

May 2012

NONPOINT SOURCE WATER POLLUTION

Greater Oversight and Additional Data Needed for Key EPA Water Program



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Why GAO Did This Study

Pollution from nonpoint sources—such as runoff from farms or construction sites—remains the leading cause of impairment to the nation's waters. Under section 319 of the Clean Water Act, each year EPA provides grants to states to implement programs and fund projects that address nonpoint source pollution; the program received \$165 million in fiscal year 2012. Section 319 includes minimum conditions that states must meet to receive grants. By regulation, EPA's 10 regional offices oversee state programs and are to ensure that states' projects can be feasibly implemented. USDA also has programs to protect water resources.

GAO examined (1) states' experiences in funding projects that address nonpoint source pollution, (2) the extent to which EPA oversees the section 319 program and measures its effectiveness, and (3) the extent to which key agricultural programs complement EPA efforts to control such pollution. GAO surveyed project managers, reviewed information from EPA's 10 regional offices on oversight of state programs, and analyzed USDA data.

What GAO Recommends

GAO recommends, among other things, that EPA provide section 319 oversight guidance to its regional offices and that USDA analyze data to determine if measures were taken to mitigate water quality impacts in section 319 project areas. EPA agreed with the recommendations, while USDA was silent on them. Both agencies commented on specific findings, which are addressed within the report.

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What GAO Found

Under section 319 of the Clean Water Act, state-selected projects to reduce nonpoint source pollution have helped restore more than 350 impaired water bodies since 2000, but other projects have encountered significant challenges. According to GAO survey results, 28 percent of projects did not achieve all objectives originally identified in the project proposal (e.g., implementing the desired number of pollution reduction practices), while many that did so still faced considerable challenges. About half such challenges were beyond staff control (e.g., bad weather or staff turnover), but the other half were challenges that generally could have been identified and mitigated before projects were proposed and selected for funding, such as gaining access to desired properties. In one state, for example, \$285,000 in section 319 funds was to subsidize the cost to homeowners of repairing damaged septic systems. Once the grant was awarded, however, one homeowner signed up to participate.

The Environmental Protection Agency's (EPA) oversight and measures of effectiveness of states' programs have not consistently ensured the selection of projects likely to yield measurable water quality outcomes. EPA's 10 regional offices varied widely in their review of states' work plans, which describe projects states plan to undertake in the upcoming year, and project selection criteria, which identify eligibility parameters for receiving section 319 funds. For example, three regional offices reported reviewing annual work plans in depth and actively influencing the types of projects selected, while three others reported limited to no involvement in such reviews, instead deferring to states' judgment on project feasibility and selection. EPA, however, has not provided its 10 regions with guidance on how to oversee the state programs. Also, EPA's primary measures of program effectiveness may not fully demonstrate program achievements. Section 319 requires states to report to EPA on two measures, including reductions in key pollutants. It does not limit EPA to these two measures, but the agency has chosen to use them as barometers of success for the section 319 program. States can demonstrate their achievements in additional ways—ways that may provide a more accurate picture of the overall health of targeted water bodies, such as the number and kind of living organisms in the water.

USDA's Environmental Quality Incentives Program is the key agricultural conservation program that can complement EPA efforts to reduce nonpoint source pollution, and its conservation practices have significantly reduced pollutants coming from agricultural land across the country. Notwithstanding its achievements, certain conservation practices can adversely affect water quality if not properly implemented—for example, by transporting polluted runoff from nutrient-laden fields into nearby water bodies. The agency's Natural Resources Conservation Service (NRCS) has procedures in place intended to ensure that its practices do not inadvertently harm water quality. During its field work, GAO identified a few instances where these procedures may not have been followed (including in watersheds where EPA's section 319 funds had been used), and therefore sought NRCS data to determine if they were isolated instances or indicative of a more prevalent issue. NRCS' national level data, however, are not sufficiently detailed to identify whether appropriate measures are always in place to mitigate potential water quality impacts. According to NRCS, such data are instead located in its field offices and are not analyzed by the agency.

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Abbreviations

CRP	Conservation Reserve Program
CREP	Conservation Reserve Enhancement Program
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
NRCS	Natural Resources Conservation Service
TMDL	Total Maximum Daily Load
USDA	U.S. Department of Agriculture

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Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, DC 20548

May 31, 2012

The Honorable Timothy Bishop
Ranking Member
Subcommittee on Water Resources and Environment
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Eddie Bernice Johnson
House of Representatives

Forty years after the 1972 Clean Water Act recognized the problem of water pollution from diffuse, or nonpoint, sources—such as runoff from farms or construction sites—nonpoint source pollution remains the leading cause of impairment of the nation’s waters. The Environmental Protection Agency (EPA) reports that more than 33,000 water bodies nationwide are impaired primarily by such pollution; that is, they do not meet water quality standards to provide for, among other things, propagation and protection of aquatic wildlife and human use and recreation. Runoff from nonpoint sources, including many farms, managed forests, and urban areas, often carries harmful pollutants such as fertilizers, pesticides, and sediment from fields and logging roads; metals and toxins from abandoned mines; and oils from roads and highways. Nonpoint source pollution may also alter natural water flow patterns, water temperatures, and ecosystems in rivers, streams, lakes, estuaries, and oceans, to the detriment of aquatic life.

Recognizing such issues, Congress in 1987 amended the Clean Water Act, adding section 319 to explicitly address nonpoint source pollution through a cooperative, grant-based program with states, which fund projects to reduce nonpoint source pollution and restore impaired water bodies. Section 319 authorizes EPA to award federal funds to states to implement nonpoint source management programs. Since fiscal year 2000, section 319 funding has averaged about \$200 million annually for projects designed to reduce nonpoint source water pollution.¹ Guidelines issued by EPA in 2003 for implementing section 319 draw particular attention to the potential benefits of working closely with the U.S.

¹In fiscal year 2012, the section 319 program received \$165 million.

Department of Agriculture (USDA), which administers agricultural conservation programs—a source of federal funding that can complement EPA's water quality improvement efforts. USDA's conservation programs provide billions of dollars in assistance to farmers. In particular, through its Environmental Quality Incentives Program, which is implemented by the Natural Resources Conservation Service (NRCS), USDA develops contracts with agricultural producers to implement conservation practices on working agricultural land to, for example, reduce soil erosion and nonpoint source water pollution.

In 1990, when we last reported on EPA's section 319 program,² we found that inherent conflicts existed between some federal agencies' policies and states' water quality goals. Pollution trends since that time suggest that such inherent conflicts and their downstream consequences remain today. In 2011, the National Oceanic and Atmospheric Administration reported that the “dead zone” at the mouth of the Mississippi River—an area in the Gulf of Mexico where low oxygen levels can stress or kill resident organisms—was nearly 7,000 square miles, about the size of the state of New Jersey. In 2009, the U.S. Geological Survey reported that nine states in the Mississippi River basin contribute over 70 percent of the nitrogen and phosphorus that lead to such dead zones, largely through fertilizers for corn, whose production is supported by USDA's commodity programs.

Concerns have been raised by federal and state agencies, scientists, and nongovernmental organizations about the persistence and severity of nonpoint source pollution. In this context, you asked us to review the effectiveness of EPA's section 319 program in addressing nonpoint source pollution of the nation's waters. Accordingly, our objectives were to examine (1) states' experiences in funding projects that effectively address nonpoint source pollution problems, (2) the extent to which EPA oversees the section 319 program and measures program effectiveness in reducing the adverse impacts of nonpoint source pollution on water quality, and (3) the extent to which key agricultural conservation programs complement EPA's efforts to reduce nonpoint source pollution.

²GAO, *Water Pollution: Greater EPA Leadership Needed to Reduce Nonpoint Source Pollution*, [GAO/RCED-91-10](#) (Washington, D.C.: Oct. 15, 1990).

To conduct this work, we reviewed relevant laws, regulations, and agency research and guidelines. We visited 8 states, in four EPA regions, which we chose on the basis of their varied types of nonpoint source pollution and proximity to some of the nation's premier watersheds, such as the Chesapeake Bay, Great Lakes, and Mississippi River.³

- To address the first objective, we surveyed a random sample of 524 managers of projects that have been implemented with section 319 funds to obtain information on the factors influencing project selection, implementation, and effectiveness on the ground. Our response rate was 57 percent. Survey results are generalizable to the 1,273 projects that were completed from January 1, 2004, through June 9, 2011; that expended section 319 funds; and that involved direct implementation of conservation practices or remediation techniques. We also examined nearly 2,000 summaries of completed projects in EPA's Grants Reporting and Tracking System database, including those that provided funds for projects conducted under USDA conservation programs, such as the Conservation Reserve Program and the Conservation Reserve Enhancement Program.⁴ Further, we obtained information from nonpoint source program officials in all 50 states, including information on states' project selection criteria, types of organizations that have received funding, and program oversight practices.⁵
- To address the second objective, we obtained from EPA's 10 regional offices information on the nature and extent of their oversight of state nonpoint source management programs, including the extent to which they examine states' project selection processes, annual plans, program objectives, and the criteria they use to annually award funds.

³We visited Arkansas, Louisiana, Maryland, Michigan, Ohio, Pennsylvania, Washington, and West Virginia.

⁴EPA's Grants Reporting and Tracking System is a database of section 319-funded projects awarded by states; the database does not include information on most section 319 projects awarded by Indian tribes. To assess the reliability of this database, we performed electronic data testing for missing data, outliers, and obvious errors. In addition, we reviewed internal controls for the database, interviewed knowledgeable agency officials, and compared summary information from the database with published reports. On the basis of this assessment, we determined that EPA's Grants Reporting and Tracking System data were sufficiently reliable for our purposes.

⁵To obtain this information, we sent a data collection instrument to nonpoint source program coordinators in all 50 states and obtained responses from all states.

In addition, we examined section 319's statutorily required reporting requirements—which EPA uses as national measures of program effectiveness—and collected information from state and local staff about whether EPA's national measures accurately reflect the water quality improvements from nonpoint source pollution control projects.

- To address the third objective, we analyzed data on conservation practices, funded under USDA's Environmental Quality Incentives Program, that have been implemented in watersheds where states have funded section 319 projects.⁶ We focused on the Environmental Quality Incentives Program in this report because improving water quality is among its specific purposes, and EPA guidelines encourage states to seek opportunities to leverage resources with this program. We reviewed USDA reports on the effectiveness of conservation practices, and we also interviewed USDA officials familiar with the program. Appendix I describes our scope and methodology in more detail.

We conducted this performance audit from December 2010 through May 2012, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Land use substantially affects the type and extent of nonpoint source pollution of water bodies. For example, soil erodes naturally from undisturbed land, but the amount of erosion can increase manyfold when trees are cut or the land is farmed. In addition, when land is used for housing or urban development, erosion from land clearing and excavation during construction can increase tremendously. Moreover, land use activities can also produce toxic pollution. For example, pesticide use in

⁶We obtained these data from the Program Contracts System, known as ProTracts, which is used to manage Natural Resources Conservation Service conservation program applications, cost-share contracts, and program fund management. To assess the reliability of these data, we performed electronic data testing for missing data, outliers, and obvious errors. In addition, we interviewed knowledgeable agency officials. On the basis of this assessment, we determined that ProTracts data were sufficiently reliable for our purposes.

farming has resulted in toxic runoff, and mining has produced leaching of heavy metals and acid mine drainage.⁷

Nonpoint source pollution can have long-lasting impacts. For instance, a heavy rain can wash tons of soil from a field, and the material can either scour a streambed or settle out and cover gravel that fish spawn in. Long after the water itself clears, populations of fish and other aquatic life may still not have recovered. Similarly, when trees and bushes are cut next to stream banks, debris falling into the stream or washing into the water may initially degrade the water, but a longer-term problem may be caused by persistent elevated water temperatures resulting from the removal of shade. In time, altered water temperatures can make the stream a less sustainable habitat for fish and other animals or may make it totally uninhabitable.

Clean Water Act's Approach to Addressing Nonpoint Source Pollution

For nearly 40 years, the Clean Water Act has played a critical role in reducing water pollution and improving the health of the nation's waters, including rivers, lakes, and streams.⁸ The purpose of the law is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Passed by Congress in 1972, the act marked a shift in clean water policy, establishing a significant federal role in controlling point sources of water pollution. Through the 1980s, EPA issued a series of reports, including a key 1984 report to Congress, finding that in the decade following passage of the act, control of point sources had resulted in significant achievements toward water quality goals but that these point source reductions had illuminated the nonpoint source contribution to water quality problems.⁹ For example, at that time, a majority of EPA regions identified nonpoint sources as the principal remaining cause of water quality problems.

⁷EPA groups the primary types of nonpoint source pollution into seven categories—agriculture, urban and stormwater runoff, hydromodification (e.g., altering water patterns by straightening streams or building dams), resource extraction, silviculture (e.g., timber harvesting), construction, and land disposal—of which the first three have been identified by the agency as the greatest contributors to nonpoint source pollution.

⁸For consistency, we refer to the statute and its amendments as the Clean Water Act throughout this report.

⁹Environmental Protection Agency, *Report to Congress: Nonpoint Source Pollution in the U.S.*, NEPIS 841R84100 (Washington, D.C.: 1984).

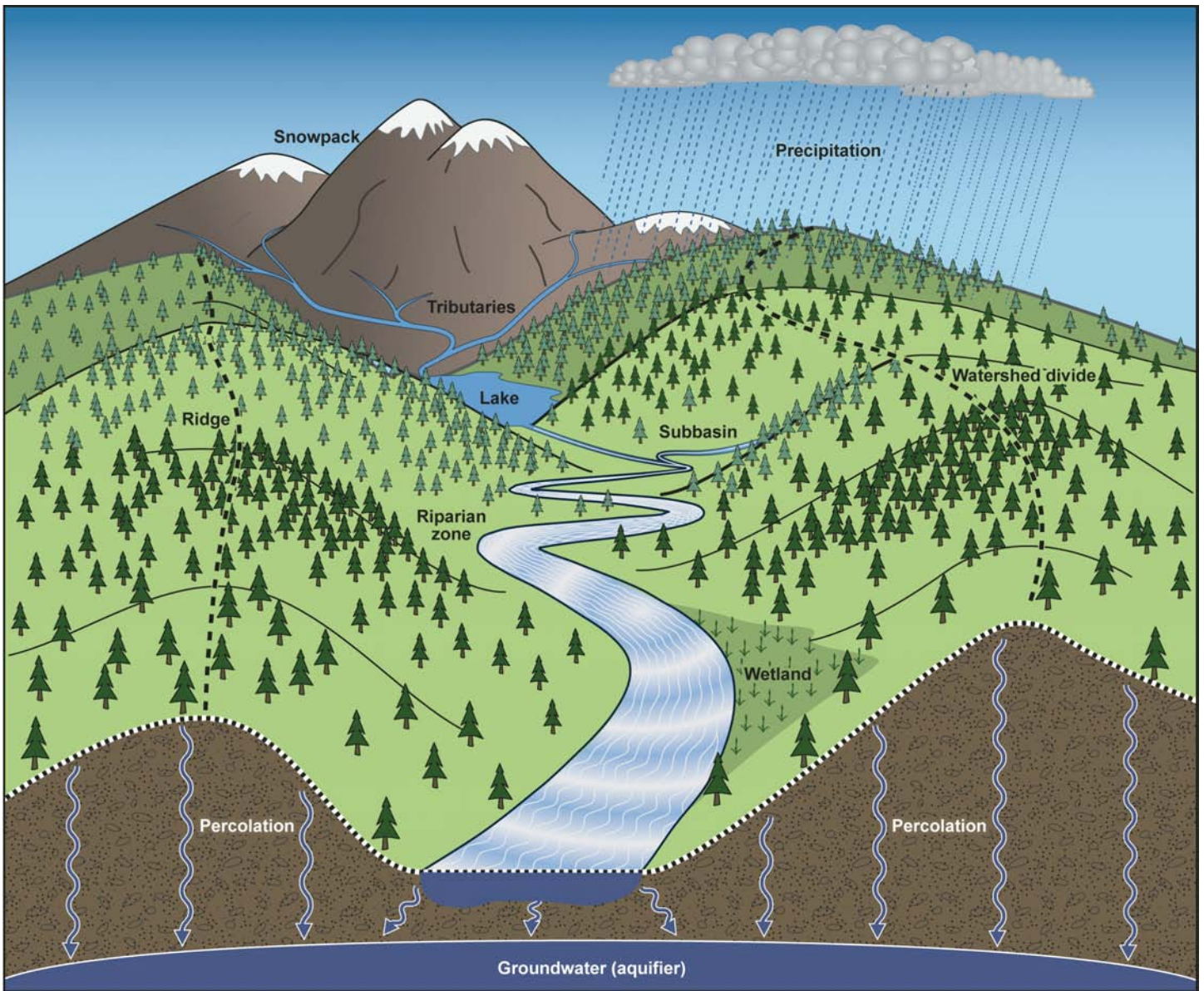
In 1987, Congress amended the Clean Water Act, adding section 319 and creating the nonpoint source management program. Section 319 provides for annual grants to be administered by EPA and incentives for states to develop and implement nonpoint source management programs. Section 319 includes various minimum conditions that states must meet to receive grants, including the development of nonpoint source management programs—which EPA must approve—and annual reports on states’ progress in achieving the goals of their management programs. States must also obtain a determination from EPA that they made “satisfactory progress” in meeting their goals from the prior year. For its part, EPA has discretion by statute to add terms and conditions to grants; to require additional information on applications; and to request additional information, data, and reports it considers necessary to determine continuing state eligibility for grants.¹⁰

¹⁰33 U.S.C. §1329(h)(1), (2), (10).

EPA Guidance to States in Developing Their Section 319 Programs

The 1987 amendments to the Clean Water Act created the nonpoint source program, but EPA did not receive an appropriation to implement the program until fiscal year 1990. In the early 1990s, EPA focused on developing technical support for states' use in developing and implementing their programs. During these initial stages, some states and EPA regions focused their nonpoint source programs narrowly on demonstrations of particular pollution control technologies. In response to EPA program guidelines issued in 1996, states upgraded their programs, and in so doing, several states incorporated watershed-based approaches as a significant and sometimes central organizing theme. These states focused their pollution reduction efforts in specific watersheds—areas of land through which all the rainfall and streams flow downhill toward a main river channel (see fig. 1). According to EPA documents, state nonpoint source programs that adopted this approach improved their capacity to solve nonpoint source pollution problems.

Figure 1: A Watershed



Sources: GAO and EPA.

In the early 2000s, EPA encouraged states to sharpen the focus of their nonpoint source management programs toward impaired water bodies. Specifically, EPA and the states determined they needed to target their efforts to reduce nonpoint source pollution within defined geographic

areas representing the most severe water quality problems. According to EPA documents, the two key steps states need to solve nonpoint source problems at the watershed level are the development of a watershed-based plan that addresses water quality needs within a watershed and the actual implementation of the plan.

