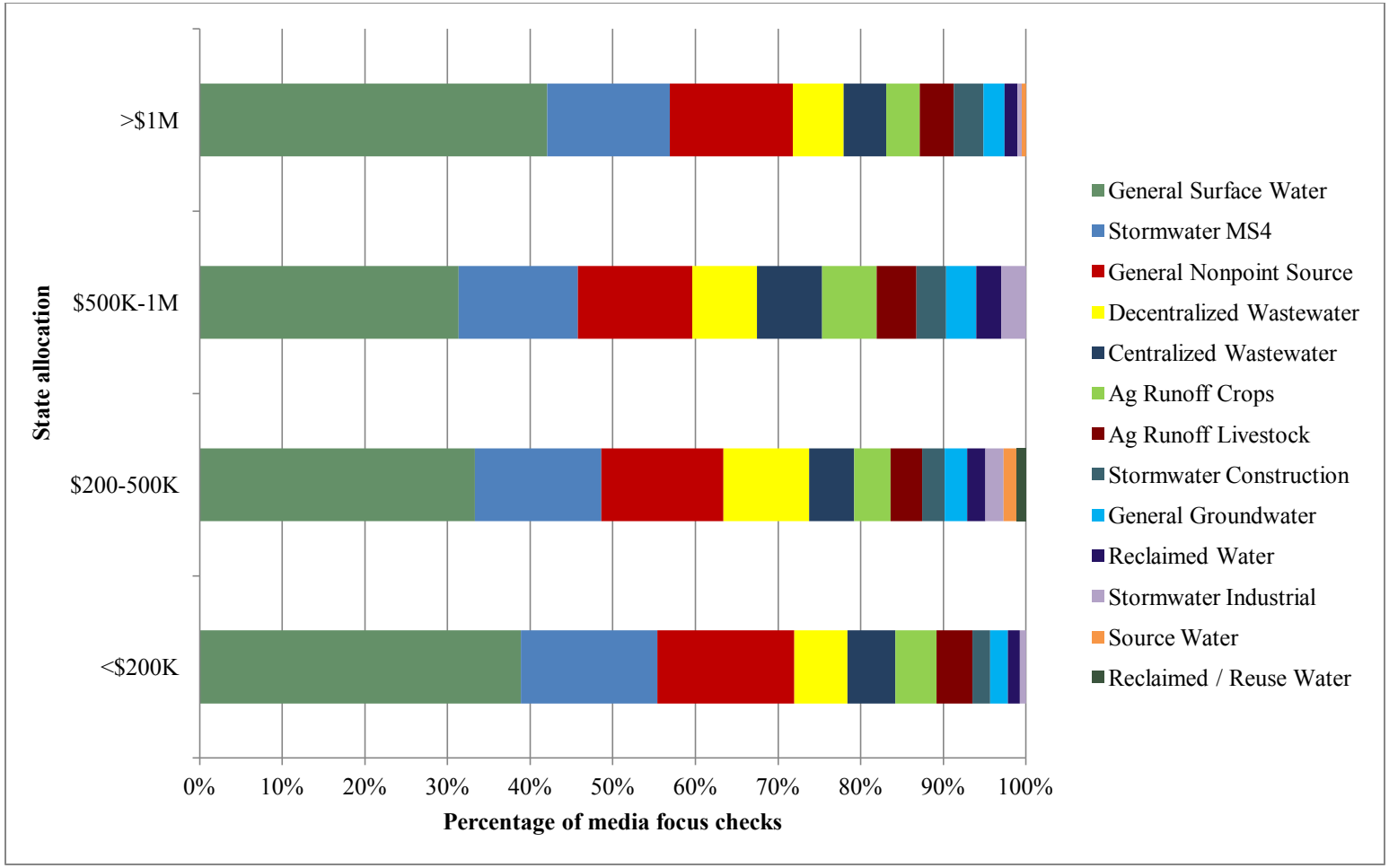


Figure C3. State ARRA allotment level versus *media focus.*

Table C9. State ARRA allotment level versus *pollutant type.*

<$200K		$200-500K		$500K-1M		>$1M	
Other	20.1%	Other	18.9%	Phosphorus	20.0%	Phosphorus	19.4%
Sediment	19.1%	Sediment	17.8%	Bacteria	18.6%	Sediment	18.1%
Phosphorus	17.6%	Phosphorus	17.1%	Sediment	17.6%	Bacteria	17.4%
Bacteria	17.6%	Bacteria	15.7%	Nitrogen	17.1%	Other	17.4%
Nitrogen	13.7%	Metals	15.7%	Other	14.3%	Nitrogen	16.1%
Metals	11.8%	Nitrogen	14.7%	Metals	12.4%	Metals	11.5%

