Disclaimer: *The Deputy Assistant Administrator of the U.S. Environmental Protection Agency's Office of Water, Joel Beauvais, signed the following notice on Monday, June 27, 2016, and EPA is submitting it for publication in the Federal Register (FR). While we have taken steps to ensure the accuracy of this Internet version of the notice, it is not the official version. Please refer to the official version in a forthcoming FR publication, which will appear on the Government Printing Office's FDsys website (http://fdsys.gpo.gov/fdsys/search/home.action) and on Regulations.gov (http://www.regulations.gov) {in Docket No. EPA-HQ-OW-2015-0668}. EPA projects that the official version of the proposed rule will be published in the FR in early July 2016.*

6560-50-P

ENVIRONMENTAL PROTECTION AGENCY

[EPA-HQ-OW-2015-0668; FRL-XXXX-X]

Decision Not to Regulate Forest Road Discharges under Section 402(p)(6) of the Clean Water Act; Notice of Decision

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of decision.

SUMMARY: The Environmental Protection Agency (EPA) is providing notice of the Agency's decision that no additional regulations are needed to address stormwater discharges from forest roads under Section 402(p)(6) of the Clean Water Act (CWA) at this time. This notice responds to the remand in *Environmental Defense Center, Inc. v. U.S. EPA*, 344 F.2d 832 (9th Cir. 2003) that requires EPA to consider whether the CWA requires the Agency to regulate stormwater discharges from forest roads.

DATES: This decision shall be considered issued for purposes of judicial review at 1 p.m. Eastern time on July 11, 2016.

FOR FURTHER INFORMATION CONTACT: Prasad Chumble, EPA Headquarters, Office of Water, Office of Wastewater Management via email at chumble.prasad@epa.gov or telephone at 202-564-0021.

SUPPLEMENTARY INFORMATION:

I. General Information

A. Applicability

This notice does not impose requirements on any entity.

B. Obtaining copies of this document and related information

1. Docket

EPA has established a docket for this action under Docket ID No**. [EPA-HQ-OW-2015-0668]; FRL-XXXX-X]**. Publicly available docket materials are available either electronically through www.regulations.gov or in hard copy at the EPA Docket Center, (EPA/DC) EPA West, Room 3334, 1301 Constitution Ave., NW, Washington, DC. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room and the Docket Center is (202) 566-1744.

2. Electronic access

You may access this Federal Register document electronically from the Government Printing Office under the "Federal Register" listings at FDSys (http://www.gpo.gov/fdsys/browse/collection.action?collectionCode=FR).

3. Dates

In accordance with 40 CFR part 23, this decision shall be considered issued for purposes of judicial review at 1 p.m. Eastern time on July 11, 2016. Under Section 509(b)(1) of the CWA,

judicial review of this decision can be had only by filing a petition for review in the U.S. Court of Appeals within 120 days after the decision is considered issued for purposes of judicial review.

II. Executive Summary

EPA has determined not to designate stormwater discharges from forest roads for regulation under Section 402(p)(6) of the Clean Water Act (CWA) at this time. EPA's decision is based on several interrelated factors. First, state, federal, regional, tribal government, and private sector programs already exist nationwide to address water quality problems caused by discharges from forest roads. Many of these programs have been improved and updated in recent years. Program implementation rates are generally high and have been shown to be effective in protecting water quality when properly implemented. These programs employ a variety of approaches, based in part on variations in regional topography and climate. While EPA recognizes that existing programs vary in their degree of rigor, the Agency has concluded that efforts to help strengthen existing programs would be more effective in further addressing forest road discharges than superimposing an additional federal regulatory layer over them.

Some commenters have asserted that federal regulatory requirements could, in theory, promote national consistency and improvements in less effective programs. In practice, however, federal forest roads regulation presents a number of challenges that make achievement of that result unlikely. Wide variations in topography, climate, ownership, management, and use across the nation's network of forest roads make the establishment of any nationwide regulatory program a complex and difficult endeavor. Mechanisms for implementation and enforcement of

any federal regulatory requirements are limited, as recent amendments to CWA Section 402(*l*) preclude both the use of National Pollutant Discharge Elimination System (NPDES) permits to regulate most discharges from forest roads and citizen suit enforcement of any Section 402(p)(6) requirements. Some commenters discussed the failings of existing best management practices (BMP) programs, including insufficient compliance rates and compliance monitoring, but a federal EPA-administered program would not necessarily be able to address these challenges more effectively than entities with regional expertise overseeing existing forestry management practice programs, especially without the accountability mechanisms afforded by a permitting program or third-party enforcement.