In 2003, EPA issued *Federal Register* guidelines for the section 319 program, which remain in use today.¹¹ These guidelines followed a substantial increase in appropriated funds. Key features of the guidelines include the following:

- The guidelines direct states to use about half their section 319 grants to develop and implement watershed-based plans for impaired watersheds. Beyond targeting funds to geographic areas in need of restoration, the guidelines also allow states to fund activities that generally support section 319 goals, such as technical assistance, staffing, projects that demonstrate innovative approaches to pollution reduction, and education programs that promote awareness and changes in behavior.
- EPA's 10 regional offices, which provide oversight of the section 319 program, are to place special emphasis on reviewing states' progress in developing and implementing watershed-based plans according to the guidelines. Regional offices are to review and discuss with states the projects states select for section 319 funding to ensure the plans' effective implementation. It is through this review process that regional offices have the opportunity to influence the types of projects states select if they believe that the projects selected by a state are not adequate to effectively reduce nonpoint source pollution.¹²
- States are encouraged to leverage section 319 funds with projects from other federal programs that have water quality objectives,

¹¹68 Fed. Reg. 60,653 (Oct. 23, 2003).

¹²By regulation, EPA regional administrators can deny the award of section 319 funds to states in instances where a work plan does not briefly describe each significant category of nonpoint source activity and commitments to be produced for each category, among other things.

including USDA's Environmental Quality Incentives Program (EQIP).¹³ This program is designed to fund conservation practices on working agricultural land to achieve national priorities, including reducing soil erosion and nonpoint source water pollution. The guidelines state that section 319 funding is especially suitable for supporting activities that either are ineligible for or typically do not receive significant USDA funding, including developing watershed-based plans in impaired watersheds, monitoring water quality, and funding staff to work with local communities to help assist and promote the development and implementation of watershed-based plans.

Under EPA's section 319 program, states retain the primary role for addressing nonpoint source water pollution. EPA's 10 regional offices annually distribute program funds to the states using a formula that is weighted heavily toward state population and the number of acres in agricultural crop production. States develop their own project selection processes and the criteria that their nonpoint source management programs will consider when determining what projects to fund. Annually, each state submits its list of selected projects to the EPA regional office for incorporation into the state's work plan, which describes what projects will be funded through section 319. Organizations that apply for section 319 funds—often including conservation districts, local governments, and nonprofit organizations—submit project proposals to states' nonpoint source management programs and, if selected, are responsible for implementing their proposed nonpoint source pollution projects under an agreement with the state. Section 319 is a nonregulatory program, and many states therefore rely primarily on voluntary approaches to address nonpoint source pollution.¹⁴ The programs' nonregulatory status, combined with private ownership of much of the nation's land, means that securing voluntary landowner participation is a key aspect of nonpoint

¹³EPA's guidelines encourage states to select projects that complement USDA's conservation program efforts because the regulations for these programs assigned a priority to reducing nonpoint source pollution in impaired watersheds. In fiscal year 2012, USDA implemented a National Water Quality Initiative in which state conservationists reserved about \$33 million in EQIP funds to help producers implement conservation practices to protect water quality in impaired or threatened watersheds.

¹⁴State nonpoint source programs may also implement regulatory activities rooted in state authority. States may use section 319 funds to support such regulatory efforts, but section 319 does not provide regulatory authority to EPA or to states with respect to the control of nonpoint source pollution.

source pollution control and, according to EPA, can introduce significant uncertainty in how and when projects are implemented.

States Have Funded Many Successful Projects but Also Some That Encountered Preventable Challenges

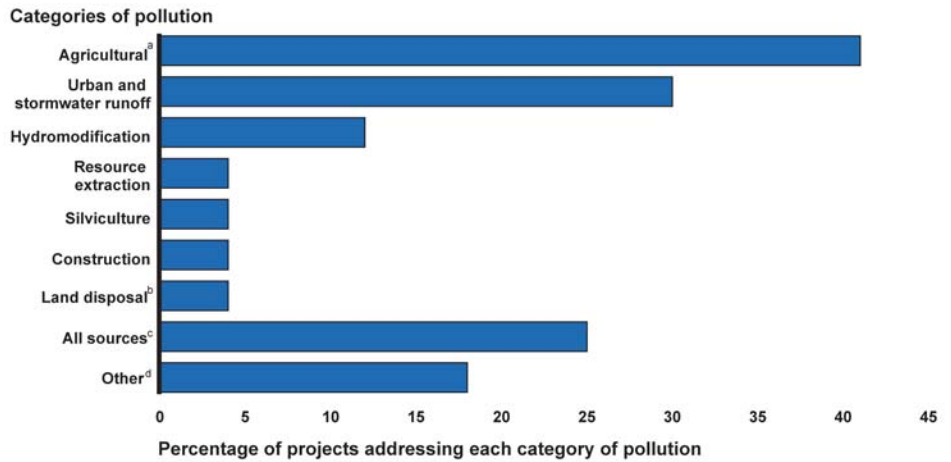
Under EPA's section 319 program, states have funded many projects that have helped successfully address nonpoint source pollution and restore and protect water bodies across the country, but states have also funded projects that have encountered significant challenges—including many that could have been prevented. This section discusses (1) the types of projects states have selected to address various categories of nonpoint source pollution, (2) the successes some section 319-funded projects have achieved in restoring impaired water bodies, and (3) projects states have funded that encountered preventable challenges.

States Have Funded Projects Addressing Varied Categories of Nonpoint Source Pollution

States' nonpoint management programs have used their annual section 319 grants from EPA to fund projects that address different categories of nonpoint source pollution. The scope of individual section 319 projects varies considerably; common activities include direct implementation of conservation practices, education and outreach efforts, water quality monitoring, and funding of state nonpoint source management program staff.

According to data from EPA's Grants Reporting and Tracking System, from fiscal year 2004 through fiscal year 2010, states awarded more than \$1.2 billion in section 319 funds to more than 5,800 projects. Projects have been funded in all 50 states and by many tribes and have been targeted to seven different categories of nonpoint source pollution, mainly agricultural, urban and stormwater runoff, and hydromodification (see fig. 2).

Figure 2: Percentage of Section 319-Funded Projects Addressing Different Categories of Nonpoint Source Pollution, Fiscal Years 2004–2010



Source: GAO analysis of EPA data.

Notes: Because many projects were listed in EPA’s Grants Reporting and Tracking System as addressing multiple categories of pollution, the cumulative percentage of projects in the figure totals more than 100 percent. Also, some projects included in the tracking system did not identify the categories of pollution they were meant to address. The percentages displayed in the figure (and discussed in the report) are based only on projects whose categories of nonpoint source pollution were identified.

^aThe “agricultural” category includes projects listed in the database as addressing, at least in part, pollution from either agriculture or animal-feeding operations.

^bThe “land disposal” category includes projects listed in the database as addressing pollution from “land disposal/storage/treatment.”

^cThe “all sources” category is used for projects that address all categories of nonpoint source pollution.

^dThe “other” category includes projects identified in the database as addressing pollution from any of the following categories: other nonpoint source pollution, historical pollutants, marinas and recreational boating, or turf management.

States funded section 319 projects that supported a mix of direct and indirect approaches to help restore, protect, or prevent further degradation of water quality.¹⁵ *Direct* approaches generally involved projects implementing conservation practices or other corrective actions to directly reduce or eliminate pollutants entering a water body. Common

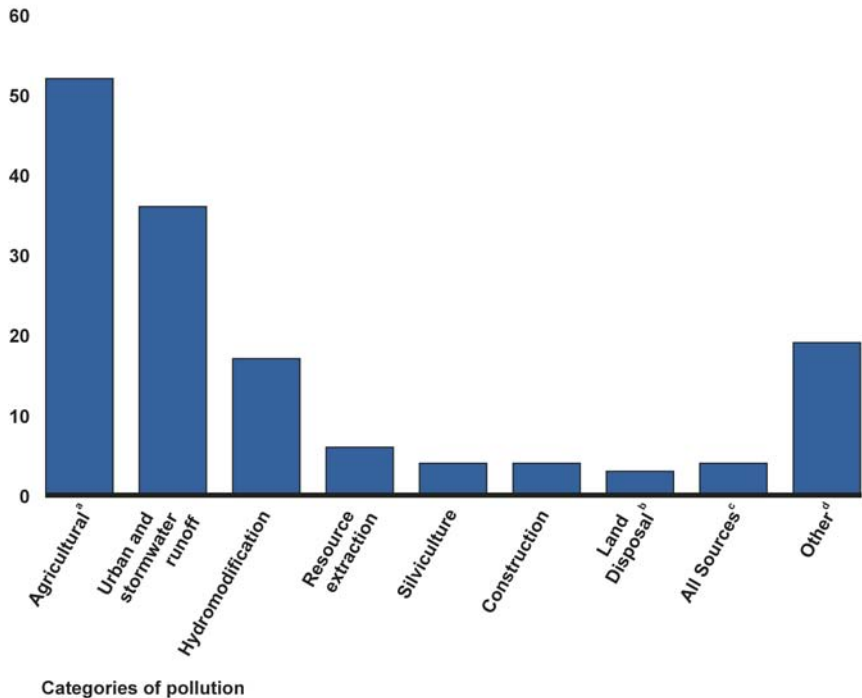
¹⁵We characterized projects as supporting either direct or indirect approaches by analyzing EPA data on the functional categories of activities listed for section 319-funded projects.

direct approaches included, but were not limited to, agricultural conservation practices, such as the installation of fences to exclude cattle from shorelines or stream banks; erosion control projects; and stormwater discharge projects such as the installation of surfaces in parking lots that absorb rainfall rather than allow it to run off into urban streams. *Indirect* approaches typically involved activities to help build state and local capacity to address nonpoint source pollution, raise public awareness, and assess water quality in particular places of concern and commonly involved methods such as education and outreach, watershed planning, and staffing.

According to our analysis of EPA data, approximately 45 percent of projects that states funded in fiscal years 2004 through 2010 under section 319 involved direct approaches and were designed primarily to implement activities to directly restore, protect, or prevent further degradation of water quality. The categories of pollution that were the most common focus of direct restoration approaches—such as implementing agricultural conservation practices, stabilizing stream banks, or restoring a stream’s natural channel configuration—include agricultural pollution and pollution resulting from urban and stormwater runoff (see fig. 3).

Figure 3: Percentage of Section 319-Funded Projects Addressing Different Categories of Pollution That Were Designed Primarily to Implement Direct Pollution Reduction Approaches, Fiscal Years 2004–2010

Percentage of projects addressing each category of pollution



Source: GAO analysis of EPA data.

Notes: The percentages displayed in the figure are based on projects that listed a direct approach to restoring, protecting, or preventing further degradation of water quality as their primary functional category of activity and listed the categories of nonpoint source pollution they were designed to address. Because many projects were listed in EPA's Grants Reporting and Tracking System as addressing multiple categories of pollution, the cumulative percentage of projects in the figure totals more than 100 percent.

^aThe "agricultural" category includes projects listed in the database as addressing, at least in part, pollution from either agriculture or animal-feeding operations.

^bThe "land disposal" category includes projects listed in the database as addressing pollution from "land disposal/storage/treatment."

^cThe "all sources" category is used for projects that address all categories of nonpoint source pollution.

^dThe "other" category includes projects identified in the database as addressing pollution from any of the following categories: other nonpoint source pollution, historical pollutants, marinas and recreational boating, or turf management.

According to our analysis of EPA data, approximately 55 percent of projects that states funded in fiscal years 2004 through 2010 under section 319 were designed primarily to implement activities that indirectly

help restore, protect, or prevent further degradation of water quality.¹⁶ We classified such projects into the following six broad groups based on the type of indirect activities they were primarily designed to support (see fig. 4):¹⁷

- *Planning activities* include the development of various planning documents designed to help identify and address nonpoint source pollution, such as watershed-based plans and total maximum daily loads (TMDL) for pollutants.¹⁸
- *Education activities* include statewide and local education and information projects, such as educating local officials about the causes and effects of nonpoint source pollution or developing nonpoint source-related educational curriculums for use in schools.
- *Water quality monitoring and assessment* activities include biological monitoring and assessments to determine water body health and monitoring the effectiveness of conservation practices.

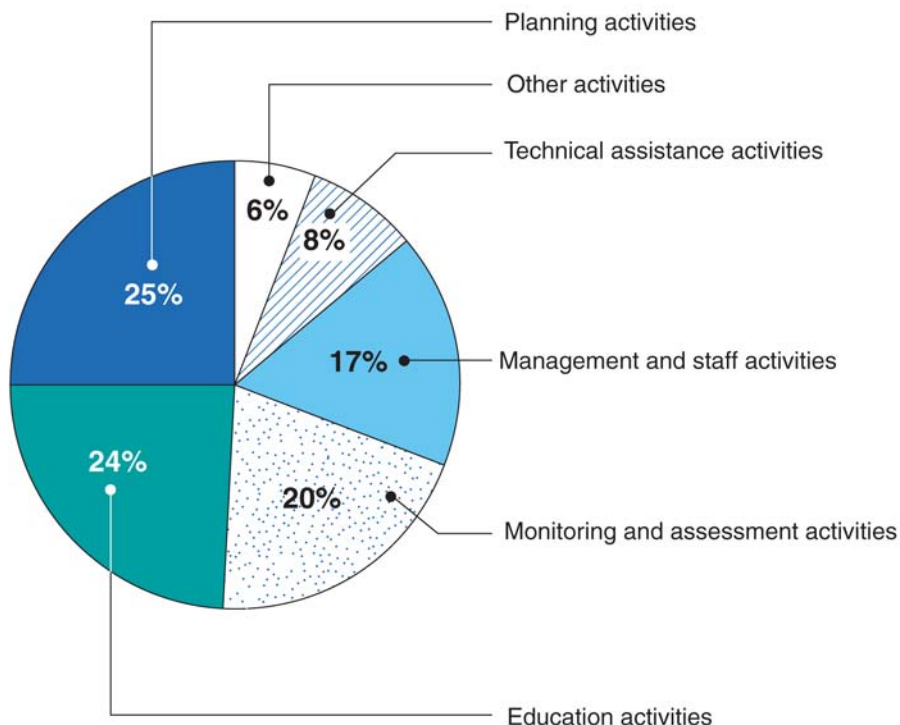
¹⁶Although the distinction between direct and indirect approaches is helpful for understanding the primary purposes of different projects, it is important to note that some section 319-funded projects supported elements of both approaches. In addition to listing a primary functional category of activity, some projects also listed secondary functional categories in EPA's Grants Reporting and Tracking System. For example, a project may have been designed primarily to install conservation practices (an example of a direct activity), but a secondary goal of the project may have involved conducting water quality monitoring (an example of an indirect activity). The data presented here are based exclusively on the primary functional category of activity listed for each project in EPA's Grants Reporting and Tracking System.

¹⁷We developed these groups largely on the basis of how EPA categorizes different indirect activities, although they also reflect modifications based on the results of our analysis.

¹⁸TMDL is a calculation of the maximum amount of a pollutant that a body of water can receive and still meet water quality standards. States can use up to 20 percent of section 319 funds to develop nonpoint source TMDLs, watershed-based plans to implement the nonpoint source TMDLs, and watershed-based plans in the absence of or before completing development of TMDLs for waters listed as impaired under section 303(d) of the Clean Water Act, among other things. The relevant EPA region can authorize a state to use over 20 percent of the incremental funding to develop watershed-based plans in section 303(d)-listed waters, but the region is to ensure that a proper balance exists between funding the development of watershed-based plans and the implementation of watershed-based plans.

- *Management and staff activities* include funding the administrative and personnel costs associated with state nonpoint source management programs, as well as supporting other program management efforts, such as funding watershed coordinators at the local level.
- *Technical assistance activities* include activities such as engineering assistance related to implementing conservation practices provided to state or local entities.
- *Other activities* include a variety of regulatory and enforcement activities, as well as activities related to groundwater and soil analyses.

Figure 4: Focus of Projects Funded under Section 319 Designed Primarily to Implement Indirect Pollution Reduction Approaches, Fiscal Years 2004-2010



Source: GAO analysis of EPA data.

Note: The percentages displayed in the figure are based only on projects that listed an indirect approach to restoring, protecting, or preventing further degradation of water quality as their primary purpose.

States Have Used Section 319 Funds to Achieve Water Quality Benefits and Restore Hundreds of Impaired Water Bodies

States have used section 319 funds to improve the condition of water bodies impaired by nonpoint source pollution. EPA reported that as of December 2011, restoration efforts supported by section 319 funds had helped 49 states partially or fully restore 356 water bodies that were listed under section 303(d) of the Clean Water Act as impaired by nonpoint source pollution.¹⁹ In addition, many other section 319-funded projects continue to restore portions of water bodies and may help them attain their water quality standards or designated aquatic uses in the near future. According to our survey results, project managers for 72 percent of the projects reported that their projects accomplished all objectives originally identified in the project proposal.²⁰ In addition, water quality improvements resulting from section 319-funded projects have been demonstrated across a variety of categories of nonpoint source pollution. For example:

- *Agricultural runoff.* Since 2007, Pennsylvania has awarded more than \$700,000 in section 319 funds to three projects to help implement the Hungry Run Watershed Implementation Plan. Two of these projects focus on installing suites of complementary agricultural conservation practices on farms located in the watershed, such as stream bank fencing, riparian buffers (undisturbed or planted areas along stream banks), and cover crops to address agricultural runoff. State and local officials we spoke with said that water quality monitoring data suggest that as a result of these efforts, Hungry Run may be removed from Pennsylvania's list of impaired waters in the future if its water quality continues to improve as a result of the department's efforts. These projects also illustrate the value of putting multiple conservation practices in place at the same location to increase the overall

¹⁹In instances where a water body has multiple segments listed by the state as impaired, each fully or partially restored segment is counted separately within the total number of restored water bodies reported by EPA. The number of partially or fully restored water bodies is based on those that had been listed as impaired during the 1998-2000 listing cycle or in subsequent years. EPA considers a water body that has been included on the Clean Water Act section 303(d) list of impaired water bodies to be "fully restored" once the water body meets all water quality standards or designated uses. "Partially restored" water bodies are those that, as a result of restoration efforts, meet some, but not all, of their initially impaired water quality standards or designated uses.

²⁰We surveyed a random sample of managers of projects receiving section 319 funding that were completed from January 1, 2004, through June 9, 2011. The response rate was 57 percent. The 95 percent confidence interval for the 72 percent of projects is 67-78 percent and denoted (67, 78). For more detail on survey methodology, see appendix I. The full results of this survey are available at [GAO-12-377SP](#).

effectiveness of water quality restoration efforts, according to the project manager.