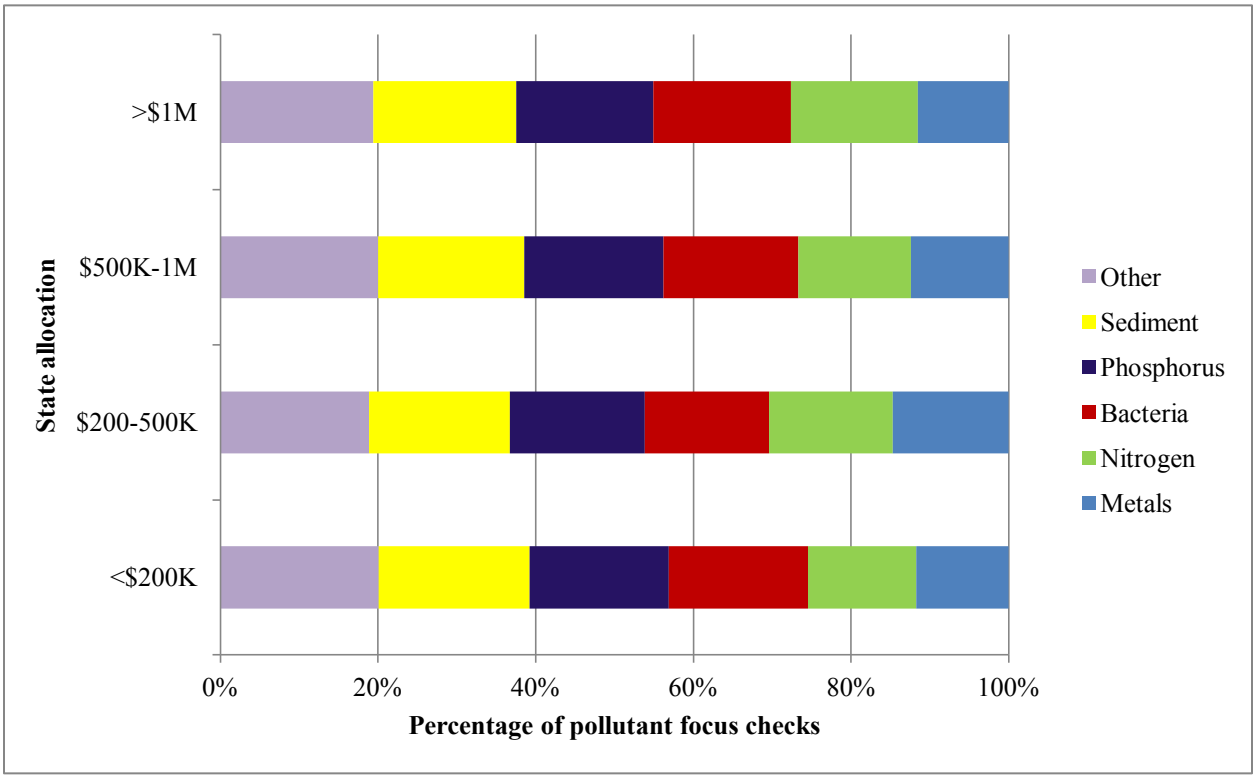


Figure C4. State ARRA allotment level versus *pollutant type.*

Table C10. State ARRA allotment level versus *GPR elements.*

<$200K		$200-500K		$500K-1M		>$1M	
LID / GI	45.0%	LID / GI	50.9%	LID / GI	59.3%	LID / GI	58.1%
Innovation - All	17.5%	Water Efficiency	18.9%	Water Efficiency	18.5%	Innovation - All	22.6%
Water Efficiency	15.0%	Innovation - All	13.2%	Innovation - All	18.5%	Climate Change	12.9%
Energy Efficiency	12.5%	Energy Efficiency	9.4%	Energy Efficiency	3.7%	Energy Efficiency	3.2%
Climate Change	10.0%	Climate Change	7.5%	Climate Change	0.0%	Water Efficiency	3.2%