For these reasons, elaborated upon below, EPA is exercising the "broad discretion the CWA gives the EPA in the realm of stormwater runoff," in deciding not to regulate stormwater discharges from forest roads. *See Decker v. Nw. Envtl. Def. Ctr.*, 133 S. Ct 1326, 1338 (2013) (affirming EPA's determination not to regulate stormwater discharges from logging roads in its industrial stormwater rule). Instead, EPA intends to work in consultation with state and local officials, as well as other federal agencies and interested stakeholders, to help strengthen their existing programs and improve awareness and implementation of forestry best management practices. In reaching this conclusion, the Agency is cognizant that the CWA reserves for states "the primary responsibilities and rights… to prevent, reduce, and eliminate pollution [and] to plan the development and use (including restoration, preservation, and enhancement) of land and water resources…" 33. U.S.C. 1251(b).

III. Legal Background

The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. 33 U.S.C. 1251(a). To that end, the CWA provides that the discharge of any pollutant by any person shall be unlawful, except in compliance with other provisions of the statute. The CWA provides for a permit program, in general, for the discharge of a pollutant from a "point source," which is defined in Section 502 of the CWA as "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." 33 U.S.C. 1362(14). In 1987 Congress added Section 402(p) to the CWA, which required NPDES permits for certain specified stormwater discharges and provided EPA with discretion to determine whether and how discharges from other stormwater sources should be addressed "to protect water quality." *See Northwest Environmental Advocates v. EPA*, 640 F.3d 1063, 1083 (9th Cir. 2011) ("[i]t is within the discretion of EPA to promulgate Phase II regulations requiring, or not requiring, permits for such discharges").

For the initial phase of stormwater regulation, Section 402(p)(1) created a temporary moratorium on NPDES permits for point sources except for those listed in Section 402(p)(2). Section 402(p)(2) includes discharges already required to have a permit; discharges from municipal separate storm sewer systems serving a population of 100,000 or more; and stormwater discharges "associated with industrial activity." Congress did not define discharges associated with industrial activity, allowing EPA to interpret the term. For other stormwater

discharges, Section 402(p)(5) directs EPA to conduct studies, in consultation with the states, for "identifying those stormwater discharges or classes of stormwater discharges for which permits are not required"; "determining to the maximum extent practicable, the nature and extent of pollutants in such discharges"; and "establishing procedures and methods to control stormwater discharges to the extent necessary to mitigate impacts on water quality."

Section 402(p)(6) authorizes the Administrator to issue regulations, in consultation with state and local officials, based on the studies prescribed by Section 402(p)(5). It provides EPA discretion in selecting which discharge sources to regulate and how to regulate them; it does not require the use of NPDES permits. Specifically, the section states that the regulations "shall establish priorities, establish requirements for state stormwater management programs, and establish expeditious deadlines" and may include "performance standards, guidelines, guidance, and management practices and treatment requirements, as appropriate." 33 U.S.C. 1342(p)(6). This flexibility is unique to stormwater discharges regulated under Section 402(p)(6) and differs from the requirement for NPDES permits for stormwater discharges listed in Section 402(p)(2) of the Act.

In 1990, EPA promulgated the Phase I stormwater regulations (55 FR 47990, November 16, 1990) ("Phase I Rule"), following the 1987 CWA amendments which directed the Agency to develop regulations requiring permits for large and medium municipal separate storm sewer systems and stormwater "discharges associated with industrial activity." In March 1995, EPA submitted to Congress a report on the results of the Section 402(p)(5) study that evaluated the nature of stormwater discharges from municipal and industrial facilities not already regulated under the Phase I regulations (EPA, 1995). On December 8, 1999, EPA promulgated the Phase II

stormwater regulations to address stormwater discharges from small municipal separate storm sewer systems and construction sites that disturb one to five acres. 64 FR 68722. Under CWA Sections 402(p)(2)(E) and 402(p)(6), EPA retains the discretionary authority to designate additional stormwater discharges for regulation.

The Phase II stormwater regulations were challenged in *Environmental Defense Center v. US EPA*, 344 F.3d 832 (9th Cir. 2003) (*EDC v. EPA*). In that case, petitioners contended that EPA arbitrarily failed to regulate discharges from forest roads under the Phase II rule. The court held that EPA failed to consider petitioners' comments and remanded the issue to EPA "so that it may consider in an appropriate proceeding Petitioner's contention that Section 402(p)(6) requires the EPA to regulate forest roads. The EPA may then either accept Petitioners' arguments in whole or in part, or reject them on the basis of valid reasons that are adequately set forth to permit judicial review." *Id.* at 863.