- *Urban and stormwater runoff:* In Michigan, urban development and its associated runoff led to the impairment of Malletts Creek, a tributary to the Huron River. To help address this impairment, the Michigan Department of Environmental Quality has allocated more than \$230,000 in section 319 funds to a project designed to implement stormwater conservation practices at a local library containing a portion of the creek on its property. Practices implemented under this project included a vegetated green roof on the library to absorb rainwater, as well as basins filled with native vegetation to help slow the flow of water from the library's parking lot into the creek. Water quality testing showed that the project's conservation practices reduced the pollutants in stormwater leaving the site, including a greater than 40 percent reduction in copper, lead, oil, and grease, along with a 66 percent reduction in zinc.²¹
- *Hydromodification:* In Washington state, the natural flow of Jimmycomelately Creek was altered in the past to facilitate farming and the construction of roads and buildings. One effect of this alteration was a significant decline in chum salmon in the creek during the 1990s. Using approximately \$300,000 in section 319 funds awarded to the Jamestown S'Klallam Tribe, along with several million dollars from other federal, state, and local sources, the effort to restore Jimmycomelately Creek involved removing roads and buildings, altering the creek channel, and planting native vegetation. A tribal official involved with this project told us that the section 319 funding helped the restoration effort include an additional tributary of the creek. The creek is still listed as impaired on Washington state's 303(d) list, but the tribe reported that more than 4,000 summer chum salmon returned to the stream to spawn in 2010 (up from 7 fish in 1999). The tribal official told us that this biological indicator is an important sign that the project was successful at reducing pollution and restoring water quality in the creek.

²¹According to the Michigan Department of Environmental Quality's Nonpoint Source Unit Chief, this project served as a demonstration for the rest of the community of effective low-impact development practices, and other local government buildings and businesses in the area have subsequently implemented similar practices, at least in part because of this project's success.

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- *Resource extraction:* In West Virginia, the Department of Environmental Protection has used more than \$625,000 in section 319 funds to install treatment systems that remove metals and neutralize acidic water draining from abandoned coal mines in the Lambert Run watershed. The acidic water drains from the mines into Lambert Run, a stream that Department of Environmental Protection staff described as having such high concentrations of iron and aluminum that fish and other water-dwelling life had not been able to survive before the installation of the treatment systems. The treatment systems channel mine drainage into ponds, where the acidic water is neutralized through contact with limestone, and metal pollutants are removed. As of February 2011, EPA reported that the treatment systems have helped to restore approximately 2.3 miles of the original 4.4 miles of impaired stream, and additional restoration efforts focused on the water body were in progress. State officials we spoke with said that monitoring data indicate that within 3 or 4 years, the stream may be removed from the state's list of impaired water bodies.

States Have Also Funded Some Projects that Encountered Preventable Challenges

Some states have directed section 319 funding toward projects that did not achieve their objectives, and many projects that did still faced challenges. Specifically, projects that relied on voluntary participation sometimes did not achieve goals when third-party buy-in was not secured in advance. Others sometimes used indirect approaches (e.g., community outreach) that did not have a clear connection to achieving tangible water quality results. Nevertheless, in recent years some states have adopted more rigorous project selection processes to avoid these challenges.

Reliance on Voluntary Participation

According to our survey results, project managers for 28 percent of all projects that involved implementing conservation practices or pollution remediation techniques reported that their projects were unable to accomplish all objectives originally identified in the project proposal.²² These projects were generally unable to implement the desired number or type of conservation practices or to implement them in the originally

²²Estimates produced from the sample of projects are subject to sampling error. We express our confidence in the precision of our results as a 95 percent confidence interval. This interval would contain the actual population value for 95 percent of the samples we could have drawn. As a result, we are 95 percent confident that each of the confidence intervals in this report includes the true values in the study population. The 95 percent confidence interval for this estimate lies between 22 percent and 33 percent and is expressed as (22, 33).

proposed locations. Moreover, of the 72 percent of the projects that project managers reported achieved their originally proposed objectives, almost half did so only after encountering significant challenges that prevented them from finishing on schedule, staying on budget, or achieving the desired levels of pollution reduction.

Many of the challenges that project staff reported facing resulted from bad weather, staff turnover, or other factors outside their control. Nevertheless, of the 132 project managers that submitted narrative responses to our survey, 71 (54 percent) cited challenges that generally could have been identified and mitigated before projects were proposed or selected for funding. For example, project staff's inability to secure third-party buy-in, such as landowner cooperation to implement the projects as intended, was the most commonly identified challenge (49 out of 132 responses to the question, or 37 percent).²³

As a result of the challenges that project staff reported facing, managers for 29 percent²⁴ of all projects reported that their projects required grant revisions to, for example, change the type, number, or location of conservation practices to be implemented and that 39 percent²⁵ of all projects required grant extensions, with most extensions more than 6 months.²⁶ (Additional information on the factors that influenced project selection and the challenges that project staff reported some projects facing can be found in the e-supplement accompanying this report, [GAO-12-377SP](#).)

The following examples illustrate projects that project staff reported could not be implemented as planned because third-party participation was not secured in advance:

²³States often select projects proposed by organizations that rely on voluntary third-party participation for implementation. Such organizations typically include soil and water conservation districts, county health departments, and nonprofit organizations. For example, project managers we surveyed reported that 81 percent of the organizations that implemented section 319-funded projects were organizations that typically rely on voluntary participation from third parties, such as landowners, to achieve project goals. Nonprofit organizations typically rely on voluntary participation from third parties, but in some cases they own the land on which projects are to be implemented.

²⁴The 95 percent confidence interval for this estimate is (23, 34).

²⁵The 95 percent confidence interval for this estimate is (33, 44).

²⁶Some projects may have required both grant revisions and extensions.

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- A project on the Illinois River was to reduce pollution by implementing conservation practices in urban and forested areas, such as rain gardens planted with native plants, which absorb urban and stormwater runoff, and prescribed burns on forested lands.²⁷ The state of Illinois provided section 319 funds to a regional planning organization to (1) put in place 2,500 urban and stormwater management practices and (2) implement prescribed burns on 1,000 forest acres. The organization, however, did not implement the project as proposed because, after receiving funding, it was unable to compel landowners to implement the practices on private property; the organization had not secured the landowners' consent before applying for the funding. As a result, of the intended 2,500 urban stormwater practices, 11 were ultimately implemented, and forest conservation measures were implemented on 282 of the intended 1,000 acres because prescribed burns could not be done.
 - In West Virginia, Department of Environmental Protection officials selected a project that was to subsidize the cost to homeowners of pumping and replacing damaged septic systems in rural areas, among other practices. The department awarded a nonprofit organization nearly \$450,000 to implement the project, of which \$285,000 was for the septic system component. A departmental official explained that the project was designed to be a 5-year project—3 years for implementation and 2 years for monitoring. In 2011, the project was in its third year of implementation, but as of November 2011, even though there was no cost to homeowners for the project, a single homeowner had signed up to have a septic system replaced. A representative from the nonprofit organization said that when the project was proposed, project staff had not verified whether landowners in the project area would participate. Upon receiving section 319 funds, the representative told us that the project did not receive much interest from the community and that her organization may have to return unspent funds to the Department of Environmental Protection to be reallocated to another project.
 - In Arizona, Department of Environmental Quality officials selected a project that aimed to install hundreds of native willows in two areas on the shore of a lake impaired by high levels of nitrogen and

²⁷Prescribed burns were chosen to remove excessive invasive shrubs and trees, which would then allow the growth of desired native vegetation for erosion control.

phosphorus. The department awarded section 319 funds to a nonprofit organization to plant the willows, whose root systems would absorb polluted runoff and thus help prevent nutrients from entering the lake. The project manager reported that after section 319 funds were received, project staff advertised the project to community members and reached out to landowners near the lake. Some landowners, however, were unwilling to have the nonprofit organization plant willows on their properties, according to the project manager's report. Some willow trees were ultimately planted in one of the two areas, but the report concluded that the project's water quality goals were not achieved and that no measurable reduction in pollutants came from the planting.

Securing voluntary third-party cooperation ahead of time is particularly important with agricultural projects, whose success largely depends on the implementation of a suite of complementary conservation practices. Agricultural projects by their nature can be particularly challenging for securing third-party participation to implement them in ways that effectively reduce nonpoint source pollution.²⁸ According to EPA officials and USDA research,²⁹ agricultural projects address nonpoint source pollution best when conservation practices are implemented as part of a suite of complementary practices. When landowners choose to implement conservation practices without all of the proper companion practices, however, assurance may be reduced that the practices will result in the

²⁸Our survey results indicate that projects addressing agricultural runoff are more challenging than those addressing other forms of nonpoint source pollution: 86 percent of projects implemented in impaired watersheds that did not accomplish all their objectives were aimed at addressing agricultural runoff, whereas 14 percent of projects that did not accomplish their objectives addressed other forms of nonpoint source pollution. The 95 percent confidence intervals for these estimates are (74, 93) and (7, 26), respectively.

²⁹In June 2010, NRCS reported that conservation practices may sometimes be inadequate to address soil and water conservation when installed in isolation, and instead, suites of complementary practices should be used where possible to better ensure protection of both soil and water resources. Department of Agriculture, Natural Resources Conservation Service, *Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Upper Mississippi River Basin, Draft* (Washington, D.C.: June 2010).

intended water quality benefits, according to state environmental protection officials we spoke with.³⁰

The need for complementary conservation practices to protect water quality is often evident on lands where livestock graze. On such land, for example, installing livestock exclusion fencing in isolation does not always ensure that the negative water quality effects of grazing will be significantly reduced unless additional practices are put in place.³¹ Livestock exclusion fencing is largely ineffective without riparian buffers, which help prevent stream bank erosion and absorb nutrients from manure, according to the nonpoint source coordinator for West Virginia's Department of Environmental Protection. When riparian buffers are absent, livestock still congregate near stream banks, altering stream ecosystems and allowing sediment and manure to enter the water.

Pennsylvania's Department of Environmental Protection funded a project that demonstrated the success of enlisting landowner cooperation to install a suite of complementary practices to protect water quality on land where livestock graze. For example, the department awarded \$1.2 million in section 319 funds to a project in Mifflin County, Pennsylvania, in which a conservation district installed suites of conservation practices on several farms to keep livestock from congregating near an impaired stream and entering it. Such practices included livestock exclusion

³⁰According to state environmental protection officials, agricultural issues are complicated and take a thorough assessment from trained and skilled specialists to determine what practices will address the observed degradation, as well as fit into farmers' management limitations. Once the proper suite of practices is determined, local and state specialists need to identify what program is the best fit to help support farmers' efforts to install the necessary practices.

³¹Livestock exclusion fences, for instance, are often installed because when livestock graze close to water bodies and drink from them, they trample stream bank vegetation, break down the stream bank, and deposit manure—which can increase the amount of sediment, nutrients, and bacteria within the water bodies and alter the physical structure of streams as well. Fencing to exclude livestock may or may not need companion practices to fully reach its pollution control potential. According to state environmental protection officials, there are a number of reasons why livestock exclusion fencing may not need to include any companion practices. For example, such fencing may not need companion practices when off-stream watering facilities or areas already exist for a pasture. In addition, riparian buffers may not be needed if the stream corridor will naturally generate a riparian buffer once fencing is installed.

fencing, riparian buffers, stream crossings,³² and off-stream watering facilities for livestock. In this case, conservation district staff said they proposed this project because the landowners were willing to install all of the complementary practices needed to keep livestock away from the stream. Further, this project is likely to help restore the stream to such a condition that it will soon be removed from the state's list of impaired waters, according to the project manager.³³

State nonpoint source management program officials in one state we visited said that because section 319 is a voluntary program, they hesitate to require participating landowners who are willing to install a given conservation practice to also install all the complementary practices that may be needed to ensure that water quality is protected. For example, in Arkansas, the state's nonpoint source management program encourages certain agricultural conservation practices to be installed together as a suite to maximize water quality benefits, but it does not require section 319 fund recipients to implement all these practices on agricultural land. One state official acknowledged that this process does not always result in implementing the conservation practices that would produce the greatest water quality benefit and that landowners may resist implementing the most effective conservation practices. Consequently, less effective practices are sometimes chosen for projects to ensure sufficient landowner participation, he said.

Our analysis of EPA data indicated that section 319 funds may have sometimes paid for conservation practices to be put in place without all of the proper companion practices. Our analysis of EPA's Grants Reporting and Tracking System data showed that when section 319 funding was used to install livestock fencing, more than half the time, the fencing may have been installed without all of the proper companion practices—those

³²Stream crossings are stabilized areas or structures that allow livestock, people, equipment, or vehicles to cross a stream in a safe and environmentally sound manner. Stream crossings help prevent stream bank erosion, water pollution, and damage to stream beds and channels.

³³In 2010, in a draft *Water Quality Manual for Livestock Grazing*, Washington state's Department of Ecology identified additional practices that should be implemented together to reduce negative water quality impacts when exclusion fencing is installed, which may include riparian buffers, stream crossings, and off-stream water facilities where livestock can drink. An Ecology official explained that if section 319 funds are used to install such fencing without these additional practices, there is limited assurance that water quality will improve.

Indirect Approaches Not
Always Linked to Tangible
Water Quality Results

practices that state environmental protection officials and USDA research show are needed to reduce nonpoint source pollution from livestock grazing. Specifically, in projects from 2004 through 2010 where about 700 separate livestock exclusion fences were installed, the following additional practices were installed with the fencing: about 50 stream crossings (7 percent), 260 riparian buffers (37 percent), and 225 watering facilities or troughs (32 percent).³⁴ (The data do not reflect instances where additional practices may have already been in place before the fencing was installed.)

Many section 319-funded projects that use indirect approaches to address nonpoint source pollution aim to educate local landowners about nonpoint source pollution problems or support other activities, such as promoting enrollment in USDA conservation programs.³⁵ Such projects are allowable under EPA guidelines and are often the key to achieving local buy-in and commitment to successfully implementing future nonpoint source pollution reduction activities, according to EPA headquarters officials. State environmental officials in several of the states we visited, however, cautioned that such projects can sometimes have limited assurance of generating meaningful water quality results when their approaches are not directly aligned with addressing nonpoint source pollution or are not linked to specific outcomes. Local education and technical assistance activities may support improvements to water quality by educating community members or developing institutional capacity to address nonpoint source pollution, but as shown in the examples below some projects offer little assurance that measurable improvements will actually be achieved. In some instances, state officials have used the

³⁴If complementary practices were installed together, one would generally expect the data to show a similar number for all practices. It is possible, however, that on some of these properties, the complementary practices were already in place or funded by the landowner or another organization.

³⁵In November 2011, EPA issued a national evaluation of the 319 program. According to this report, projects that use indirect approaches provide funds to enable the states to work with federal, state, local, private-sector, and watershed groups to gain cooperation and to leverage dollars, authorities, and other resources to solve or prevent nonpoint source pollution problems. These funds also provide critical support for state staff to conduct project planning and selection, monitoring, and building of partnerships, which are critical to ensure successful implementation of watershed-based plans. Environmental Protection Agency, *A National Evaluation of the Clean Water Act Section 319 Program* (Washington, D.C.: November 2011).

lessons learned from funding such projects to help inform their decisions on whether to fund similar projects in the future.

- One section 319-funded project in Arkansas had the stated purpose of training teachers and conservation district employees to teach a conservation education curriculum, so that they in turn could encourage students to participate in a conservation program, thereby developing students' appreciation and awareness of natural resources. Although designed to teach students about nonpoint source pollution, the project did not have a clear link to tangible reductions in nonpoint source pollution or changes in behavior stemming from the use of section 319 funds. According to the state's nonpoint source program director, his staff found that while the curriculum materials this project funded were well received by many teachers, staff were unable to ascertain the effectiveness of the project and whether it resulted in any behavioral change.
- A project in California aimed to implement conservation practices in a creek that was impaired in part by sewage disposal from septic systems. To do so, the project sought to increase community education through several outreach initiatives, among other activities. Project staff held workshops and community events, which about 200 people attended, and conducted follow-up surveys, which showed that 80 to 90 percent of residents had increased their understanding of environmental conditions and watershed pollution. Nevertheless, in the project's final report, project staff concluded that changing the habits of residents to actually implement conservation practices—such as pumping septic systems, planting streamside vegetation, and limiting fertilizer use—was much more complicated than originally anticipated. Despite increased levels of awareness, the report concluded, few conservation practices were implemented.
- In West Virginia, the state nonpoint source program director told us that the state's department of environmental protection used section 319 to fund a project to promote best management practices on oil and gas drilling sites and access roads. The project was designed to establish a training program for company inspectors that would help them identify drilling sites and access roads contributing to sediment runoff into impaired waters. The training would help company inspectors promote the design and implementation of management practices in these areas to reduce runoff and encourage compliance with such practices. This project promoted positive practices, but according to a departmental official, few management practices were ultimately implemented. In addition, he said, the project was not

directly linked to specific water quality outcomes, such as the number of sites and roads on which practices were to be implemented, and he will likely not use section 319 funds to fund similar projects in the future.

Projects using section 319 funds to pay for staff to promote enrollment in USDA conservation programs have also sometimes lacked approaches and intended outcomes that were directly aligned with addressing nonpoint source pollution.³⁶ Project managers with whom we spoke said that when such projects do not contain concrete deliverables, such as the number and specific location of acres enrolled in conservation programs, there is limited assurance that the most vulnerable land will be protected. For example, Kansas awarded \$225,000 in section 319 funds to a project whose objectives were to provide dedicated assistance to USDA's Conservation Reserve Program (CRP) and eliminate delays in providing program enrollment assistance to agricultural crop producers.³⁷ Funding was used to hire from 24 to 30 part-time staff to help interested landowners enroll in the CRP program, complete paperwork, and enroll acres in the program in shorter-than-typical time frames. According to the state project manager, the project did not include a specific focus on promoting CRP in areas of concern to nonpoint source water pollution. She also told us that the state Department of Health and Environmental Services has since concluded that projects such as these are not always the most cost-effective because the number of vulnerable acres enrolled has not been proportional to the resources invested. As a result, the number of funded staff decreased to 8 the next time the project was proposed, and the state project manager said that such projects may not be funded in the future.

Similarly, West Virginia's Department of Environmental Protection used section 319 funds for several projects aimed, in part, at enrolling

³⁶Since 2004, 20 states have spent nearly \$30 million on nearly 100 projects that were designed, at least in part, to provide administrative support to USDA programs and activities or to directly promote these USDA programs and activities to landowners. The \$30 million includes four projects approved by Michigan's Department of Environmental Quality, totaling more than \$10 million, which were designed to fund the state's nonpoint source management program staff, who are generally responsible for assisting with Conservation Reserve Enhancement Program agreements, among other activities.

³⁷CRP is a voluntary program for agricultural landowners through which they can receive annual rental payments and cost-share assistance to establish long-term, resource-conserving covers on eligible farmland.

landowners in USDA's CRP and Conservation Reserve Enhancement Program (CREP).³⁸ According to the state's nonpoint source program director, the department has not had much success in reducing nonpoint source pollution when section 319 funds are used to enroll land in CRP and CREP because pieces of land contributing the largest amounts of agricultural runoff are not always enrolled. West Virginia's nonpoint source program director told us that as a result, he will be reluctant to use section 319 funds on projects aiming to enroll landowners in these programs.