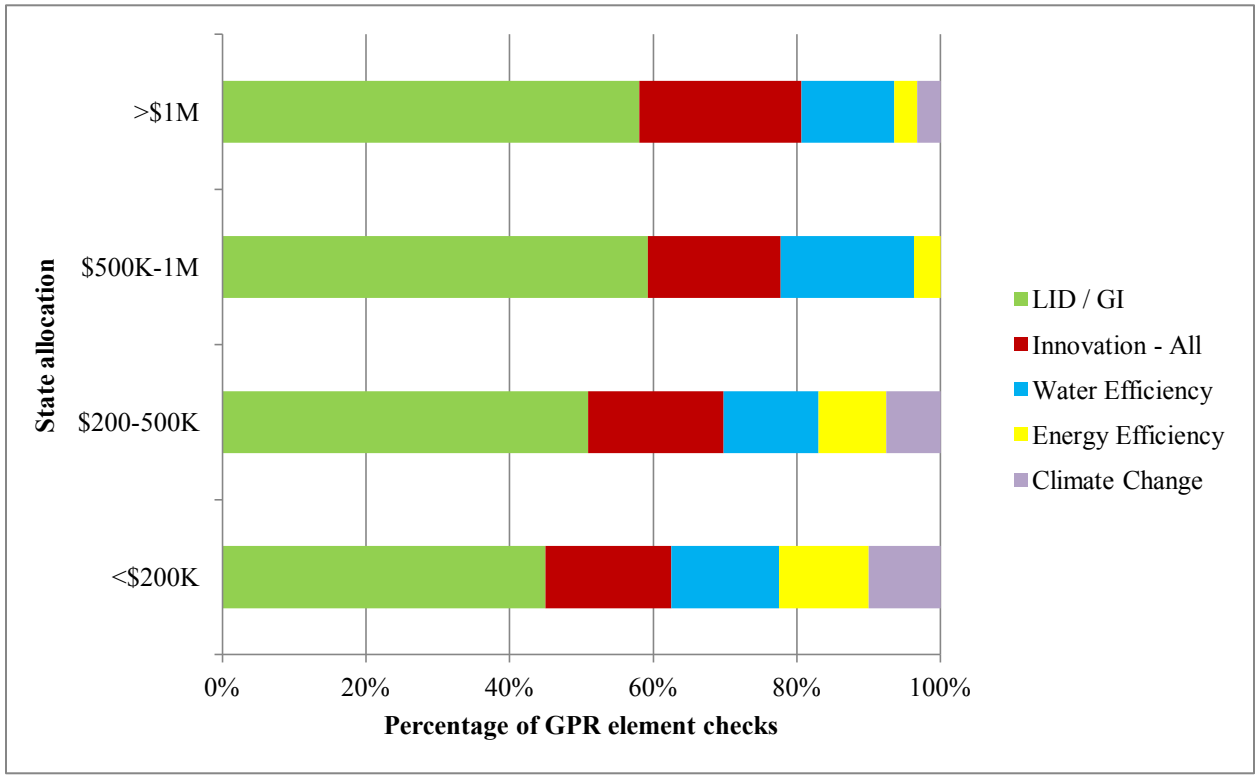


Figure C5. State ARRA allotment level versus *GPR elements.*

Table C11. State ARRA allotment level versus *timeframe.*

<$200K		$200-500K		$500K-1M		>$1M	
2 to 10 years	83.9%	2 to 10 years	82.4%	2 to 10 years	71.4%	2 to 10 years	83.3%
> 10 years	9.7%	< 2 years	9.5%	< 2 years	14.3%	< 2 years	11.5%
< 2 years	6.5%	> 10 years	8.1%	> 10 years	14.3%	> 10 years	5.2%