In November 2011, EPA issued a national evaluation of the 319 program and found that states' success in controlling agricultural nonpoint source pollution when funding these types of indirect projects has been mixed.³⁹ The report noted that on one hand these projects can help develop and strengthen key partnerships among federal programs and are critical for making significant progress in remediating large numbers of water bodies impaired by nonpoint source pollution. Coordinated efforts between state nonpoint source programs and NRCS state conservationists has occurred in about one-half of all states' farm bill program funding, which is distributed in whole or in part in accordance with the states' nonpoint source program goals and priorities, according to the report.⁴⁰ But EPA also reported that many states have had difficulty obtaining significant, broad-based, recurring support from USDA programs for nonpoint source program priorities. Many states therefore identified improved coordination and collaboration with USDA programs as a key nonpoint source program goal, according to EPA's report.

Preventing Challenges through More Rigorous Project Selection

Our review of some states' experiences and EPA's 2011 evaluation report has shown that the challenges associated with third-party participation and projects whose approaches are not clearly linked to tangible water

³⁸CREP, as part of CRP, is a voluntary land retirement program that helps agricultural producers protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water. CREP authorizes state-federal conservation partnerships that address specific state and nationally significant water quality, soil erosion, and wildlife habitat concerns related to agriculture.

³⁹Environmental Protection Agency, *A National Evaluation of the Clean Water Act Section 319 Program* (Washington, D.C.: November 2011).

⁴⁰In other words, USDA's project-ranking systems include significant weighting of water quality considerations, such as projects focused in impaired watersheds, nonpoint source program priority watersheds, or watersheds that have watershed-based plans.

quality results can largely be avoided when states use more rigorous project selection processes. For example, in 2006, Ohio's nonpoint source management program staff examined the types of organizations that commonly received its section 319 funding and found that more than 70 percent of funding had gone to soil and water conservation districts, county health departments, and regional planning agencies, which typically have little authority to address water quality problems, according to Ohio's nonpoint source program director. Ohio's program staff found that these organizations often used section 319 funding to pay for staff salaries without getting a proportionate improvement in water quality from the projects they implemented. Further, when funds were used for implementing projects, these organizations' projects were not implemented as anticipated in the grant application—typically resulting in substantially less water quality improvement than originally intended.

For example, in 2004 Ohio's EPA allocated \$500,000 under section 319 to one agricultural project to install 15 different complementary conservation practices in an impaired watershed. The organization that received the grant, however, was unable to convince farmers in the impaired watershed to adopt the conservation practices, and after numerous grant revisions and extensions, it implemented 3 of the 15 planned conservation practices, according to Ohio's nonpoint source management program director. Instead, he told us, the majority of funding was used to purchase 111 pieces of equipment for tilling fields and handling and transporting manure, which can help reduce the amount of nutrient runoff entering nearby water bodies. What had started as a comprehensive approach to changing farmers' behavior and farming practices evolved into an agricultural equipment acquisition project because agricultural equipment was what the landowners wanted, he explained. In addition, Ohio's program review showed that section 319 funds were being used to support payroll for 27 full-time-equivalent staff positions in local organizations for some projects whose indirect approaches did not contain objectives or deliverables that addressed nonpoint source pollution problems, according to the nonpoint source management program director. Further, the nonpoint source management program director told us that the water quality results were not proportionate with the investment.

Following the 2006 review, Ohio's nonpoint source management program changed its project selection criteria to favor grantees with authority to implement projects on the ground or projects for which any necessary landowner buy-in was secured in advance. Ohio EPA's application process now requires that specific properties for proposed projects be

identified before grants are awarded and that assurances from property owners are obtained in advance, so that conservation practices can be implemented as planned. These programmatic changes have also prompted Ohio's nonpoint source program to fund fewer projects that rely on indirect approaches. Consequently, since 2007, Ohio's nonpoint source program has funded fewer than 5 full-time-equivalent positions in local organizations. Ohio EPA's nonpoint source program director told us that these changes have helped the agency make significant progress in achieving the state's water quality goal.⁴¹

Other states have changed their project selection processes along the same lines. In its November 2011 report, EPA found that as part of 15 states' project selection processes, nonpoint source program staff coordinate with project staff at the local level before selecting proposed projects for section 319 funding.⁴² The report goes on to say that this preproposal coordination helps increase local understanding of state nonpoint source program priorities, identifies potential project partners, gauges local receptivity to projects, and provides greater assurance of potential project success. These efforts typically improve the quality of proposals and, ultimately, water quality results from section 319-funded projects, according to EPA's report. For example, Colorado's nonpoint source management program increased the rigor of its project selection process by working with local officials to identify the highest-priority water quality issues so that the state can better support the projects that will be most effective in addressing them.

⁴¹Ohio's water quality goal is for 100 percent of large rivers and 80 percent of small rivers to attain their designated use by 2020.

⁴²The report notes that 20 states' project selection processes explicitly take into consideration a project's feasibility for successful implementation.

EPA's Oversight and Measures of Effectiveness of States' Programs Have Not Consistently Ensured Projects Likely to Yield Measurable Water Quality Outcomes

EPA regional offices have varied widely in the extent of their oversight and the amount of influence they have exerted over state nonpoint source management programs. In addition, EPA's primary measures of effectiveness of state management programs may not always demonstrate the achievement of program goals—which are to (1) eliminate remaining water quality problems and (2) prevent new threats from creating future impairments—or reflect the achievements of some critical state activities for reducing nonpoint source pollution.

EPA's Regional Offices Have Varied in Their Oversight of States' Nonpoint Source Management Programs

EPA's 10 regional offices varied in their oversight of states' nonpoint source management programs and the extent to which they influenced the projects states funded through section 319. This variability is seen most notably in regional offices' reviews of states' annual work plans and project selection criteria, which are to describe the activities that states' nonpoint source management programs plan to undertake in the upcoming year and the parameters for which projects are eligible to receive section 319 funds from the state. To oversee states' nonpoint source management programs, EPA regional offices by regulation are to determine, before annually awarding section 319 funds to states, that achievement of states' proposed work plans is feasible—which means that states are to demonstrate that the projects described in the work plan can be implemented.⁴³ Officials from most regional offices reported to us that they do not assess the feasibility of specific projects. Nevertheless, regional offices have almost always determined that states have made satisfactory progress in achieving their program goals—a condition that must be met for states to receive section 319 funding the following year.

Variations in EPA Regional Office Oversight

Among their responsibilities for oversight of state nonpoint source management programs as provided in regulation and guidance, EPA's 10 regional offices perform two key functions. First, they review state nonpoint source management program plans, which are to identify states' goals for addressing nonpoint source pollution. Second, they review

⁴³40 CFR §§ 35.111(a)(4) , 35.101(a)(10) (2012).

states' annual work plans and project selection criteria, which are to describe the activities that states' nonpoint source management programs plan to undertake in the upcoming year to meet program goals and the parameters for which projects are eligible to receive section 319 funds from the state.

Regional offices have varied in the extent of their review of states' nonpoint source management program plans, which are to ensure that states align the goals of their programs with the highest-priority water quality impairments. Some regional offices have encouraged states to modify their plans, whereas other regional offices have not. For example, regional office officials reported to us that Region 5 has encouraged all of its states to revise their management plans within the past 5 years,⁴⁴ whereas Region 1 has not encouraged any of its states to update their plans since 1999.⁴⁵ Section 319 guidance to states indicates that they should update their nonpoint source management plans if EPA finds that the practices and measures proposed in such plans are not adequate to reduce the level of nonpoint source pollution. Overall, EPA's 2011 report evaluating states' implementation of the section 319 program found that EPA regional offices have not required 28 states to upgrade their nonpoint source management program plans since 1999 or 2000.⁴⁶ As a result, according to the report, these states' plans play a diminished role or are simply ignored in the current implementation of the states' programs and do not adequately reflect innovations that have become available during the past decade, including watershed-based planning and low-impact development. One primary reason for the variations in oversight among the regional offices could be that EPA headquarters has not issued specific implementing guidance to the 10 regional offices on

⁴⁴Region 5 comprises Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin.

⁴⁵Region 1 comprises Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. Massachusetts added an amendment to its management plan in 2007.

⁴⁶EPA's 2011 report does not specify which states have not upgraded their nonpoint source management program plans.

how they are to fulfill their regulatory oversight responsibilities for the 319 program.⁴⁷

Regional offices have also varied in the extent of their review of each state's annual work plans and project selection criteria. Officials from three regional offices told us that they reviewed annual work plans in depth and played an active role in influencing the types of projects selected. For example, Region 4 officials reported that they helped ensure that several states within the region targeted their section 319 funds to severely impaired watersheds and, before granting funding, selected project applicants who were willing to implement and capable of implementing projects.⁴⁸ Specifically, state program officials in North Carolina established a priority-setting system in collaboration with the regional office, which helped state staff review and rank project proposals. Final project selections were generally made after proposals were ranked and reviewed by various stakeholders, including Region 4 officials. An official with another regional office told us that this kind of process provides regional offices with the opportunity to guide states to spend funds on certain geographic regions or to encourage implementation of projects in watersheds that have a watershed implementation plan and willing landowners.

In contrast, of the 7 other regional offices, 4 reported that they review project selection criteria on an "as needed" basis, and 3 regions reported that they have limited to no involvement in reviewing or approving the project selection criteria. When reviewing project selection criteria and work plans, EPA's regional offices have an opportunity to influence how state funding is distributed, determine which projects are selected to receive section 319 funds, reject proposed projects, or require

⁴⁷EPA's existing national water program guidance for fiscal year 2013 provides little direction to EPA regional offices. EPA's 2003 guidelines for section 319 grants are focused on state responsibilities. To the extent they discuss regional office oversight, the 2003 guidelines identify some responsibilities but generally do not advise regions on how they are to fulfill them. For example, the guidelines state that the region will work with a state to ensure that the work plan has programmatic, technical, and scientific merit, but there is no further direction on what regions should consider in ensuring this is achieved.

⁴⁸Region 4 states include Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee.

EPA Regional Offices Almost Always Approve State Programs for Annual Funding

modifications to the state programs' annual goals.⁴⁹ Nevertheless, most of the 10 regions reported that although they provide feedback to states on specific project proposals before states select projects, they do not systematically assess the merits and feasibility of specific projects.⁵⁰ As noted above, EPA headquarters has not issued specific guidance to the 10 regional offices, including on how to review states' plans for project feasibility and criteria to ensure that funded projects have characteristics that reflect the greatest likelihood of effective implementation and tangible water quality results.

Notwithstanding the variation in regional offices' reviews of nonpoint source management program plans and annual work plans, regional offices have almost always determined that states have made satisfactory progress in achieving their program goals, which states must do to receive section 319 funding the following year. Regional office officials told us that it is more common for regional office staff to work with states that are at risk for not achieving satisfactory progress than to withhold funds. For example, according to Region 8 officials, the regional office almost withheld its determination of satisfactory progress from Wyoming for not having developed satisfactory watershed-based plans, but it granted the determination instead and then worked with Wyoming state program staff to direct future funds toward developing TMDLs with implementation plans that would include all the elements of satisfactory watershed-based plans. Officials from regional offices reported to us that determinations of satisfactory progress were made according to a variety of factors specific to each state's program, such as the number of projects completed and reductions in pollutant loads, which states commonly reported in nonpoint source management program reports.⁵¹ Officials with one regional office told us that the determination of satisfactory progress is a fairly low bar and that they were generally reluctant to withhold this

⁴⁹In addition, regional offices also review proposed projects and activities for synopses explaining the state's strategy for using section 319 funds in the current fiscal year, including the nonpoint source problems to be addressed, the types of practices that will be implemented, and indicators of performance, among other things.

⁵⁰Because of the way EPA records information on the achievements of states' nonpoint source management programs, we could not determine whether water quality outcomes differed in the states that received more oversight than in those that did not.

⁵¹We also found that regional offices use specific criteria in making these determinations about half the time.

determination because states would then not receive funds to address a significant water quality problem.

EPA's Primary Measures of Effectiveness May Not Fully Demonstrate Program Goal Achievements

In addition to requiring states to report on their progress in meeting milestones for their nonpoint source management programs, section 319 requires states to annually report to EPA on two measures of effectiveness resulting from implementation of their management programs: (1) reductions in loadings of specific nonpoint source pollutants and (2) improvement in water quality of water bodies identified on states' lists of impaired waters as requiring nonpoint source controls to meet water quality standards. Section 319 does not limit EPA to these two measures of effectiveness, but the agency has chosen to use these two reporting requirements as barometers of success for the section 319 program. Specifically, EPA provides nationwide data on these two measures to Congress to report on the progress that the section 319 program makes each year toward achieving the program's goals of (1) eliminating remaining water quality problems and (2) preventing new threats from creating future impairments. Reporting on the two measures of effectiveness is statutorily required, but as described in the 2003 Federal Register guidelines and other EPA documents, states can demonstrate the achievements of nonpoint source management programs in additional ways—ways that in many respects may provide a more accurate picture of environmental outcomes and reflect the achievements of some critical state activities for reducing nonpoint source pollution, such as the number, kind, and condition of living organisms in the water.

Reporting Requirements Emphasize Reductions of Specific Nonpoint Source Pollutants

For the first national performance measure of effectiveness—reductions in loadings of specific nonpoint source pollutants—EPA requires states to provide information on the amounts by which nitrogen, phosphorus, and sediment have been reduced in water bodies where section 319 projects targeting such pollutants have been implemented.⁵² According to several state environmental protection officials, EPA's focus on these reductions as one of two primary reporting requirements has inherent limitations. For instance, it has encouraged some states to design their nonpoint source management programs and select projects to maximize reductions in

⁵²EPA reported that in fiscal year 2010, projects funded at least in part by section 319 funds had achieved estimated nationwide reductions during the year of 9.7 million pounds of nitrogen, 2.6 million pounds of phosphorus, and 2.1 million tons of sediment.

specific pollutants, but the projects and activities associated with reducing these pollutants do not always address the root cause of a nonpoint source pollution problem that prevents living organisms from inhabiting the water. One example of this limitation is the manner in which states have used section 319 funds to mitigate the effects of channeling streams in areas of agricultural production. Stream channeling occurs when farmers straighten creeks and streams to maximize the amount of land that can be farmed and make it easier to move machinery across fields (see fig. 5). Channeling streams, however, removes vegetation along stream banks, alters streambed configuration and water flows, and disrupts stream food webs and other life-supporting systems, according to EPA documents, and such effects may extend far downstream.

Figure 5: An Eastern Washington Stream Channeled to Maximize Crop Yield



Source: GAO.

Projects to mitigate the adverse effects of channeled streams may yield large pollutant reductions, but because they do not address the straightening of the streams, the goal of healthier water bodies—as measured by biological indicators, such as the number, kind, and condition of living organisms in the water—is not always achieved. For

example, to absorb runoff and help reduce loads of nitrogen, phosphorus, and sediment, section 319 funds have often been used for projects that install 20- to 120-foot-wide grass filter strips as a buffer between cropland and adjacent water bodies. These filter strips, however, do not solve the water quality problems caused by the loss of streamside vegetation and altered streambed configuration, according to an engineer with Ohio's nonpoint source management program.⁵³ From 2001 to 2005, one midwestern state used section 319 funds to install more than 40,000 feet of grass filter strips, which were estimated to have reduced nitrogen by more than 500,000 pounds and phosphorus by 168,000 pounds annually. Yet none of the watersheds where the grass filter strips were installed demonstrated any measurable improvement in stream health (since they were installed 7 to 11 years ago), as indicated by the number, kind, and condition of living organisms in the water, according to the engineer who monitored the stream.

Some state officials mentioned their concerns when this performance measure drives project selection. For example, an official with Iowa's Department of Natural Resources told us that focusing on this reporting requirement has compelled his state's nonpoint source management program to select projects that are likely to substantially reduce nitrogen, phosphorus, and sediment, even though such reductions may not address actual causes of stream impairment or improve the condition of water bodies for aquatic life. In addition, an official with Michigan's Department of Environmental Quality told us that he generally has the flexibility to choose projects that are the most cost-efficient and effective at addressing nonpoint source pollution. To satisfy EPA, however, he told us he feels compelled to use section 319 funds for several projects each year that may not be the most important in addressing nonpoint source pollution problems but that are likely to yield large reductions in pollutants.

In contrast, we also found limited instances in which states funded projects (such as stream restoration) that, rather than concentrating on reductions of specific pollutants, sought instead to address the underlying causes of impairment. One project in Ohio in 2011 involved the headwaters of the Big Darby River, which had been channeled more than a century ago to help agricultural producers increase crop yields. The

⁵³Grass filter strips do not absorb polluted runoff as well as natural riparian vegetation, according to the engineer.

channeling, however, removed streamside trees and shrubs and altered the stream's flow, thereby increasing water temperatures and reducing the stream's ability to support life. Furthermore, the officials said that numerous local agricultural activities contributed nitrogen, phosphorus, and sediment to the stream. Project staff did not focus solely on the pollutants used by EPA as key measures; instead, their holistic design focused on restoring the natural configuration and flow of about one mile of the stream's headwaters. Project engineers told us that when this restoration is completed, the stream will be able to better assimilate pollutants, water temperature will fall, stable stream banks will reduce erosion, and structure and habitat for living things will be restored for approximately 75 downstream miles (see fig. 6).

Figure 6: Restoration of the Headwaters of the Big Darby River in Ohio



Source: The Nature Conservancy.

EPA research and guidelines over the past several decades acknowledge the advantages of incorporating biological indicators (e.g., the number, kind, and condition of living organisms) into state water quality programs

States Must Report on the
Number of Water Bodies
Removed from State Lists of
Impaired Waters

to better reflect environmental outcomes.⁵⁴ In 2005, EPA stated that the most direct and effective measure of the integrity of the water body is the status of its living systems and that the use of biological information can help states improve water quality protection.⁵⁵ Moreover, EPA's 2003 *Federal Register* guidelines list demonstrable improvements in biological or physical parameters—such as increased diversity in fish or insect populations or improved riparian areas—as a key method for measuring the progress and success of state nonpoint source programs.⁵⁶

Nonetheless, despite the advantages of implementing projects that address the varied root causes of water bodies' impairment and associated downstream effects, EPA data show that state nonpoint source management programs have far more often funded practices that generally reduce pollutant loads than those more directly linked to improving the number, kind, and condition of living organisms in water bodies. For example, the installation of filter strips and other similar practices have been funded more often than stream restoration projects—at least 1,000 projects compared with about 175—since 2004, even though stream restoration projects generally result in more living organisms in the water.

For the second national performance measure of effectiveness—the improvement in water quality of water bodies identified on state lists of impaired waters as requiring nonpoint source controls to meet water quality standards—EPA asks states to provide information on the number of water bodies that are removed from these lists. EPA tracks this number to document how states' efforts are improving water quality across the nation and to demonstrate to Congress the program's annual progress in

⁵⁴EPA has singled out Ohio and Maine as states that have adopted biologically based information in how they measure water quality. Both Maine and Ohio developed and adopted their programs to incorporate ecologically relevant endpoints into decisions, inform water quality management decisions, and quantify water quality improvements, among other things. Maine and Ohio scientists have identified a sequence of steps and milestones that EPA has compiled as a template other states may use to develop biologically based measures of water quality.

⁵⁵Environmental Protection Agency, *Use of Biological Information to Better Define Designated Aquatic Life Uses in State and Tribal Water Quality Standards: Tiered Aquatic Life Uses*, (Washington, D.C.: Aug. 10, 2005).

⁵⁶Water quality standards are established by each state, however, so the extent to which biological indicators are incorporated as measures of program success may depend in part on how states define their water quality standards.

reducing nonpoint source pollution. Since 2000, states have removed more than 350 water bodies from their lists of impaired waters.⁵⁷

EPA's focus on this second measure may also influence state project selection in ways that may reduce the effectiveness of their nonpoint source management programs. According to four officials from the eight states we visited, this focus has compelled state program staff to choose projects for water bodies that were close to being restored and removed from the states' 303(d) lists of impaired waters, rather than solely those that are most degraded. For example, Maryland's nonpoint source program manager told us that the program's project selection committee targeted projects for water bodies close to removal from the state's list of impaired water bodies over water bodies with more serious water quality problems, where such funding could have had a greater impact on nonpoint source pollution. He told us that such projects are selected because EPA expects each state to "deliver" several such successes each year. According to the official, each case has its merits. The former is more likely to result in meeting standards for the particular water body. The latter demonstrates incremental improvement and typically has a greater pollutant load reduction, which benefits downstream waters like the Chesapeake Bay.

The emphasis on this measure of effectiveness has also encouraged some state program staff to focus on restoring impaired water bodies even when they have determined that greater benefit could be achieved by protecting high-quality water bodies not yet listed as impaired. Environmental protection officials from several states we visited told us that if EPA put a greater emphasis on protecting high-quality water bodies, they would likely select some different projects on water bodies that are not yet impaired but are threatened by nonpoint source pollution. Instead of focusing solely on EPA's two performance measures, Maine's Department of Environmental Protection requested and received permission from EPA to fund projects that focus on preventing pollution of lakes, streams, and coastal waters by, for example, providing training opportunities to advance stream protection efforts. The state's nonpoint source program's annual report for 2010 reported that such a focus is far more cost-effective than the long-term investments needed to restore waters once they become polluted.

⁵⁷ According to EPA, this number does not reflect the net change in the number of impaired water bodies over this time period; water bodies are also being added to state lists of impaired waters each year.

EPA's former nonpoint source pollution chief acknowledged that EPA's emphasis on the two statutorily required national performance measures makes it difficult to judge which states are making more progress than others in addressing nonpoint source pollution. He said that protecting undisturbed lakes and streams is critical for protecting aquatic life but that such projects rarely demonstrate substantial reductions in pollutant concentrations. He also said that, conversely, reductions in pollutants are reported each year in some states without associated improvements in biological indicators. EPA does not require states to provide information on their progress under the nonpoint source program in improving water bodies' condition for aquatic life or the protection of high-quality water bodies.

In EPA's November 2011 program evaluation, the agency reported that it will issue new section 319 guidelines to states in fiscal years 2012 to be implemented in 2012 and 2013. EPA reported that these guidelines will generally address program accountability but did not specify whether such accountability will include measures to more accurately reflect the overall health of targeted water bodies (e.g., the number, kind, and condition of living organisms) or demonstrate states' focus on protecting high-quality water bodies, where appropriate.

A Key USDA Program Largely Complements EPA's Section 319 Program, although It Is Unclear How Closely Its Procedures to Protect Water Quality Are Followed

USDA's Environmental Quality Incentives Program (EQIP) is the key agricultural conservation program that can complement EPA's efforts to reduce nonpoint source pollution.⁵⁸ According to the Department's Natural Resources Conservation Service (NRCS), which manages the program, it has resulted in substantial pollutant reductions in key watersheds across the country.⁵⁹ Nonetheless, certain conservation practices under the program could adversely affect water quality if installed without the proper suite of companion practices to mitigate these adverse effects. NRCS officials maintain that its procedures ensure that conservation practices conserving one resource (e.g., soil) do not inadvertently harm another (e.g., water), and that its quality control measures ensure they are followed at the ground level. Our analysis of the EQIP data shows that nutrient management plans and other conservation practices of one kind

⁵⁸The program funds conservation practices throughout the nation that are intended to reduce nonpoint source pollution and, among other things, soil erosion.

⁵⁹Reports describing such pollutant reductions are available at www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/deap/pub.

or another have often been put in place. The EQIP data, however, is kept at an aggregated level and does not reveal which mitigation measures are applied for site-specific conditions on the ground—information which is necessary to determine whether the mitigation measures are effective.

NRCS Soil and Water Conservation Practices and Procedures Are Intended to Prevent Certain Practices from Adversely Affecting Water Quality

Under EQIP, NRCS funds conservation practices throughout the nation that are intended to reduce nonpoint source pollution and, among other things, soil erosion.⁶⁰ NRCS has developed standards for each conservation practice, which provide science-based criteria that participating agricultural producers are supposed to follow to address soil, water, air, plant, animal, and energy resource concerns. Each practice's potential effects on soil, water, and air quality are documented in the agency's assessments of the conservation practices' physical effects. Almost one-half the conservation practices can address nonpoint source water pollution, according to officials in NRCS' Office of Science and Technology.

According to NRCS technical documents, some conservation practices could have unintended, negative effects on water quality if installed without the proper "companion practices" capable of mitigating the potential negative effects. This is due to the fact that EQIP-funded practices may have distinct purposes, such as to reduce soil loss or improve soil conditions for agriculture, which are not oriented toward improving water quality. For example, NRCS often funds underground outlet systems, which help move surface water to a "suitable outlet," such as a drainage ditch, to reduce soil erosion. Such systems can help conserve soil, but NRCS conservation practice physical effects assessments show that such systems can also help transport nutrients (nitrogen and phosphorus) and pesticides from nutrient-laden fields into outlets that in turn feed nearby water bodies.⁶¹

⁶⁰EQIP offers cost-share payments and technical assistance to agricultural producers through 1- to 10-year contracts to implement conservation practices. Cost-share payments require agricultural producers to pay some percentage of the total cost of the conservation practices, which can include money or in-kind payments (e.g., labor or use of equipment). According to NRCS, the program funds an average of 4 conservation practices per contract.

⁶¹According to NRCS, underground outlet systems allow water to change elevations and move more quickly, which reduces the time that natural processes have to reduce nutrients or other agricultural chemicals.

According to officials in NRCS' Office of Science and Technology, the agency has therefore put procedures in place to help ensure that all resources, including water quality, are protected when EQIP funds are used. These procedures include the following:

- *Environmental evaluation:* NRCS' National Environmental Coordinator told us that the agency requires its field planners to perform an environmental evaluation for every proposed conservation practice as part of NRCS' process to comply with the National Environmental Policy Act.⁶² The environmental evaluation helps field planners identify existing soil and water resources on land where a conservation practice is proposed and to analyze the effects of the proposed practice on the same resources. In short, NRCS field planners are to assess whether the proposed actions for improving one resource (e.g., soil erosion) will negatively affect another resource (e.g., water quality) and document their assessment and determination.
- *Compliance with state plans for impaired waters:* With respect to water quality, field planners are to identify whether a proposed practice is on or near a stream listed by the state as impaired. If it is, then field planners are directed to review and comply with any existing pollution limits or watershed plans that have been established by the state. This process asks field planners to ensure that landowners are provided with options to install practices that will not further degrade the stream segment. The final decision on what practices to install ultimately rests with the landowner.
- *Nutrient management planning:* In the event of a significant net negative effect on water quality, field planners are to document it, which would trigger an environmental assessment or an environmental impact statement under the National Environmental Policy Act, according to NRCS' National Environmental Coordinator. He said that significant net negative effects on water quality are rare because landowners instead typically agree to implement other, mitigating practices along with the proposed practice. The agency's key method to help ensure that the potential negative effect is mitigated is termed *nutrient management planning*. Nutrient

⁶²Under the National Environmental Policy Act, federal agencies are to assess, among other things, the effects of major federal actions that significantly affect the environment and prepare a detailed statement on the environmental impacts of those actions.

management plans describe a coordinated combination of conservation practices that help farmers manage the amount, form, placement, and timing of fertilizer to support crop production while also minimizing polluted runoff.⁶³ These plans are site specific and are developed by NRCS field planners and implemented by landowners.

- *Alternative mitigation measures:* According to NRCS Science and Technology officials, if landowners choose not to adopt nutrient management plans, NRCS field staff may still work with them to develop alternative mitigation measures—that is, additional conservation practices, often in a suite, to minimize potential adverse effects on water quality. Such mitigation measures may include, for example, planting cover crops on agricultural fields or installing filter strips on field borders. Each of these practices helps reduce runoff of nutrients and pesticides from fields into nearby water bodies by absorbing pollutants in plant root systems.

Instances of Potential Water Impacts Raise Questions about the Extent of Adherence to Procedures, but NRCS Data Are Too Highly Aggregated to Resolve Them

During the course of our field work, we identified instances that raised questions as to whether NRCS' procedures to protect water quality were always implemented as intended, particularly in watersheds where EPA's section 319 funds had been used. To ascertain whether such instances were isolated occurrences or indicative of a broader problem, we examined NRCS' national level data to determine the extent to which NRCS' procedures intending to ensure that all resources are protected (including water quality) were followed.

Observed Instances of Potential Water Impacts from Conservation Practices

During the course of our field work, we found some indications that site-specific mitigating practices were not implemented when practices with potentially negative effects on water quality were installed. For example, nonpoint source management program staff in two states told us that

⁶³In addition, nutrient management plans take into account critical factors that may affect water quality, including a property's slope gradient, soil composition and density, and distance to a water body. For some sites that are at high risk for contributing pollution to nearby water bodies, NRCS' nutrient management plans require the landowner to limit fertilizer application to the amount that can be taken up by the crop, among other things, to protect water quality.

NRCS field staff have sometimes funded soil conservation practices without appropriate alternative mitigation measures. Specifically:

- An agriculture specialist in Washington State's nonpoint source pollution program told us that NRCS field staff have authorized funding of stream crossings for livestock. The departmental official told us that stream crossings in Washington were installed on certain properties where livestock exclusion fencing prevented cattle from entering the stream. The stream crossings were to be installed for emergency purposes only, in case off-site watering facilities were unable to function, and closed off with gates. He explained, however, that some landowners chose not to implement additional conservation practices, such as off-site watering facilities in places that would keep the cattle away from the stream, and they have kept the gates permanently open, meaning that livestock now enter certain streams more often than they did before installation of the stream crossings.⁶⁴ A former agriculture specialist with the program echoed this concern, stating that on land where livestock graze in eastern Washington, it is not uncommon for NRCS conservation practices intended to protect water quality to be implemented in such a way that actually increases the number of livestock entering streams.
- An engineer with Ohio's Environmental Protection Agency official told us that NRCS promoted hayland buffer strips to help reduce soil erosion and absorb nutrient runoff as part of a NRCS water quality focused program. The buffer strips were to be 100 to 200 feet wide, located adjacent to a water body, and to remain in place for 3 years. Landowners received \$100 per acre each year for installing these buffer strips. But on some properties, riparian vegetation—and the water quality protection it provides—was removed so that landowners could install hayland buffers. According to an engineer with Ohio's Environmental Protection Agency, hayland buffers provide less overall protection to water quality than wooded riparian vegetation, such as that which was removed.

⁶⁴According to NRCS, this scenario is likely an exception. Adding stream crossings generally allows cattle to travel from one side of a property to another and concentrates their crossing at one place, thereby reducing stream bank erosion and nutrient runoff in streams. Stream crossings are generally part of suites of companion practices whose net effect on water quality is positive, according to NRCS.

Headquarters Data on Projects’
Potential Impacts Are Too
Highly Aggregated to Reveal
Site-Specific Information

To determine whether the instances we observed when meeting with state officials were isolated examples or indicative of a more prevalent problem, we examined EQIP data on three key parameters: (1) the universe of conservation practices funded by NRCS field units that could have negative water quality effects in watersheds in which Section 319 projects were funded; (2) for that universe of practices, the extent to which nutrient management plans were in place to mitigate unintended adverse effects on water quality; and (3) where nutrient management plans were not in place, the extent to which alternative mitigation practices were in place that could reliably serve that same purpose.

Conservation practices that can affect water quality. EQIP data show that from 2005 through 2010, of the 47,000 practices that NRCS field units funded in watersheds where states allocated section 319 funds, nearly 8,000 were types of individual conservation practices that could facilitate agricultural runoff or have other unintended consequences unless other mitigating measures were implemented along with them.⁶⁵ These 8,000 practices were funded in about 820 watersheds.

Use of nutrient management plans. EQIP data show that nutrient management plans—the agency’s primary method for ensuring that those practices intending to conserve one resource (e.g., soil) do not inadvertently harm another resource (e.g., water)—were funded on properties in less than one-third of the watersheds where soil conservation practices that NRCS acknowledges could degrade water quality were also funded. According to NRCS officials, there are several reasons why the data on nutrient management plans do not provide a complete picture of water protection efforts. For example, it is possible that some of the acres within the 820 watersheds where these practices were funded were actually not vulnerable—that is, were not close to water bodies of concern—and therefore did not require a nutrient management plan to ensure that water quality was protected. In addition, officials told us that nutrient management plans expire after 3 years, so nutrient management plan contracts that expired during the time period of our analysis that could have possibly addressed the practices with potential adverse effects on water quality would not appear in the data. Furthermore, landowners often adopt nutrient management practices well

⁶⁵Underground outlets, access roads, and subsurface drains, accounted for 80 percent of the nearly 8,000 conservation practices.

beyond the length of a contract because they recognize the economical and environmental benefits of improved nutrient use efficiency provided by those practices, according to NRCS officials.⁶⁶

Use of alternative mitigation measures. As noted above, the absence of a nutrient management plan does not mean that an NRCS conservation practice will adversely affect water quality, *if* proper alternative mitigation measures are in place. According to NRCS officials, when a conservation practice with a potentially negative effect is identified, and where a nutrient management plan is not in place, conservation planners are alerted so that they know to plan any site-specific mitigating practices to ensure positive outcomes. However, when we examined EQIP data provided by USDA to determine if alternative mitigation measures were funded in the two-thirds of watersheds where nutrient management plans had not been funded, we found the data to be too highly aggregated to allow for a determination as to whether the conservation practices reflected in the data were the appropriate practices that could mitigate site-specific problem. For example, the EQIP data show that the agency funds an average of 4 conservation practices per EQIP contract. This summary information, however, does not shed light on the *type* of practices that are being installed, whether the combination of those practices have a water quality focus, or whether they are effective in mitigating the potentially adverse effects on water quality of the practices in question.

According to NRCS officials, detailed, project-specific information, while not available at the national level, is available in NRCS' many field offices across the country. NRCS field staff, for instance, are supposed to document their site-specific determinations, which include information on, among other things, how conservation practices are to be implemented in a way that protects all resources. Moreover, the field offices are subject to NRCS' internal quality assurance processes designed to ensure that all contracts are structured to protect all resources, including water quality, and that projects are appropriately tailored to reflect site-specific

⁶⁶NRCS officials also commented that in some instances a landowner might have taken the initiative to choose an alternative mitigation measure that protects soil and water quality, without needing to adhere to a formal nutrient management plan.

conditions.⁶⁷ Nonetheless, EQIP officials told us they neither ask for nor analyze this site-specific information. Without examining such data, however, it is difficult to see how NRCS can assure itself or the Congress that certain practices are not having unintended effects on water quality.

Conclusions

The magnitude, pervasiveness, and dispersed nature of nonpoint source pollution make it particularly difficult for states to control. EPA has achieved some notable successes through its section 319 program and, in recent years, has helped states target their nonpoint source pollution reduction efforts in watersheds with the most severe water quality problems. Now more than ever, EPA's and states' limited budgets make it critical that the most effective projects are selected for funding. In some cases, however, states used section 319 to fund projects that were not effectively implemented or not clearly linked to tangible water quality results. Our review of the experiences of some states and EPA's 2011 evaluation report has shown that such issues can potentially be avoided when states use more rigorous project selection processes. EPA's regional offices can constructively influence the types of projects that states fund through the program, but they are generally not reviewing states' plans for project feasibility or for project selection criteria that would help ensure that funded projects have characteristics reflecting the greatest likelihood of effective implementation and tangible water quality results. As state programs have evolved over the last decade, some state programs have shown that certain characteristics of proposed projects, such as securing third-party buy-in in advance, can provide greater assurance that these projects will achieve tangible water quality results, although such lessons learned have not been systematically adopted by all states.

In addition, EPA's emphasis on two statutorily required reporting measures as measures of effectiveness—to the exclusion of other measures—may not be fully capturing information reflecting program

⁶⁷ Specifically, NRCS emphasized the rigor of its quality control process noting, for example, that the program uses a ranking process for proposed projects that gives greater weight to projects implementing complete suites of practices over individual practices. In addition, NRCS field staff review each contract to ensure it complies with the agency's procedures, and that practices are planned and applied appropriately for site-specific concerns and conditions. After conservation practices are implemented, NRCS state or field staff spot-check 5 percent of all program contracts to ensure practices are appropriately planned and applied for site-specific conditions.

achievements and may, in some cases, influence state project selection toward narrow measures of nonpoint source pollution over comprehensive results. As a result of EPA's focus on these primary measures, states are sometimes selecting projects targeted to meet those measures, rather than selecting projects that could have larger impacts on improving the health of impaired or threatened water bodies. At present, certain EPA documents discuss the advantages of additional performance measures that may more accurately reflect the overall health of water bodies, such as conditions for aquatic life, but the agency does not require states to use such measures to provide information on their progress under the nonpoint source program. As a result, most states report on reductions of specific pollutants, rather than on indicators of overall health of targeted water bodies (e.g., the number, kind, and condition of living organisms) or on protection of high-quality water bodies that are not impaired. EPA plans to soon issue new section 319 guidelines to states that generally address program accountability, but it is unclear whether and to what extent these new guidelines will include measures to more accurately reflect the overall health of targeted water bodies or demonstrate states' focus on protecting high-quality water bodies, where appropriate.

USDA's Environmental Quality Incentives Program has helped to substantially reduce sediment, nitrogen, and phosphorus runoff across the country. By their nature, however, some of the conservation practices supported by the program have the potential to inadvertently conflict with EPA efforts to reduce nonpoint source water pollution. While NRCS procedures strive to minimize such problems, state environmental officials identified instances where these procedures may not always have their intended effect. NRCS has cited highly-aggregated data to demonstrate that a preponderance of mitigating practices—an average of four practices per project—counter any possibility that such unintended effects occur. However, the EQIP data provided by USDA lack the details needed to assess whether these other practices mitigate the potential for negative effects. The most meaningful data on the use and effectiveness of mitigating practices is site-specific information that resides within NRCS' field offices, and has been neither obtained nor analyzed by NRCS program officials. Tapping and analyzing these data could more accurately inform NRCS, and other interested parties including the Congress, on the extent to which EQIP projects may inadvertently affect water quality in areas where Section 319 funds are used.