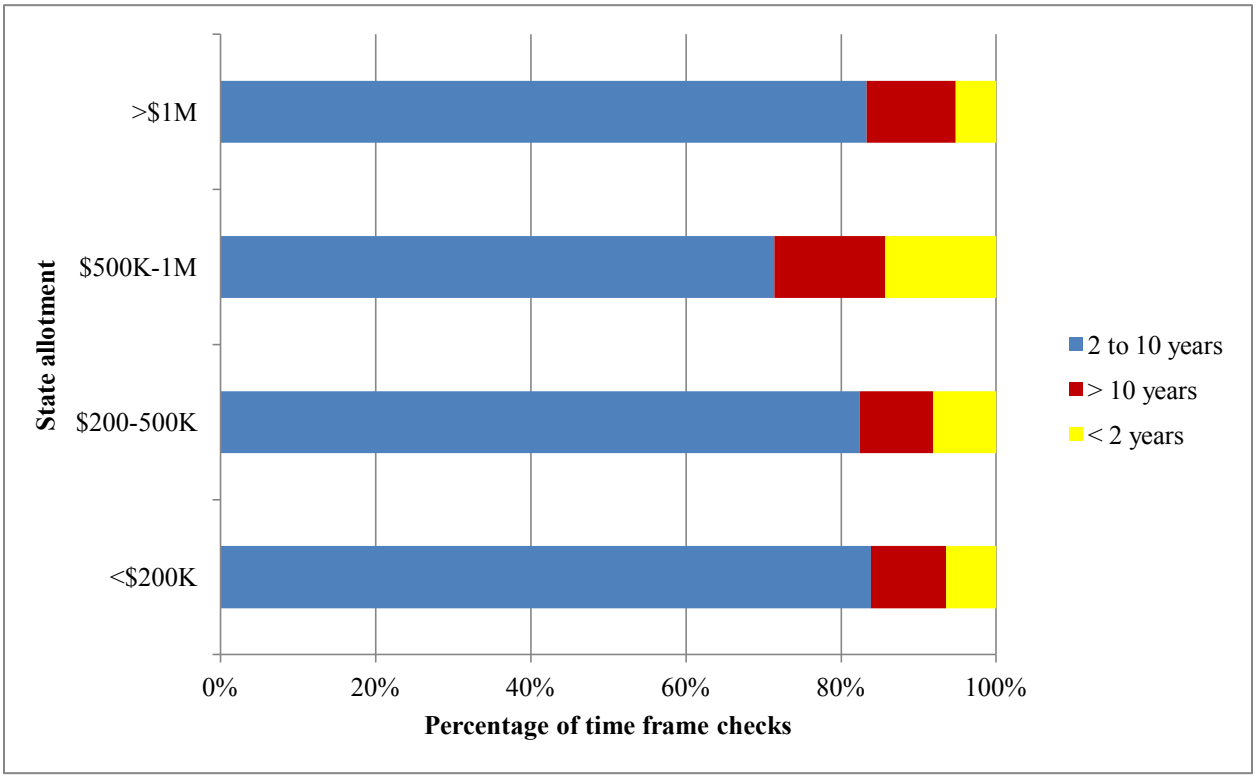


Figure C6. State ARRA allotment level versus *timeframe.*

Table C12. State ARRA allotment level versus *project type.*

<$200K		$200-500K		$500K-1M		>$1M	
Ecosystem Assessment	28.7%	Ecosystem Assessment	19.0%	Ecosystem Assessment	25.9%	Ecosystem Assessment	35.1%
Green Infrastructure	13.2%	Water Quality Planning	13.8%	Water Quality Planning	19.6%	Water Quality Planning	15.9%
Water Quality Planning	13.2%	Public Outreach	13.4%	Green Infrastructure	12.5%	Water Program Support	10.9%
Public Outreach	10.3%	Green Infrastructure	10.3%	Water Program Support	10.6%	Green Infrastructure	7.9%
Water Policy	5.9%	Consensus Building	8.6%	Public Outreach	9.3%	Public Outreach	7.5%
Consensus Building	5.9%	Water Program Support	8.6%	Water Policy	6.2%	Nonpoint Source	5.9%
Technical Guidance	5.1%	Technical Guidance	7.3%	Consensus Building	5.0%	Consensus Building	5.0%
Water Program Support	5.1%	Water Policy	6.5%	Nonpoint Source	4.4%	Water Policy	4.2%
Water Efficiency	3.7%	Environmentally Innovative	3.9%	Environmentally Innovative	3.1%	Technical Guidance	4.2%
Energy Efficiency	3.7%	Nonpoint Source	3.4%	Technical Guidance	2.2%	Environmentally Innovative	2.9%
Nonpoint Source	2.9%	Water Efficiency	3.0%	Water Efficiency	0.9%	Water Efficiency	0.4%
Environmentally Innovative	2.2%	Energy Efficiency	2.2%	Energy Efficiency	0.3%	Energy Efficiency	0.0%