Recommendations for Executive Action

We are making three recommendations to help protect the quality of our nation's water resources.

To strengthen EPA's implementation of its responsibilities under the Clean Water Act's section 319 nonpoint source pollution control program, we recommend that the Administrator of EPA take the following two actions:

- provide specific guidance to EPA's 10 regional offices on how they are to fulfill their oversight responsibilities, such as how to review states' plans for project feasibility and criteria to ensure that funded projects have characteristics that reflect the greatest likelihood of effective implementation and tangible water quality results, and
- in revising section 319 guidelines to states, and in addition to existing statutorily required reporting measures, emphasize measures that (1) more accurately reflect the overall health of targeted water bodies (e.g., the number, kind, and condition of living organisms) and (2) demonstrate states' focus on protecting high-quality water bodies, where appropriate.

To provide assurance that efforts to conserve soil resources do not work at cross-purposes with efforts to protect water quality, we recommend that the Secretary of Agriculture direct the Chief of the Natural Resources Conservation Service to analyze available information, and obtain necessary information from field offices, to determine the extent to which appropriate mitigation measures are implemented when nutrient management plans are not in use, particularly in watersheds where states are spending section 319 funds.

Agency Comments and Our Evaluation

We provided a draft of this report to the Administrator of the Environmental Protection Agency and to the Secretary of Agriculture for their review and comment. EPA provided written comments in an April 16, 2012, letter, in which the agency expressed general agreement with the report's two recommendations calling for improved and more consistent regional oversight, and for improved and more comprehensive program measures. The letter also cited GAO's "constructive engagement with the EPA headquarters, the EPA regions, and state nonpoint source control program staff." It did, however, also question our characterization of several points related to project selection and effectiveness. The letter is included in appendix II along with our responses to the agency's comments.

USDA's NRCS provided written comments in an April 20, 2012, letter that did not specify whether the agency concurred with our recommendations. The letter acknowledged that we addressed some of the concerns NRCS raised in reviewing an earlier "Statement of Facts" we had provided NRCS officials as a means of verifying the factual information we had planned to use in drafting our report. However, in its letter, NRCS took issue with what it characterized as "several inaccuracies" that remained after the draft report was sent to USDA for comment. Specifically, NRCS identified two, related concerns with the draft report, stating that (1) the message conveys that USDA soil conservation practices have unintended negative impacts on water quality and (2) this inaccuracy appears to be based on misinterpretation and subsequent misuse of a generalized planning tool (Conservation Practice Physical Effects matrix), lack of knowledge of NRCS conservation planning process, and inferences that exceed the limitations of the data on which they are based. Regarding the first concern, our draft report acknowledged the goals and accomplishments of NRCS' Environmental Quality Incentives Program in mitigating the impacts on water quality of certain agricultural practices. We revised the language in the draft report to further discuss the program's benefits in response to NRCS comments. That said, our field work identified instances where the program's goal of mitigating agricultural impacts appeared—on occasion—not to have been carried out at the ground level, and where water quality may have been affected as a result.

Addressing NRCS' second concern, in an effort to ascertain whether instances of ground water quality being affected were anecdotal or more prevalent, we examined USDA data and other information. Specifically, we examined (1) information from NRCS' Conservation Practice Physical Effects matrix; (2) data on EQIP conservation practices funded in watersheds where states had spent section 319 funds; and (3) information on the extent to which "alternative mitigation measures" are used as required, when nutrient management plans are not in use. In examining this information, we concluded that the EQIP data provided by USDA do not contain site-specific information on the extent to which alternative mitigation measures are effectively employed when nutrient management plans are not used. As we state in the report, without examining such information, neither we, nor NRCS, could determine that certain practices are not having unintended effects on water quality.

It was for this reason and to ensure that complete data are available to allow NRCS and others to assess whether the program has unintended water quality impacts that we recommended that NRCS analyze available

information and obtain necessary site-specific information from field offices as necessary. NRCS would then be in a better position to determine the extent to which appropriate mitigation measures are implemented when nutrient management plans are not in use (and particularly in watersheds where states are spending section 319 funds). We therefore continue to believe this recommendation has merit. NRCS' letter is included in appendix III, along with our responses to its comments.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the Administrator of EPA, the Secretary of Agriculture, the appropriate congressional committees, and other interested parties. In addition, this report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff members have any questions about this report, please contact me at (202) 512-3841 or trimbled@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix IV.



David C. Trimble
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

The objectives of our work were to examine (1) states' experiences in funding projects that effectively address nonpoint source pollution problems, (2) the extent to which the Environmental Protection Agency (EPA) oversees the section 319 program and measures program effectiveness in reducing the adverse impacts of nonpoint source pollution on water quality, and (3) the extent to which key agricultural conservation programs complement EPA's efforts to reduce nonpoint source pollution.

To conduct this work, we reviewed relevant laws, regulations, and agency guidance. In addition, we visited 8 states in four EPA regions: Arkansas, Louisiana, Maryland, Michigan, Ohio, Pennsylvania, Washington, and West Virginia. We chose these states on the basis of their varied types of nonpoint source pollution and proximity to some of the nation's premier watersheds, such as the Chesapeake Bay, Great Lakes, and Mississippi River. On our site visits, we met with state nonpoint source management program officials, conservation districts, nonprofit organizations, watershed associations, and research officials.

We also interviewed agency officials, including officials from EPA, the U.S. Department of Agriculture (USDA), EPA regional offices, the Natural Resources Conservation Service's Office of Science and Technology, and the Environmental Quality Incentives Program. We also interviewed representatives from the National Association of Conservation Districts, Association of State and Interstate Water Pollution Control Administrators, New England Interstate Water Pollution Control Commission, and state abandoned mine land programs. We discussed with these officials their observations on efforts to reduce nonpoint source pollution and the challenges associated with such efforts. We also interviewed subject-matter experts from industry and academia.

To examine states' experiences in selecting projects that effectively address nonpoint source pollution, we e-mailed a 10-question data collection instrument to nonpoint source program management officials in all 50 states, which solicited information from them on project selection processes, project selection criteria, types of organizations receiving funding, program organization and responsibilities, and program oversight practices. We received responses to this data collection instrument from every state. We also examined summary information, including objectives, methods, and outcomes, for more than 1,500 projects in EPA's Grants Reporting and Tracking System database. We reviewed this information for all projects in the database that were (1) awarded funding during or after fiscal year 2004 and completed before December

31, 2011; (2) categorized as nonstatewide projects; (3) received section 319 funds; and (4) had complete information on objectives, methods, and outcomes. Before reviewing project summary information and drawing the sample for our survey, we interviewed EPA officials to discuss the reliability of the data contained in EPA's Grants Reporting and Tracking System; we also checked for outliers and determined that the data were sufficiently reliable for our purposes.

In addition, we surveyed a random sample of 524 managers of projects that have been implemented with section 319 funds. The purpose of this survey was to examine topics such as general project information, project proposal and selection, conservation practice selection, project implementation and goals, challenges associated with projects, monitoring and oversight, and funding sources. To identify issues pertaining to section 319-funded projects and to develop the survey questions, we reviewed state annual reports and interviewed headquarters and regional agency officials and subject-matter experts.

We selected an initial simple random sample from EPA's Grants Reporting and Tracking System out of a universe of 1,584 projects. We selected projects that received section 319 funding; were completed between January 1, 2004, and June 9, 2011; and involved implementing conservation practices or remediation techniques, rather than, for example, projects that focused primarily on planning or monitoring. After drawing the initial sample, we removed duplicates and excluded projects that we learned were statewide, because such projects did not always involve implementing conservation practices or remediation techniques. We also excluded projects from North Dakota and South Dakota because some incomplete projects and some that never started in these states were listed as complete in EPA's Grants Reporting and Tracking System. After obtaining contact information for the sampled projects, we also excluded those projects for which knowledgeable officials were no longer available. After making these adjustments, we estimated that the number of projects meeting our criteria was 1,273. For those project managers who had more than 2 projects sampled, we randomly selected 2 projects for the survey in order to reduce respondent burden. After these adjustments, the final number of projects in the sample was 524.¹ The

¹The initial random sample was 618. After adjustments were made to the eligible survey population, the random sample was 524 managers of projects.

results of our survey are generalizable to the population of section 319 projects that meet our criteria. That is, they are not generalizable to projects, for example, that did not implement conservation practices or those that were completed before January 1, 2004.

The survey was conducted using self-administered electronic questionnaires posted on the World Wide Web. While developing the survey questions, we conducted two rounds of pretests with section 319 project managers over the phone. We conducted six first-round exploratory pretests with managers to help develop the scope of the questionnaire and key concepts. After refining our concepts and questions, we pretested a draft version of the questionnaire with five project managers. We conducted pretests to check that (1) the questions were clear and unambiguous, (2) terminology was used correctly, (3) the questionnaire did not place an undue burden on agency officials, (4) the information could feasibly be obtained, and (5) the survey was comprehensive and unbiased. We made changes to the content or format of the questionnaire after each pretest according to the feedback we received. A draft of the questionnaire was also reviewed by independent GAO survey experts, and we revised the questionnaire to reflect that review.

We contacted survey respondents by sending the survey through an e-mail notification to each. We e-mailed each potential respondent a unique password and username to ensure that only members of the target population could participate in the survey. The survey data were collected from September 2011 through November 2011. We sent follow-up e-mail messages to those who had not responded by the deadline to our original e-mail. We then telephoned all remaining nonrespondents for whom contact information was available, beginning in October 2011. We received a total of 298 responses, accounting for an overall unweighted response rate of 57 percent. Estimates produced from the sample of projects are subject to sampling error. We express our confidence in the precision of our results as a 95 percent confidence interval. This interval would contain the actual population value for 95 percent of the samples we could have drawn. As a result, we are 95 percent confident that each of the confidence intervals in this report includes the true values in the study population. Additionally, to encourage honest and open responses, we pledged in the introduction to the survey that we would report information in the aggregate and not report data that would identify a particular respondent. This report does not contain all the results from the survey; the survey and a more complete tabulation of the results are provided in a supplement to this report (see [GAO-12-377SP](#)). To

eliminate data-processing errors, we independently verified the computer program that generated the survey results.

In addition to tabulating and analyzing the frequencies of survey responses, we conducted a content analysis of all of the open-ended narrative responses received to survey questions 33, 34, and 35. We analyzed the content of the 180 responses to question 33 and the 106 responses to 34 to identify the types of challenges faced and reasons for grant revisions and extensions. Question 33 was coded using the following categories: property access, lack of identified project sites, staff, weather, budget, technical, the National Environmental Policy Act, administrative barriers, coordination, other, exempt, and unclear. Projects coded as exempt included those for which no challenge was encountered or the project was found to be outside of the scope of the sample. Projects were coded as unclear if it was unclear whether a challenge was encountered or if the nature of the challenge was unclear. Question 34 was coded using the following categories: time, budget, location, project scope or specifications, other, exempt, and unclear. Projects coded as exempt included those for which no grant extension was required or the project was found to be outside of the scope of the sample. Projects were coded as unclear if the length of the extension was unclear. Question 34 was coded to reflect the number of months of the grant extension; unclear and exempt categories were also used. We also analyzed the 129 responses to question 35, which was coded to reflect the number of months of the grant extension, including use of unclear and exempt categories. Coding was performed independently by two coders; team members then met to discuss the coding categories and reached consensus on the final coding category assignment for each response. Measures of interrater reliability were calculated before codes were reconciled and found to be sufficiently high for the purposes of this analysis. The numbers of responses in each content category were then summarized and tallied.

To examine the extent to which EPA oversees the section 319 program and measures program effectiveness in reducing the adverse impacts of nonpoint source pollution on water quality, we obtained from EPA's 10 regional offices information on the nature and extent of their oversight of state programs, including the extent to which they examine states' project selection processes, annual plans, and program objectives and the criteria they use to annually award funds. In addition, we examined section 319's statutorily required reporting requirements, which EPA uses as national measures of program effectiveness. We evaluated the water quality benefits derived from projects that address these measures,

compared with the water quality benefits of projects that address other EPA-approved measures of state program effectiveness, primarily by reviewing EPA documents and interviewing state nonpoint source program officials. We also obtained annual reports from 42 states' nonpoint source management programs and reviewed 25 of them to determine how they reported the achievements of section 319-funded projects during the most recent fiscal year for which the report was available.

To examine the extent to which key agricultural conservation programs complement EPA's efforts to reduce nonpoint source pollution, we analyzed data on USDA's conservation practices funded under the Environmental Quality Incentives Program that have been implemented in watersheds where states have allocated section 319 funds. We obtained these data from the Program Contracts System, known as ProTracts, which is used to manage Natural Resources Conservation Service conservation program applications, cost-share contracts, and program funds. We also examined USDA reports on the effectiveness of conservation practices, including those produced by the Conservation Effects Assessment Project. To assess the reliability of this database, we performed electronic data testing for missing data, outliers, and obvious errors. In addition, we interviewed knowledgeable agency officials and compared summary information from the database with published reports. On the basis of this assessment, we determined that ProTracts data were sufficiently reliable for our purposes. We also interviewed USDA officials in the Natural Resources Conservation Service's Office of Science and Technology.

We conducted this performance audit from December 2010 through May 2012, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Comments from the Environmental Protection Agency

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 16 2012

OFFICE OF WATER

Mr. David C. Trimble
Director, Natural Resources and Environment
U.S. Government Accountability Office
Washington, D.C. 20548

Dear Mr. Trimble:

Thank you for the opportunity to review and comment on the draft report *Nonpoint Source Water Pollution: Greater Oversight and Additional Data Needed for Key EPA Water Program*, which examines aspects of the EPA's Clean Water Act Section 319 grant program. Overall, the EPA believes GAO's findings highlight the fact that the EPA and the states have done well with the resources Congress has provided in achieving nonpoint source pollution reductions, and we are in general agreement with GAO's two recommendations to the EPA to improve the effectiveness of this program. Although modestly funded relative to the challenges of nonpoint source pollution nationwide, the Section 319 grant program has used partnerships and leveraging of additional resources to achieve significant watershed protection and restoration. This includes the restoration of more than 360 water bodies documented as "Section 319 Nonpoint Source Success Stories."¹ However, the EPA suggests that the continued success of the nonpoint source program depends on the right balance of sufficient resources, legal authorities, and true partnerships with the United States Department of Agriculture (USDA), the states, and other key stakeholders to achieve a common goal of water quality protection and improvement. The EPA's general comments are contained in this letter, with more detailed comments and editorial recommendations in the enclosure.

GAO Finding Highlights Success of EPA's Clean Water Act Section 319 Program

The EPA appreciates GAO's acknowledgment of the program successes in the Section 319 program. This is especially notable given the program's primary emphasis on non-regulatory approaches that rely on voluntary participation by local stakeholders and private landowners. GAO's finding that over 70 percent of watershed projects accomplished all objectives originally identified in the proposal indicates that the majority of Section 319-funded projects are carefully planned and well managed during implementation. We believe the characterization and language in the GAO report should better align with this generally positive finding about the Section 319 program (see detailed comments in the attachment).

Although GAO did find that some Section 319-funded projects encountered difficulties, the report indicates a number of instances in which states learned from funding unsuccessful projects and adjusted the state project selection process accordingly. This type of adaptive management is essential in

¹ <http://water.epa.gov/polwaste/nps/success319/>

See comment 1.

watershed-based implementation where local leaders, landowners, partners and resources vary in each new location.

Adaptive Management Necessary for Section 319 Implementation Projects

GAO's discussion under "preventing challenges through more rigorous project selection" suggests that all projects should have necessary landowner "buy-in" secured in advance. While this may be feasible for some smaller projects where project coordinators are able to fund recruitment up front, the EPA does not believe it is feasible to require all grant applicants to have landowner participation secured in advance. Despite best efforts in project selection and outreach/recruitment of landowners, Section 319-funded projects are based on voluntary participation and in many cases will require adjustments during a project period. The EPA does not believe GAO should broadly characterize projects that use adaptive management as facing "preventable challenges" and suggests some wording changes in the detailed comments.

See comment 2.

Nonpoint Source Control Practices are Implemented in the Context of Watershed-Based Plans

The GAO report correctly notes that waters impaired by agriculture are best addressed through a suite of conservation practices. We are concerned by GAO's assertion that "...the EPA data indicated that Section 319 funds paid for conservation practices to be put in place in isolation" and don't believe the GAO analysis supports this conclusion. Reviewing projects in the Section 319 Grants Reporting and Tracking System (GRTS) gives a snapshot of project activity but may not provide a full picture of watershed restoration. GRTS provides data for past or ongoing Section 319 projects but will not represent practices that have been put in place already or are planned, or that are being implemented via other agencies and funding mechanisms (e.g., EQIP). The Section 319 guidelines require a watershed-based plan be in place prior to funding implementation projects for impaired waters. The purpose of this requirement is to ensure that water quality problems are analyzed at a watershed scale, critical areas are identified, and a suite of necessary practices are identified and implemented through the plan.

See comment 3.

See comment 4.

The Role of Section 319 Funding in Restoring and Protecting the Nation's Waters

The GAO review is described as stemming from concerns about the persistence of nonpoint source pollution "particularly given more than 20 years of funding for the Section 319 program." This preface to the GAO report lacks critical context related to the pervasiveness, variety, and magnitude of NPS pollution nationwide relative to the federal funding levels and scope of the Section 319 program. NPS pollution encompasses a wide range of sources that are not subject to federal or even state regulation. The scope of the problem expands as a result of population growth and land use changes; even as waters are restored, others are listed as impaired as a result of development pressures and other factors such as recent identification of existing water quality problems. The vast extent and continuous nature of NPS pollution requires that the problem be addressed through a variety of federal, state and local non-regulatory and regulatory approaches, as well as through multiple funding sources.

See comment 5.

As one point of reference, the Clean Watersheds Needs Survey 2008 Report to Congress compiles state estimates of costs to address NPS pollution and decentralized/onsite wastewater systems at \$46.7 billion over a 20-year period. This is likely an underestimate as not all states provided information for the

NPS/onsite systems portion of the survey. The reported funding needs are equivalent to an annual need of \$2.3 billion per year.

Section 319 funding is most appropriately viewed as a critical source of support for state NPS management programs and for watershed projects that demonstrate successful NPS pollution controls. While Section 319 funding is an essential part of the solution, it is not the entire remedy. Many states successfully leverage additional state, federal and local funds in support of their NPS programs, and the EPA continues to work with federal partners to leverage the greater resources available through other programs. In this regard, we are pleased about a joint FY13 initiative with USDA's Natural Resources Conservation Service in which we will collaborate in watersheds across the country to address waters impaired by excess nutrients and sediments. Given that GAO's study looked at aspects of USDA programs, we welcome any insights GAO may have for additional opportunities for partnering and leveraging with USDA.