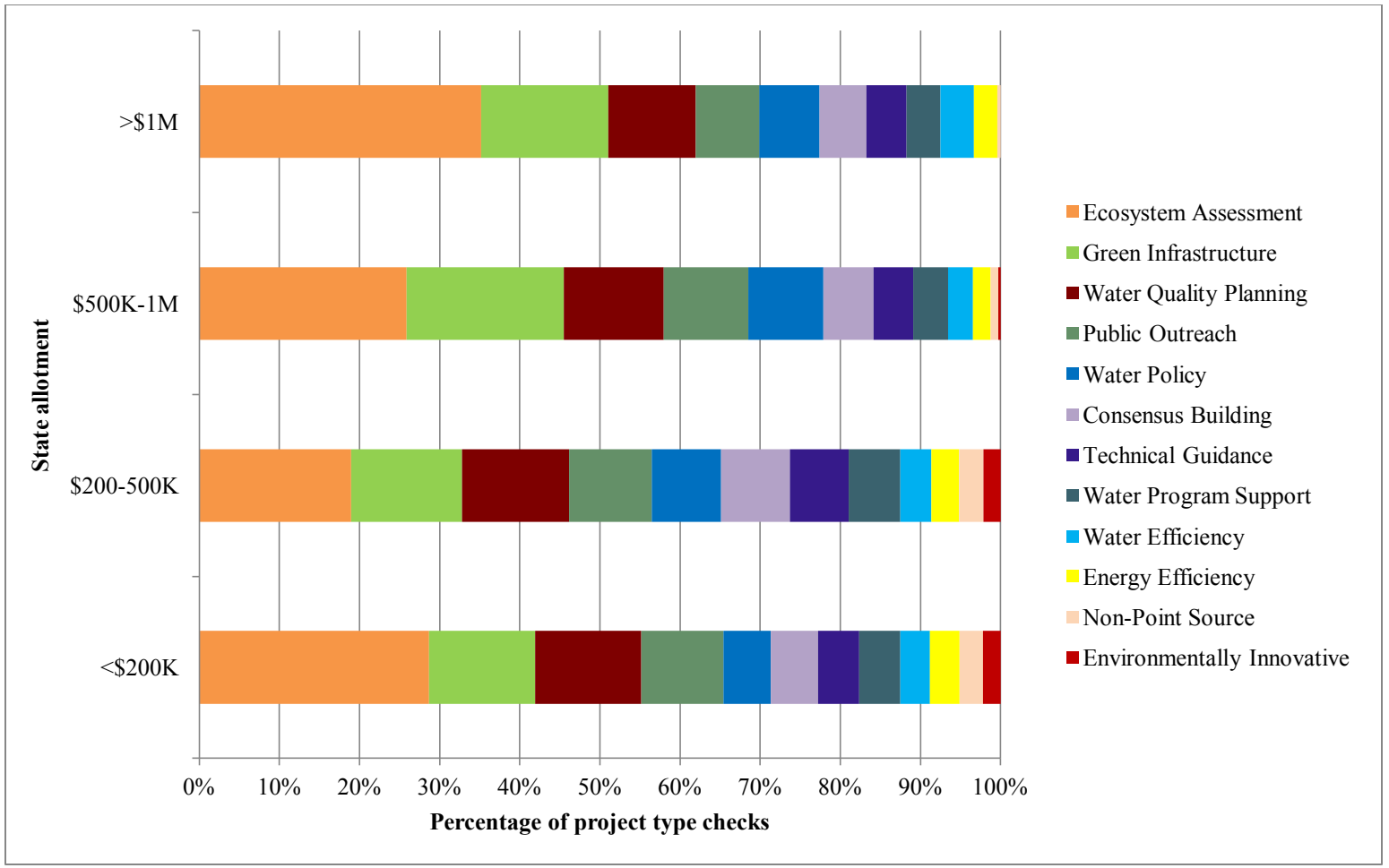


Figure C7. State ARRA allotment level versus *project type.*

Analyses of Non-ARRA-Specific Projects: Supplemental Data

Table C13. Non-ARRA project funding level versus *environmental benefits.*

<$25K (51 projects)		$25-50K (19 projects)		$50-100K (15 projects)		$100-200K (18 projects)		>$200K (15 projects)	
Education	39%	Education	39%	Education	40%	Assessment	46%	Education	32%
Planning	25%	Assessment	28%	Assessment	31%	Education	26%	Program	26%
Program	21%	Planning	28%	Planning	23%	Planning	21%	Planning	24%
Assessment	15%	Program	6%	Program	6%	Program	8%	Assessment	18%
Implementation	0%	Implementation	0%	Implementation	0%	Implementation	0%	Implementation	0%
Climate Change	0%	Climate Change	0%	Climate Change	0%	Climate Change	0%	Climate Change	0%

Table C14. Non-ARRA project funding level versus *media focus.*

<$25K (51 projects)		$25-50K (19 projects)		$50-100K (15 projects)		$100-200K (18 projects)		>$200K (15 projects)	
Decentralized Wastewater	26.1%	General Surface Water	27.8%	General Surface Water	53.8%	General Surface Water	60.7%	General Surface Water	37.5%
General Surface Water	20.5%	Stormwater MS4	19.4%	General Nonpoint Source	19.2%	General Nonpoint Source	25.0%	Centralized Wastewater	17.5%
General Groundwater	20.5%	General Nonpoint Source	13.9%	Stormwater MS4	15.4%	Stormwater MS4	10.7%	Stormwater MS4	15.0%
General Nonpoint Source	9.1%	Centralized Wastewater	11.1%	Ag Runoff Crops	7.7%	Centralized Wastewater	3.6%	General Nonpoint Source	10.0%
Stormwater MS4	6.8%	Decentralized Wastewater	8.3%	Centralized Wastewater	3.8%	Decentralized Wastewater	0.0%	Decentralized Wastewater	5.0%
Stormwater Construction	5.7%	Ag Runoff Crops	5.6%	Decentralized Wastewater	0.0%	Stormwater Industrial	0.0%	General Groundwater	5.0%
Ag Runoff Crops	5.7%	General Groundwater	5.6%	Stormwater Industrial	0.0%	Stormwater Construction	0.0%	Source Water	5.0%
Centralized Wastewater	2.3%	Stormwater Construction	2.8%	Stormwater Construction	0.0%	Ag Runoff Crops	0.0%	Ag Runoff Crops	2.5%
Ag Runoff Livestock	2.3%	Ag Runoff Livestock	2.8%	Ag Runoff Livestock	0.0%	Ag Runoff Livestock	0.0%	Ag Runoff Livestock	2.5%
Source Water	1.1%	Source Water	2.8%	General Groundwater	0.0%	General Groundwater	0.0%	Stormwater Industrial	0.0%
Stormwater Industrial	0.0%	Stormwater Industrial	0.0%	Reclaimed Water	0.0%	Reclaimed Water	0.0%	Stormwater Construction	0.0%
Reclaimed Water	0.0%	Reclaimed Water	0.0%	Source Water	0.0%	Source Water	0.0%	Reclaimed Water	0.0%
Reclaimed / Reuse Water	0.0%	Reclaimed / Reuse Water	0.0%	Reclaimed / Reuse Water	0.0%	Reclaimed / Reuse Water	0.0%	Reclaimed / Reuse Water	0.0%