EPA's Response to GAO's Recommendations

The EPA completed the *National Evaluation of the Clean Water Act Section 319 Program* in November 2011. Appendix C of this study outlines a number of potential Section 319 program enhancements. We are moving forward this year with several of these program revisions aimed at strengthening the strategic focus of state NPS programs, providing more consistent review of state programs nationally, and improving our ability to document the progress and success of the Section 319 program. We will be revising our *Nonpoint Source Program and Grants Guidelines for States and Territories* in November 2012 for use in Fiscal Year 2013 and beyond. These program efforts align well with the two GAO recommendations for the EPA.

Additionally, as part of an Agency Water Quality Priority Goal for Fiscal Year 2012-2013, the EPA has committed that 50 percent of states will revise their NPS management programs plans by September 30, 2013. Within the next few months, we will be providing guidance to states and the EPA regions on updating NPS program plans. The EPA will also provide guidance to the EPA regions on conducting annual satisfactory progress determinations of states' NPS program progress, increasing national consistency in the conduct of these reviews. The EPA's response to the recommendations and additional program refinements are described below.

(1) Provide Specific Guidance to EPA Regional Offices on Oversight

GAO's first recommendation for the EPA is to provide guidance to the EPA regional offices on how they are to fulfill their oversight responsibilities. GAO's report mentioned the variable rate of updates to state NPS management program plans, and recommends reviewing state workplans for project feasibility and criteria to ensure that funded projects have characteristics that reflect the greatest likelihood of effective implementation and tangible water quality results.

The EPA agrees with this recommendation. As noted above we will provide guidance on the EPA regional review of updated State NPS management program plans, as well as for the EPA regional satisfactory progress determinations of state NPS programs. In terms of project selection, we would like to reiterate the finding in the GAO report that all regions review annual state grant workplans. Further, some EPA regions play a greater role in project selection by, for example, participating in state project selection committees. We believe, and GAO's analysis seems to support, that successful projects have been associated with differing levels of EPA regional involvement unique to state and regional circumstances. We will engage the states and the EPA regions to identify best practices for project selection in the Section 319 program, and we will incorporate these best practices into our program guidance as appropriate.

Review Section 319 Program Measures

GAO's second recommendation to the EPA is to emphasize measures that (1) more accurately reflect the overall health of targeted water bodies, and (2) demonstrate states' focus on protecting high quality water bodies, where appropriate. The EPA is in agreement with the idea that more or different measures would better represent the progress and accomplishments of the Section 319 program, especially given the inevitably long lag time from project initiation to positive water quality results.

GAO cites some limitations with the existing program measure to quantify pollutant load reductions (nitrogen, phosphorus, sediments). The EPA recognizes that reductions in pollutant loadings do not always capture the full water quality benefits of various projects. Nonetheless we believe reductions in pollutant loadings are an effective way to realize water quality results and are an important measure of success for many projects. Pollutant reductions are often a necessary component, even if other actions are needed to achieve full restoration. This measure provides valuable information in the implementation year to give some indication of recent progress, and is called for by statute. We have a strong interest in making this measure more meaningful, for example by linking annual pollutant reductions to the total reductions needed to reach water quality goals. Later this year, the EPA will undertake a process to develop program measures that will gauge incremental progress in addressing water quality in NPS-impaired waters.

The EPA appreciates GAO's interest in the need to focus on the overall health of water bodies in the context of measuring the number, kind and condition of living organisms. The EPA encourages states to consider biological assessment and the adoption of biocriteria as part of their water quality standards program. Where states do gauge their water quality progress against biocriteria, this is usually noted in the descriptive summaries of the EPA's measure WQ-10 (i.e., Section 319 Success Stories). Moving forward we expect to continue the practice of gauging the success of Section 319 restoration projects based on state-established water quality standards, including biocriteria where these standards exist and states monitor for them.

We appreciate GAO's emphasis on the importance of protecting unimpaired/healthy waters and expanding the role of the Section 319 program to do so accordingly. The current (2003) Section 319 grant guidelines are focused on restoring impaired waters. While we expect that restoration of impaired waters will continue to be a key feature of the Section 319 program, we are actively considering ways to provide greater emphasis on protecting high quality waters and will address this issue when we revise the grant guidelines later this year.

**Appendix II: Comments from the
Environmental Protection Agency**

Measuring the benefits of protection (e.g., pollution prevention) presents a more difficult set of challenges than measuring restoration of already-impaired waters. While we cannot commit to adopting such a program measure in the near future, we are very interested in addressing how to meaningfully measure the prevention of impairment with data and methods that are accessible to most states. We are hopeful that we could move in this direction and adopt such a measure in the coming years.

Again, thank you for the opportunity to comment. The EPA expresses its appreciation for the thoughtful work of GAO staff members during this review, and their constructive engagement with the EPA headquarters, the EPA regions, and state nonpoint source control program staff.

Sincerely,



Nancy K. Stoner
Acting Assistant Administrator

Enclosure

The following are GAO's comments on the Environmental Protection Agency's letter dated April 16, 2012.

GAO Comments

1. EPA stated that our report should better align with the generally positive finding that over 70 percent of watershed projects accomplished all of their originally identified objectives. As EPA suggested, we made several changes to our report to put the 70 percent figure in context. In response to the EPA comment are two additional considerations. First, the fact that 72 percent of projects eventually achieved their goals does not suggest that they all did so in either a timely fashion or without significant complications. For example, as we state in our report, almost half of the projects that achieved their goals did so after encountering significant challenges that prevented them from finishing on schedule, staying on budget, or achieving the desired levels of pollution reduction. Second, we did not intend to arbitrarily identify a specific pass/fail threshold for the success of surveyed projects or intend to suggest that 70 percent is an acceptable or unacceptable share of projects that achieved originally proposed goals. Instead, for those projects that did not achieve their originally proposed goals and for those that did so while encountering challenges, we described the challenges that projects most often faced—and their main causes—to provide information that may assist EPA and the states in developing or modifying project selection criteria or, through other means, better ensure that projects receiving section 319 funds in the future will have a high likelihood of achieving pollution reduction and other project goals.
2. EPA stated that we should not broadly characterize projects that use adaptive management (i.e., projects in which some issues cannot be identified in advance but rather need to be addressed after a project is under way) as facing "preventable challenges." EPA noted in particular that it is not feasible for grant applicants to obtain landowner buy-in in advance of project selection. We acknowledge the difficulty that EPA and the states face in trying to reduce nonpoint source water pollution and protect threatened waters using primarily voluntary methods and that numerous unforeseen factors can affect the success of project implementation. Our survey results showed, however, that the chief reason why some projects did not achieve their originally proposed goals was because third-party buy-in was not secured in advance. Moreover, a key component of EPA's strategy under the section 319 program is to have states lay the groundwork in advance, using "indirect" projects (e.g., education and outreach

activities) to obtain local support so that direct implementation projects can succeed. The experiences of some states, such as Ohio, have shown that where rigorous project selection criteria have been put in place—such as requirements to secure landowner participation in advance—the quality of projects has increased over time (as measured by the ability of project applicants to actually implement their projects as intended), and local partners have been more effective in meeting such requirements.

3. EPA stated it was concerned by our statements about EPA data indicating that section 319 funds paid for conservation practices "to be put in place in isolation" and that it did not believe the analysis supported this conclusion. The draft report had acknowledged that EPA's Grants Reporting and Tracking System (GRTS) data do not provide a complete picture of multi-agency efforts to implement conservation practices. In response to EPA's comment, we revised the report to further acknowledge that, for the properties reflected in our analysis of GRTS data, complementary practices may have been installed by NRCS, landowners, or others. Notwithstanding the incompleteness of the GRTS data, however, our field work showed that section 319-funded projects to reduce agricultural runoff were ineffective because the proper suites of companion practices were not always installed. We noted that environmental protection officials from several of the states we visited told us that they had often encountered this problem with section 319-funded projects to reduce agricultural runoff.
4. EPA cites a requirement in its guidelines that a watershed-based plan be in place before funding implementation projects for impaired waters, as adding further assurance that in selecting projects, "water quality problems are analyzed at a watershed scale, critical areas are identified, and a suite of necessary practices are identified and implemented through the plan." We acknowledge the guidelines' requirement for a watershed-based plan and its value. Nonetheless, despite the good intentions behind such watershed-based plans, EPA does not have regulatory authority to compel either the implementation of the plans or the suites of practices described within them, particularly on agricultural land. That choice is ultimately left to the landowners within the plans' geographic areas. Thus, while having a watershed-based plan could help promote positive outcomes, the plan in and of itself is no guarantee that its requirements will be fulfilled.

5. EPA stated that our allusion to the persistence of nonpoint source pollution, "particularly given more than 20 years of funding for the Section 319 program," does not account for the pervasiveness, variety, and magnitude of nonpoint source pollution nationwide relative to the federal funding levels and scope of the section 319 program. We acknowledge the massive scope of the nation's nonpoint source water pollution problem and that its persistence and pervasiveness is not something that EPA alone can be expected to solve with Section 319 funding alone. We have adjusted the text accordingly. At the same time, we believe that the funding levels allocated to the section 319 program are not insignificant and that the improvements suggested in this report can enhance the program's contributions toward alleviating the nation's nonpoint source pollution problem.

Appendix III: Comments from the U.S. Department of Agriculture

Note: GAO comments supplementing those in the report text appear at the end of this appendix.

United States Department of Agriculture



Natural Resources Conservation Service
Post Office Box 2890
Washington, D.C. 20013

APR 20 2012

Mr. David C. Tremble
Director, Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, N.W., Room 2123
Washington, D.C. 20548

Dear Mr. Tremble:

Thank you for allowing the Department of Agriculture (USDA) to review and comment on the draft report entitled "Nonpoint Source Water Pollution – Greater Oversight and Additional Data Needed for Key EPA Water Program."

We were pleased to see that you addressed several of our concerns in the "Statement of Facts for GAO's Review of EPA's Section 319 Program" (Job Code: 361251). However, it is clear that several inaccuracies still remain in the report. Therefore, we request your attention to their correction.

Overall Comment:

Throughout this report, the message is conveyed that USDA soil conservation practices have unintended negative impacts on water quality. This message disregards years of university and Federal research findings that document the positive benefits of soil conservation practices on water quality. This inaccuracy appears to be based on misinterpretation and subsequent misuse of a generalized national planning tool (the "Conservation Practice Physical Effects (CPPE) matrix"), lack of knowledge of the Natural Resources Conservation Service (NRCS) conservation planning process, and inferences that exceed the limitations of the data on which they are based.

The following comments are referenced by page and paragraph:

- Highlights of "What GAO Found," last paragraph: "USDA data show that from 2005 through 2010, the program funded nearly 8,000 practices that –if implemented in isolation– can increase nonpoint source pollution."

NRCS does not implement practices in isolation. In fact, NRCS analysis of its Environmental Quality Incentives Program (EQIP) data show an average of four practices funded per EQIP contract. NRCS uses a site-specific conservation planning process that accounts for critical soil, site, cropping system, management, and other factors that impact water quality (e.g. factors such

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See comment 1.

See comment 2.

Mr. David C. Tremble
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See comment 3.

as slope gradient, soil properties influencing infiltration, surface residue impacts on runoff, and distance to water bodies). It is true that a single practice standard may have benefits for one resource concern and not another. However, NRCS implements suites of practice standards in an overall (comprehensive) Conservation Plan. In this way multiple resource concerns are addressed and multiple conservation practices are implemented to achieve the landowners' and environmental goals. As described more fully later in this review, the perception that USDA implements practices in isolation apparently arises from misinterpretation of the CPPE matrix. The CPPE matrix is a generalized, national tool that provides a first approximation of potential effects for each practice. If a potentially negative effect is identified, then the conservation planner is alerted to this possibility so that they know to plan any site-specific mitigating practices (if needed) to ensure positive outcomes. Interpretation of the effects of individual practices using the CPPE matrix, therefore, is not appropriate for assessing overall effects of site-specific conservation plans. Consequently, we request that you delete such statements (here and on pages 37, 38, and 40), as they are inaccurate within the context of how NRCS develops and implements site-specific conservation plans.

Now on pages 41, 42,
and 46.

- Highlights of "What GAO Found", last paragraph: "...but USDA data showed that these plans had not been funded for use on properties in about two-thirds of the 800 watersheds."

See comment 4.

This information is misleading and inaccurate. The report context from where this summary statement is drawn (page 40, paragraph 2) shows that nutrient management is the particular focus of the statement. Although nutrient management (practice 590) is a frequently used approach for enhancing water quality, it is not the only practice used for mitigating water quality issues. NRCS has identified over 80 practices with potential water quality improvement attributes. Implying that NRCS' procedures for protecting water quality have not been followed in two-thirds of the watersheds without an analysis of the use of the other 80 water quality improving practices is not only a misinterpretation of the statistics, but this conclusion violates a basic tenet of statistical analysis by inferring a conclusion that far exceeds the limitations of the data.

Now on page 46.

Because NRCS does not know which watersheds GAO used in their analysis, NRCS examined all 30,000 watersheds and found about 80 percent had water quality improving practices in place with a similar share reporting "Nutrient Management Plans." This percentage does not mean that the other 20 percent were sub-standard (i.e. water quality may not have been identified as a resource concern). However, failure to consider practices other than "nutrient management" in this analysis clearly understates the number of water quality improving practices that are in place on the landscape. In addition, EQIP contracts typically last for about 3 years. Producers often adopt nutrient management practices well beyond the length of a contract because they recognize the economical and environmental benefits of improved nutrient use efficiency provided by those practices. This adoption would not likely appear in an analysis of existing contracts. USDA requests that either the above qualifiers be added to improve accuracy of the report, or this section be deleted.

See comment 5.

- Page 5, paragraph 1: "For example pesticide use in farming has resulted in toxic runoff."

Mr. David C. Tremble
Page 3

USDA requires that growers enrolled in USDA programs follow all national, State and local regulations. This requirement would include the need to follow pesticide labels. Pesticide labels are developed post extensive multiple year testing programs, and when followed, should not typically result in toxic runoff. Pesticide application is governed by the Environmental Protection Agency (EPA) and is controlled specifically by the active ingredient label restrictions. NRCS takes this resource concern a step further and if soil and pesticide interactions indicate an elevated pesticide risk, that risk is addressed by conservation mitigation measures designed to lower the pesticide risk. Further, there is often a suite of conservation practices applied to agricultural settings in the form of an Integrated Pest Management (IPM) plan. Indeed, agrochemicals are very expensive and their over-application is neither a wise environmental nor economical decision. Most producers strive to balance the most efficacious pesticide with the least amount of application. Pesticides used in accordance with labeling are frequently applied with little threat to the environment. Pesticide use should be planned as part of an overall strategy designed to improve economic production and protect the environment.

Now on page 41.

- Page 37, paragraph 1: “USDA and EPA documents have identified NRCS’s Environmental Quality Incentives Program as the key agricultural conservation program that can complement EPA’s efforts to reduce nonpoint source pollution under section 319, but certain soil conservation practices under the program may hinder the success of EPA’s efforts.”

See comment 6.

NRCS disagrees that soil conservation practices may hinder the success of EPA’s efforts. Upon speaking with GAO, it appears such conclusions are largely drawn from misinterpretation and subsequent misuse of the CPPE matrix. NRCS implements suites of practice standards in an overall (comprehensive) Conservation Plan. In this way multiple resource concerns are addressed and multiple conservation practices are implemented to achieve the landowners’ and environmental goals. Interpretation of the effects of individual practices using the CPPE matrix is not appropriate for assessing overall effects of site-specific conservation plans. Consequently, we respectfully request that you delete such statements as they are inaccurate within the context of how NRCS develops and implements site-specific conservation plans.

Now on page 42.

- Page 38, first complete paragraph: “...some soil conservation practices could have unintended, negative effects on water quality if installed in isolation.”

See comment 7.

NRCS analysis of EQIP data finds an average of four practices per contract, indicating that single practice implementation is very rare (please see table below).

Mr. David C. Tremble
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Fiscal Year 2011 Financial Assistance Programs Contracts and Number of Practices in Contracts (Source: ProTracts 10/1/2011)

	Total Number of Practice Occurrences	Number of Active or Completed Contracts	Average Number of Practices in Contracts
EQIP	168,500	38,352	4
WHIP	17,569	3,856	5
AWEP	4,866	1,299	4
CBWI	11,340	1,716	7
AMA	1,119	275	4
TOTAL	203,394	45,498	4

Good conservation planning requires that the planner understands the site conditions and stated resource concern. Adequate planning avoids, minimizes, and mitigates negative consequences associated with conservation plan implementation. The statement about the effects of practices installed in isolation indicates that GAO again used the CPPE matrix. The CPPE matrix is simply a very rough first approximation of effects that is most often used as a training tool or part of EQIP ranking and is not the only effects assessment tool used during site-specific conservation planning. When water quality is a concern, other effects assessments include such evaluations as soil erosion potential, risk of nitrogen leaching, and risk of phosphorus loss. Because the CPPE matrix includes a single rating for all parts of the country and all situations, it is well recognized that its site-level accuracy is low. Also, "facilitating practices" may be employed that do not directly affect a resource concern, but have a beneficial effect when used in a system of practices. For these and other reasons stated elsewhere, USDA requests that this statement be deleted.

- Page 38, paragraph 1: The report refers to underground outlets in saying that "Such systems can also increase the quantity of nutrients (nitrogen and phosphorus) and pesticides transported into outlets that in turn feed nearby water bodies".

Again, this is a misinterpretation of the CPPE matrix, and the statement by GAO is an inaccurate description of the practice. Underground outlets are used to allow water to change elevation without erosion. The practice is not used as part of a field drainage system. The practice does not increase the possibility of nutrients in the water, nor change the flow of water eventually reaching surface water systems; the practice prevents erosion while allowing the water to move down slope. The "negative entry" in the CPPE matrix is included to alert the planner that this

See comment 8.

Now on page 42.

See comment 9.

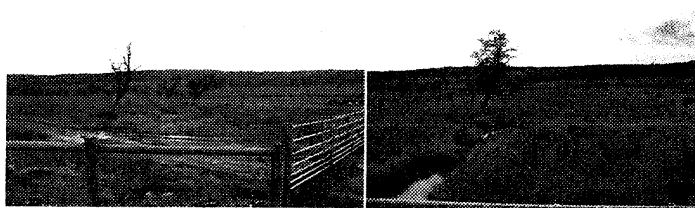
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practice allows water to move more quickly and thus reduces the time that natural processes have to reduce the nutrients or other agricultural chemicals. Please delete or clarify this section to reflect the above information.

- Page 38, paragraph 1: The report states that "...if such (livestock) crossings are installed in isolation...(they) can increase the number of livestock entering the stream."