Table C15. Non-ARRA project funding level versus *pollutant focus.*

<$25K (51 projects)		$25-50K (19 projects)		$50-100K (15 projects)		$100-200K (18 projects)		>$200K (15 projects)	
Nitrogen	28.1%	Nitrogen	23.3%	Phosphorus	19.3%	Sediment	17.4%	Nitrogen	18.7%
Bacteria	24.8%	Bacteria	23.3%	Sediment	19.3%	Bacteria	17.4%	Phosphorus	18.7%
Phosphorus	19.0%	Phosphorus	19.2%	Bacteria	19.3%	Other	17.4%	Bacteria	17.3%
Sediment	10.7%	Sediment	13.7%	Nitrogen	15.8%	Phosphorus	16.3%	Other	17.3%
Other	10.7%	Other	11.0%	Other	14.0%	Metals	16.3%	Metals	16.0%
Metals	6.6%	Metals	9.6%	Metals	12.3%	Nitrogen	15.1%	Sediment	12.0%

Table C16. Non-ARRA project funding level versus *GPR elements.*

<$25K (51 projects)		$25-50K (19 projects)		$50-100K (15 projects)		$100-200K (18 projects)		>$200K (15 projects)	
LID / GI	50.0%	LID / GI	100.0%	LID / GI	0.0%	LID / GI	0.0%	LID / GI	0.0%
Innovation - All	50.0%	Energy Efficiency	0.0%	Energy Efficiency	0.0%	Energy Efficiency	0.0%	Energy Efficiency	0.0%
Energy Efficiency	0.0%	Water Efficiency	0.0%	Water Efficiency	0.0%	Water Efficiency	0.0%	Water Efficiency	0.0%
Water Efficiency	0.0%	Climate Change	0.0%	Climate Change	0.0%	Climate Change	0.0%	Climate Change	0.0%
Climate Change	0.0%	Innovation - All	0.0%	Innovation - All	0.0%	Innovation - All	0.0%	Innovation - All	0.0%

Table C17. Non-ARRA project funding level versus *time frame.*

<$25K (51 projects)		$25-50K (19 projects)		$50-100K (15 projects)		$100-200K (18 projects)		>$200K (15 projects)	
2 to 10 years	69.4%	2 to 10 years	68.4%	2 to 10 years	73.3%	2 to 10 years	52.9%	2 to 10 years	93.3%
< 2 years	16.3%	< 2 years	21.1%	< 2 years	26.7%	< 2 years	47.1%	< 2 years	6.7%
> 10 years	14.3%	> 10 years	10.5%	> 10 years	0.0%	> 10 years	0.0%	> 10 years	0.0%

Table C18. Non-ARRA *project* funding level versus *project type.*

<$25K		$25-50K		$50-100K		$100-200K		>$200K	
Public Outreach	26.5%	Ecosystem Assessment	19.6%	Ecosystem Assessment	26.1%	Ecosystem Assessment	36.7%	Water Quality Planning	22.0%
Ecosystem Assessment	17.7%	Water Quality Planning	19.6%	Public Outreach	21.7%	Public Outreach	20.4%	Water Program Support	22.0%
Technical Guidance	11.5%	Public Outreach	15.7%	Consensus Building	19.6%	Water Program Support	16.3%	Ecosystem Assessment	17.1%
Nonpoint Source	10.6%	Green Infrastructure	9.8%	Water Quality Planning	15.2%	Consensus Building	12.2%	Consensus Building	17.1%
Water Quality Planning	10.6%	Nonpoint Source	9.8%	Water Program Support	13.0%	Water Quality Planning	10.2%	Public Outreach	17.1%
Consensus Building	9.7%	Consensus Building	9.8%	Nonpoint Source	2.2%	Technical Guidance	4.1%	Technical Guidance	4.9%
Water Program Support	8.0%	Technical Guidance	7.8%	Water Policy	2.2%	Green Infrastructure	0.0%	Green Infrastructure	0.0%
Water Policy	4.4%	Water Program Support	5.9%	Green Infrastructure	0.0%	Water Efficiency	0.0%	Water Efficiency	0.0%
Green Infrastructure	0.9%	Environmentally Innovative	2.0%	Water Efficiency	0.0%	Energy Efficiency	0.0%	Energy Efficiency	0.0%
Water Efficiency	0.0%	Water Efficiency	0.0%	Energy Efficiency	0.0%	Environmentally Innovative	0.0%	Environmentally Innovative	0.0%
Energy Efficiency	0.0%	Energy Efficiency	0.0%	Environmentally Innovative	0.0%	Nonpoint Source	0.0%	Nonpoint Source	0.0%
Environmentally Innovative	0.0%	Water Policy	0.0%	Technical Guidance	0.0%	Water Policy	0.0%	Water Policy	0.0%

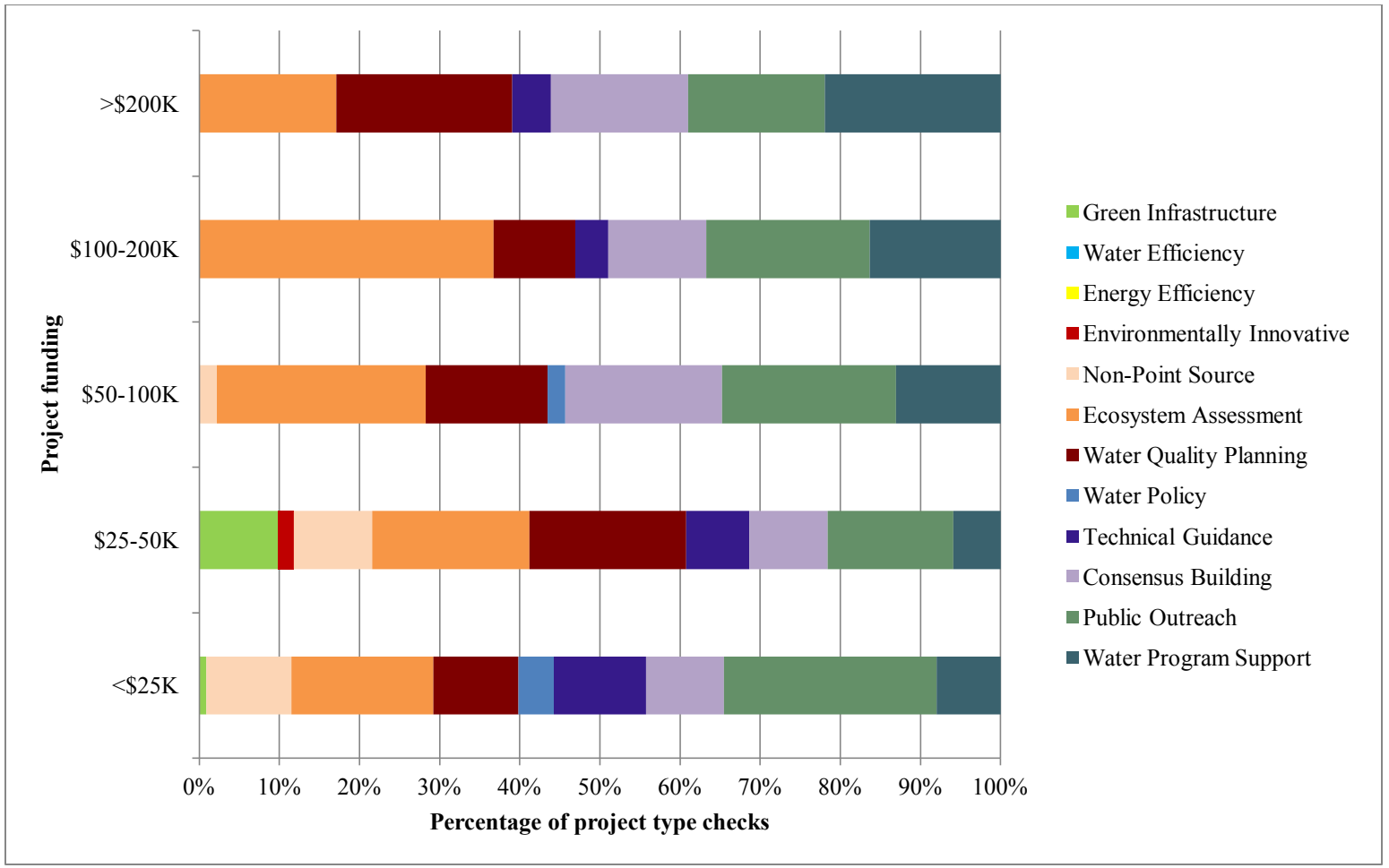


Figure C8. Non-ARRA project funding level versus *project type.*

Combined Analyses of Non-ARRA-Specific Projects: Supplemental Data

Table C19. Pollutant focus of ARRA and non-ARRA 604(b) projects compared to leading causes of water quality impairment in each of the 15 states studied

State[1]	303d Report Year[2]	Pollutant Priorities in WQ Reports[3]	Combined Project Pollutant Focus[4]	ARRA Project Pollutant Focus[5]	Non-ARRA Project Pollutant Focus[6]
Arizona	2008	• Pesticides • Metals (other than Mercury) • Pathogens • Mercury • Organic Enrich. / Oxygen Depletion	Bacteria Metals Other Nitrogen Phosphorus Sediment	Bacteria Metals Other Nitrogen Phosphorus Sediment	Bacteria Metals Other Nitrogen Phosphorus
Florida	2010	• Mercury • Organic Enrich. / Oxygen Depletion • Pathogens • Algal Growth	Nitrogen Metals Other Phosphorus Sediment Bacteria	Nitrogen Metals Other Phosphorus Sediment Bacteria	Other Nitrogen Metals Phosphorus Sediment Bacteria
Hawaii	2006	• Nutrients • Turbidity • Algal Growth • Pathogens	Nitrogen Phosphorus Sediment Bacteria Other Metals	Other Nitrogen Phosphorus Sediment Bacteria Metals	Nitrogen Phosphorus Sediment Bacteria Other Metals
Idaho	2010	• Temperature • Cause Unknown – Impaired Biota • Sediment • Pathogens	Nitrogen Bacteria Phosphorus Other Metals Sediment	Other Phosphorus Metals	Nitrogen Bacteria Phosphorus Other Metals Sediment
Illinois	2006	• Nutrients • Metals (other than Mercury) • Turbidity • Organic Enrich. / Oxygen Depletion	Nitrogen Phosphorus Bacteria Metals Other Sediment	Nitrogen Phosphorus Bacteria Metals Other Sediment	Nitrogen Phosphorus Bacteria Metals Other Sediment
Louisiana	2006	• Organic Enrich. / Oxygen Depletion • Pathogens • Mercury • Salinity / TDS / Chlorides / Sulfates	Other Nitrogen Phosphorus Sediment Bacteria Metals	Other Nitrogen Phosphorus Sediment Bacteria Metals	Other