This statement lacks perspective. NRCS analysis of the full EQIP data finds an average of four practices per contract, implying that single practice implementation is very rare. NRCS realizes that according to this GAO report, a Dept. of Ecology official at Washington State provided an example of landowners keeping the gates open rather than using them for emergency purposes only, as intended. USDA feels this is the exception, as miles of exclusion fencing are contracted every year to keep livestock out of streams, and stream crossings are appropriately utilized to help attain those water quality benefits.

As an example, NRCS fenced cattle out of 2.5 miles of a stream on a Maryland farm (below, left picture). Adding a stream crossing (see gate in left picture) allows cattle to travel from one side of the farm to another, but concentrates their crossing at one place, thereby reducing streambank erosion and nutrient losses to the stream. NRCS worked with the landowner to then plant buffers to stabilize the banks and capture runoff nutrients before they reach the stream (right picture). For balance, please add these pictures and associated descriptions to the report.



- Page 39, paragraph 2: "...that help farmers manage the amount, form and timing of fertilizer".

Please also include the "placement" factor in the 4Rs concept of nutrient management (i.e. "the amount, form, placement, and timing of fertilizer").

- Page 40, paragraph 1: The report states that "...17 percent, were types of individual conservation practices that could degrade water quality, according to NRCS's analysis of its conservation practices' physical effects."

This statement is misleading and conveys an inaccurate message for at least two reasons. First, it is based on misuse of the CPPE matrix. The CPPE matrix is used in the planning stage to alert

Now on page 45.

See comment 10.

Now on page 44.

Now on page 46.

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planners of potential issues so they can plan accordingly. They then use this information in developing their conservation plans (i.e. they do not prescribe practices detrimental to water quality). Because the CPPE matrix provides a single rating for all parts of the country and all situations, it is well recognized that its results are generalized. Again, its use in the conservation planning process is only as a preliminary tool to let planners know the potential effects and to plan accordingly (i.e. offer mitigating practices if needed). Secondly, this statement does not report the number of practices actually installed in isolation. These statistics are needed by GAO before a conclusion can be reached on whether conservation practices are installed singly without other mitigating practices. As previously provided, NRCS analysis of all EQIP data shows an average of four practices employed per EQIP contract. Therefore, USDA requests deletion of this misleading message.

Now on page 46.

- Page 40, paragraph 2: the report states that "...nutrient management plans were funded on properties in less than one-third of the watersheds where soil conservation practices were funded that NRCS acknowledges could degrade water quality."

See comment 12.

Again, NRCS does not agree that its soil conservation practices are a threat to water quality. Numerous Federal and university research studies have documented the benefit of those practices for reducing nutrient and sediment transport to water bodies. Again, this statement appears to arise from the auditors' misinterpretation and misuse of the CPPE matrix. NRCS does not recommend practices in isolation. Instead, NRCS uses a comprehensive, site-specific conservation planning process to ensure that multiple resource concerns are addressed, including water quality. In addition, although nutrient management is a frequently used approach for enhancing water quality, it is not the only practice used for mitigating water quality issues. NRCS has identified over 80 practices with potential water quality improvement attributes. Implying that NRCS' procedures for protecting water quality have not been followed in two-thirds of the watersheds without an analysis of the use of the other 80 plus water quality improving practices is not only a misinterpretation of the statistics, but this conclusion violates a basic tenet of statistical analysis by inferring a conclusion that far exceeds the limitations of the data on which it is based.

See comment 13.

Because NRCS does not know which watersheds GAO used in their analysis, NRCS examined all 30,000 watersheds and found about 80 percent had water quality improving practices in place with a similar share reporting "Nutrient Management Plans." The failure to consider practices other than "nutrient management plans" clearly understates the number of water quality improving practices on the landscape. In addition, EQIP contracts typically last for about 3 years. Producers often adopt nutrient management practices well beyond the length of a contract because they recognize the economical and environmental benefits of improved nutrient use efficiency provided by those practices. This adoption would not show up in an analysis of existing contracts. USDA requests that either the above qualifiers be added to improve the accuracy of the report, or that this section be deleted.

Now on page 49.

- Page 43, third paragraph:

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This concluding paragraph summarizes the same points presented in the text, asserting that NRCS practices may inadvertently conflict with EPA efforts to reduce nonpoint source water pollution. In summary, it is clear that this assertion is based on misinterpretation and subsequent misuse of the CPPE matrix, a lack of knowledge of the NRCS conservation planning process, inferences that exceed the limitations of the data, and a disregard for university and Federal research findings. For these reasons, USDA requests changes in this concluding paragraph consistent with those requested in this review. Specifically, please remove any assertion that USDA practices conflict with water quality improvements.

Additional Information for Objective #3

The third stated objective for this report was to examine “the extent to which key agricultural programs complement EPA efforts to control such (nonpoint) pollution.” Based on this objective, it would seem appropriate for GAO to include information on published studies that provide such an evaluation. For several years, university and Federal research has documented the positive benefits of agricultural conservation practices at watershed scales as part of the Conservation Effects Assessment Project. In all, 42 watersheds covering 13 million acres combined have been studied (14 by USDA-ARS, 17 by universities through USDA’s National Institute of Food and Agriculture NIFA, and 11 by NRCS). As modeling results show in the table below, conservation practices on cultivated cropland have reduced sediment loss with runoff by 47-73 percent, nitrogen loss in runoff by 35-58 percent, nitrogen loss through leaching by 9-45 percent, and phosphorus loss by 33-59 percent.

Percent Reductions in Loss of Sediment, Nitrogen, and Phosphorus from Conservation Practice Use in Five Regions					
Constituent	Upper Mississippi	Chesapeake Bay	Great Lakes	Ohio-Tennessee	Missouri
Sediment	61	55	47	52	73
N (surface)	45	42	43	35	58
N (subsurface)	9	31	30	11	45
Total P	42	41	39	33	59

These reports are available at the following Web site:
<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/pub>.

To improve accuracy and balance of this GAO report, USDA requests that the above evaluations of conservation practices and associated Web site link be included in this report.

See comment 14.

See comment 15.

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- Page 2, paragraph 2 and footnote 2:

GAO indicates USDA's farm commodity programs indirectly contributed to nonpoint source water pollution through policies that encouraged the use of fertilizers and pesticides. This statement makes it seem as though commodity programs are creating pollution. Farmers are now free to plant whatever they want. There are little if any commodity program provisions that encourage excess crop production. If anything, given conservation compliance rules, commodity programs may actually reduce nonpoint pollution.

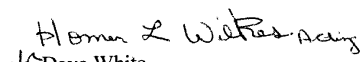
- Page 24, footnote 39:

Please reword the Conservation Reserve Enhancement Program (CREP) footnote to read: "Part of CRP, CREP authorizes State-Federal conservation partnerships that address specific State and nationally significant water quality, soil erosion, and wildlife habitat concerns related to agriculture."

Concluding Comments:

USDA appreciates the opportunity to review and comment on this draft report, but has serious concerns over several inaccuracies stated in the current version of the report. USDA requests that you please address the inaccuracies in the manner identified herein. The EPA 319 program is important and addresses critical non-point source water quality issues. USDA will continue to work with our federal partners at EPA and the State water quality agencies to coordinate programs and efforts to address non-point source water quality issues. Please direct any questions pertaining to this review to Dr. Wayne Honeycutt, NRCS, Deputy Chief for Science and Technology, at Wayne.Honeycutt@wdc.usda.gov, or (202) 720-4630.

Sincerely,


Dave White
Chief

Now on page 28.

The following are GAO's comments on the Department of Agriculture's letter dated April 20, 2012.

GAO Comments

1. NRCS commented on what it referred to as "several inaccuracies" that remained after the draft report was sent to USDA for comment. As discussed in the Agency Comments section of this report, in examining NRCS information, we concluded that the EQIP data provided by USDA do not contain site-specific information on the extent to which alternative mitigation measures are employed when nutrient management plans are not used. We continue to believe, as we state in the report, that without examining such information, neither we nor NRCS could determine that certain practices are not having unintended effects on water quality.
2. NRCS commented on our finding that from 2005 to 2010 the Environmental Quality Incentives Program funded nearly 8,000 practices that—if implemented in isolation—can increase nonpoint source pollution. Specifically, in its letter, the agency stated that "NRCS does not implement practices in isolation. In fact, NRCS analysis of its Environmental Quality Incentives Program data show an average of four practices funded per contract." We acknowledge that NRCS does not fund practices in isolation and have revised the report to clarify this statement. Nonetheless, our statement is correct in that the nearly 8,000 practices we identified have the potential to have a negative effect on water quality if, depending on site-specific conditions, the proper companion practices are not installed along with them. We note in the report that NRCS generally funds multiple practices per contract—an average of 4, according to NRCS' letter—but that this figure does not shed light on the type of practices that are being installed and whether the additional practices properly mitigate the potentially negative effects on water quality. It was for this reason that we recommended that NRCS analyze available information, which may involve obtaining site-specific information from field offices, to determine the extent to which appropriate mitigation measures are implemented when nutrient management plans are not in use.
3. NRCS stated that we misinterpreted the agency's use of its conservation practice physical effects (CPPE) assessments, noting that, "The CPPE matrix is a generalized, national tool that provides a first approximation of potential effects for each practice... Interpretation of the effects of individual practices using the CPPE matrix is not appropriate for assessing overall effects of site-specific

conservation plans.” We acknowledge that USDA generally implements suites of practices as part of site-specific conservation plans and have made changes in the report to clarify this point. Nevertheless, as NRCS’ letter states, the CPPE matrix provides an “approximation of potential effects” for each practice and, as such, can give an indication of the kind of effects that can occur if site-specific conservation plans are not implemented as intended. For instance, NRCS’ letter further states, “If a potentially negative effect is identified, then the conservation planner is alerted to this possibility so that they know to plan any site-specific mitigating practices to ensure positive outcomes.” In our field work, we found indications that site-specific mitigating practices were not always implemented when practices with potentially negative effects on water quality were installed. In an effort to determine whether the instances we observed were anecdotal or more prevalent, we then examined EQIP data but found these data not sufficiently detailed to determine if appropriate site-specific mitigation practices were also implemented.

4. NRCS commented on our finding that USDA data showed that nutrient management plans had not been funded for use on properties in about two-thirds of the 800 watersheds, stating that “this information is misleading and inaccurate...Although nutrient management is a frequently used approach for enhancing water quality, it is not the only practice used for mitigating water quality issues.” We disagree that this information is misleading and inaccurate. In meetings in July and August 2011, NRCS officials stated that nutrient management planning was the agency’s primary method for ensuring that those practices intending to conserve one resource (e.g., soil) do not inadvertently harm another resource (e.g., water). As we stated in our draft report, nutrient management plans are the mechanism that field planners often use to ensure water quality is protected on a property in an impaired watershed, and such plans might direct field planners to propose one or more of the 80 conservation practices that can improve water quality, according to NRCS officials. Our draft report also acknowledged that where nutrient management plans are not in place, other conservation planning procedures exist. For example, field planners might propose alternative mitigation measures—which would likely include one or more of the 80 conservation practices that can improve water quality—without requiring a landowner to adhere to a formal nutrient management plan. As we state in the report, because of limitations in the precision of EQIP data, the extent could not be ascertained to which alternative mitigation measures were in place for the roughly

two-thirds of watersheds where nutrient management plans were not funded and where the data also showed that practices had been funded that could potentially degrade water quality.

5. NRCS stated that because we did not “consider practices other than nutrient management,” we “understate the number of water quality improving practices that are in place on the landscape.” We are not questioning the number of water quality practices funded by NRCS; rather, it was the limitations of USDA’s data that prevented us, and NRCS, from identifying the full extent to which those water quality improving practices were implemented where they should be. Several state environmental protection officials we spoke with echoed this concern, telling us that because they do not have information on where NRCS funds practices, they do not know whether, and where, they need to use section 319 funds to implement mitigating practices to protect water quality or other practices to complement NRCS efforts. The agency’s summary data showing that “80 percent [of watersheds] had water quality improving practices” does not mean that such practices were always properly implemented with other companion practices to mitigate the effects of those practices that have the potential to degrade water quality.
6. NRCS disagreed with our finding that soil conservation practices may sometimes adversely affect efforts to protect water quality. In addressing this issue above, we acknowledged that, in general, such practices have substantial environmental benefits, but that in certain instances, it is possible that certain conservation practices—including some designed to minimize soil erosion—can negatively affect water quality when the proper companion practices are not also implemented.
7. NRCS provided information showing that under EQIP, the agency rarely implements conservation practices in isolation and instead funds “an average of four practices per contract.” We acknowledge, as previously stated, that NRCS rarely funds practices in isolation and have revised the report to clarify this statement. We also acknowledge that NRCS generally funds multiple practices per contract—an average of four, according to NRCS’ letter—but this number alone does not shed light on the type of practices that are being installed and whether the additional practices mitigate the potentially negative effects on water quality in the watersheds we analyzed.
8. NRCS commented on how we used information in its conservation practice physical effects assessments, asserting that “The CPPE matrix is simply a very rough first approximation of effects that is most often

used as a training tool ... and is not the only effects assessment tool used during site-specific conservation planning.” We acknowledge, as we have above, that the CPPE matrix is not the only tool used during site-specific planning and that field planners generally propose “site-specific mitigating practices to ensure positive outcomes,” according to NRCS’ letter. Nevertheless, in our field work we found some indications that site-specific mitigating practices were not implemented when practices with potentially negative effects on water quality were installed. As noted above, it is the limitations of the EQIP data available to NRCS in illuminating whether such instances were isolated occurrences, or indicative of a broader issue, that led us to recommend that NRCS analyze available information, which may involve NRCS obtaining site-specific information from field offices, to determine the extent to which appropriate mitigation measures are implemented where nutrient management plans are not in use, particularly in watersheds where states are spending section 319 funds.

9. NRCS stated that we misinterpreted the agency’s CPPE matrix in describing underground outlet systems. This information, however, came directly from NRCS field office technical guides and other NRCS documents. We nonetheless added information, as NRCS suggested in its letter, to clarify that underground outlets “allow water to move more quickly and thus reduce the time that natural processes have to reduce nutrients or other agricultural chemicals.”
10. NRCS stated that our example of stream crossings in Washington state is an exception and that “miles of exclusion fencing are contracted every year to keep livestock out of streams, and stream crossings are appropriately utilized to help attain those water quality benefits.” We acknowledge that the example from Washington State may well be an exception. Nevertheless, because of limitations in the availability of data, neither we nor NRCS could determine whether examples such as these were exceptions or more prevalent. As we stated earlier, it was for this reason, and to ensure that complete data are available to allow NRCS and others to assess whether the program has unintended water quality impacts, that we recommended that NRCS analyze information on the extent to which mitigation measures are implemented in situations where NRCS-funded conservation practices may negatively affect water quality (and particularly in watersheds where states are spending section 319 funds).
11. NRCS stated that our statement that 17 percent of conservation practices were types of individual conservation practices that could

degrade water quality was misleading and conveyed an inaccurate message. Specifically, NRCS stated that this finding is (1) based on misuse of the CPPE matrix, and (2) does not report the number of practices actually installed in isolation. To respond to NRCS' first point, as we stated above, we acknowledge that the CPPE matrix is not the only tool used during site-specific planning, but in our field work we found some indications that site-specific mitigating practices were not implemented when practices with potentially negative effects on water quality were installed. To respond to NRCS' second point, because of limitations in the precision of EQIP data, we could not ascertain the extent to which alternative mitigation measures were in place for the roughly two-thirds of watersheds where nutrient management plans were not funded and where the data also showed that practices had been funded that could potentially degrade water quality. Upon our request for information on alternative mitigation measures, NRCS officials told us that such information was documented and stored at the field level but that such information was not catalogued and available at the headquarters level.

12. NRCS stated that we misinterpreted and misused the CPPE matrix. As we stated above, NRCS' letter states that the CPPE matrix provides an "approximation of potential effects" for each practice and, as such, can give an indication of the kind of effects that can occur if site-specific conservation plans are not implemented as intended. In our field work, we found indications that site-specific mitigating practices were not always implemented when practices with potentially negative effects on water quality were installed.
13. NRCS stated that we misinterpreted USDA statistics on the use of nutrient management plans and "violated a basic tenet of statistical analysis by inferring a conclusion that far exceeds the limitations of the data on which it is based." We acknowledge, as we did in our draft report, that where nutrient management plans are not in place, other conservation planning procedures exist. Because of limitations in the precision of EQIP data, however, the extent could not be ascertained to which alternative mitigation measures were in place for the roughly two-thirds of watersheds where nutrient management plans were not funded and where the data also showed that practices had been funded that could potentially degrade water quality. Upon our request for information on alternative mitigation measures, NRCS officials told us that such information was documented and stored at the field level, but that such information was not catalogued and available at the headquarters level. Rather than drawing "inferences that exceed the

limitations of the data on which they are based,” as NRCS stated, we concluded that neither we, nor NRCS, could draw such inferences without additional information on the extent to which alternative measures are employed—or if site-specific conditions make them unnecessary—on these EQIP contracts when nutrient management plans are not used.

14. NRCS stated, “In summary, it is clear that this assertion is based on misinterpretation and subsequent misuse of the CPPE matrix, a lack of knowledge of the NRCS conservation planning process, inferences that exceed the limitations of the data, and a disregard for university and Federal research findings.” We disagree. Our draft report acknowledged the noteworthy goals and accomplishments of EQIP in mitigating the impacts on water quality of certain agricultural practices. In response to the NRCS comments, we revised the language in the draft report to further discuss the program’s benefits in finalizing the report. However, we found instances where NRCS conservation planning process did not mitigate certain practices’ effects at the ground level, and where water quality had been impacted as a result. In an effort to ascertain whether the instances we observed were anecdotal or more prevalent, we examined USDA data and other information, including the CPPE matrix, and concluded that neither we nor NRCS could draw such inferences without additional information on the extent to which alternative measures are employed on Environmental Quality Incentives Program contracts when nutrient management plans are not used. It was for this reason—and to ensure that complete data are available to allow NRCS and others to assess whether the program has unintended water quality impacts—that we recommended that NRCS analyze available information and obtain necessary site-specific information from field offices as necessary. NRCS would then be in a better position to determine the extent to which appropriate mitigation measures are implemented when nutrient management plans are not in use (and particularly in watersheds where states are spending section 319 funds).
15. NRCS provided additional information on EQIP’s water quality benefits, specifically requesting that we include information from published studies on the benefits of agricultural conservation practices. The draft report cited EQIP’s contributions toward improving water quality, but we nonetheless added language as suggested on the program’s pollutant reductions in key watersheds and on NRCS reports describing the agency’s water quality improvement efforts.

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

David C. Trimble, (202) 512-3841, or trimbled@gao.gov

Staff Acknowledgments

In addition to the individual named above, Steve Elstein, Assistant Director; Nathan Anderson; Elizabeth Beardsley; Mark Braza; Ellen Chu; Emily Eischen; Mitch Karpman; Jill Lacey; Dae Park; Kiki Theodoropolous; Jason Trentacoste; and Josh Wiener made key contributions to this report.

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