State[1]	303d Report Year[2]	Pollutant Priorities in WQ Reports[3]	Combined Project Pollutant Focus[4]	ARRA Project Pollutant Focus[5]	Non-ARRA Project Pollutant Focus[6]
Maine	2010	• Cause Unknown - Impaired Biota • Organic Enrich. / Oxygen Depletion • Nutrients • Dioxins	Phosphorus Sediment Nitrogen Bacteria Metals Other	Phosphorus Sediment Nitrogen Other Bacteria Metals	Phosphorus Sediment Nitrogen Bacteria Metals Other
Massachusetts	2006	• Pathogens • Nutrients • Noxious Aquatic Plants • Organic Enrich. / Oxygen Depletion	Bacteria Nitrogen Sediment Phosphorus Metals Other	Bacteria Sediment Phosphorus Nitrogen Metals Other	Nitrogen Bacteria Sediment Phosphorus Metals Other
Minnesota	2008	• Nutrients • Mercury • Turbidity • Cause Unknown – Impaired Biota	Nitrogen Phosphorus Sediment Bacteria Metals Other	Nitrogen Phosphorus Sediment Bacteria Metals Other	Nitrogen Phosphorus Sediment Bacteria Metals Other
Montana	2010	• Metals (other than Mercury) • Nutrients • Sediment • Temperature	Other Sediment	Other Sediment	Other
New Jersey	2008	• Pesticides • Metals (other than Mercury) • Polychlorinated Biphenyls (PCBs) • Cause Unknown	Nitrogen Phosphorus Bacteria Metals Other Sediment	Nitrogen Phosphorus Bacteria Metals Other Sediment	Nitrogen Phosphorus Bacteria Metals Other
New York	2010	• Nutrients • Polychlorinated Biphenyls (PCBs) • pH / Acidity / Caustic Conditions • Organic Enrich. / Oxygen Depletion • Pathogens	Phosphorus Nitrogen Other Bacteria Sediment Metals	Other Phosphorus Nitrogen Bacteria Sediment Metals	Phosphorus Nitrogen Bacteria Other Sediment Metals
North Carolina	2010	• Pathogens • Cause Unknown – Impaired Biota • Turbidity • Metals (other than Mercury)	Phosphorus Sediment Bacteria Other Nitrogen Metals	Phosphorus Sediment Bacteria Other Nitrogen Metals	Phosphorus Sediment Bacteria Other Metals Nitrogen

State[1]	303d Report Year[2]	Pollutant Priorities in WQ Reports[3]	Combined Project Pollutant Focus[4]	ARRA Project Pollutant Focus[5]	Non-ARRA Project Pollutant Focus[6]
Washington	2008	• Temperature • Pathogens • Organic Enrich. / Oxygen Depletion • pH / acidity / Caustic Conditions	Nitrogen Bacteria Other Phosphorus Sediment Metals	Nitrogen Bacteria Other	Nitrogen Bacteria Other Phosphorus Sediment Metals
Wyoming	2010	• Pathogens • Metals (other than Mercury) • Habitat Alterations • Sediment	Bacteria Nitrogen Phosphorus Sediment Metals Other	Bacteria Other	Bacteria Nitrogen Phosphorus Sediment Metals Other

[1]15 states with both ARRA and non-ARRA 604(b) project reviews.

[2]Year of state 303(d) list reviewed.

[3]Pollutants listed in order by states as the top four leading causes of impairment on their 303(d) lists.

[4]Pollutant focus, in order, of all state 604(b) projects.

[5]Pollutant focus, in order, of ARRA 604(b) projects only.

[6]Pollutant focus, in order, or non-ARRA 604(b) projects only.

NOTE: State water quality impairments versus ARRA project pollutant focus were reviewed after this study's pollutant focus areas were identified, so there is some variation in parameter nomenclature. For example, 303(d) listings differentiate between non-mercury metals and mercury, whereas the study includes mercury among other metals listed as a pollutant focus area. 303(d) lists also include the terms "organic enrichment/oxygen depletion (OE/OD)" a condition tied to nutrient loading; the study includes nitrogen and phosphorus as pollutant focus areas, but not OE/OD.