In the years following the decision in *EDC v. EPA*, EPA undertook research to improve the Agency's knowledge of the water quality impacts of forest road stormwater discharges and the programs that exist to reduce those impacts. During that period, the Northwest Environmental Defense Center initiated litigation concerning logging road stormwater discharges. In 2011, the U.S. Court of Appeals for the Ninth Circuit issued a decision in *Northwest Environmental Defense Center v. Brown*, 640 F.3d 1063 (9th Cir. 2011) ("*NEDC*"), a citizen suit alleging violations of the CWA for unpermitted discharges of stormwater from ditches alongside two logging roads in state forests. The court held that because the stormwater runoff from the two roads in question is collected by a system of ditches, culverts, and channels

and then discharged into waters of the U.S., there was a point source discharge of stormwater associated with industrial activity for which an NPDES permit is required.

On May 23, 2012, EPA published a Notice in the Federal Register summarizing known water quality impacts related to forest roads and discussing existing state, tribal, and voluntary programs designed to address those impacts. (77 FR 30473). The Notice expressed EPA's intent to specify that only stormwater discharges associated with rock crushing, gravel washing, log sorting, and log storage are discharges associated with silvicultural activity that are subject to permitting under the stormwater regulations pertaining to industrial activity. The Notice also discussed the Agency's consideration of non-permitting approaches to address other stormwater discharges from forest roads. On December 7, 2012, EPA promulgated a rule (77 FR 72970) clarifying that discharges of stormwater from silviculture activities other than rock crushing, gravel washing, log sorting, and log storage do not require an NPDES permit. On March 20, 2013, the Supreme Court reversed the Ninth Circuit's ruling in *NEDC*, holding that discharges of stormwater that ran off logging roads into ditches, culverts, and channels did not require an NPDES permit as stormwater from industrial activity. *See Decker v. Nw. Envtl. Def. Ctr.,* 133 S. Ct 1326 (2013).

In January 2014, Congress amended CWA Section 402(*l*) to effectively prohibit the requirement of NPDES permits for the discharge of runoff "resulting from the conduct of the following silviculture activities conducted in accordance with standard industry practice: nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance." 33 U.S.C. 1342(l). In addition, the amendment prohibits third-party lawsuits

("citizen suits") authorized by CWA Section 505(a) for any requirements established under Section 402(p)(6) for the silviculture activities listed above.

In December 2014, EDC and the Natural Resources Defense Council filed a petition with the Ninth Circuit to compel EPA to respond, within six months, to the question remanded in the 2003 *EDC v. EPA* decision of whether Section 402(p)(6) requires federal regulation of stormwater discharges from forest roads. Following execution of a settlement agreement filed with the court on August 26, 2015, the court entered an order establishing a schedule requiring EPA to issue a final determination by May 26, 2016. The parties subsequently extended the deadline by joint stipulation to June 27, 2016.

IV. Background on Forest Roads and their Water Quality Impacts

Forests cover about one-third of the continental U.S. (approximately 816 million acres). Over half are privately owned (58% or approximately 475 million acres) (USFS, 2016). Of private forest land, 63% is owned by families and individuals and is commonly referred to as ''family forests.'' Most of the family forest owners (around 62%) own fewer than 10 acres of forest land. Owners of the remaining private forest land include corporations, Real Estate Investment Trusts (REITs), conservation organizations, clubs, and Native American tribes (USFS, 2016). Over 300 Native American reservations are significantly forested, and Native American tribal lands include 18.6 million acres of forest land, including 1.5 million acres of productive timberland (Bureau of Indian Affairs, 2009). Private forest land owners invest considerable resources in forest road construction and maintenance, as they are critical assets that enhance property values, maintain economic viability, and facilitate sustainable forestry.

Forty-two percent of forest land, or approximately 341 million acres, is publicly-owned. The federal government administers an estimated 74% of the public forest land. State forestry, park, and wildlife agencies account for most of the 22% of state-owned public forest land. The remaining 4% of public forest land is owned by local governments, such as counties and towns (USFS, 2016). Within the U.S., the distribution of public versus private forests differs greatly among the various regions of the country. For example, forest ownership in the Northwest is dominated by public ownership, primarily by the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM). Private ownership is more prevalent in the Southeast and Northeast (*Id*.).

Forests are connected by a vast network of forest roads built over the course of more than a century. Roads exist in forests for all land ownership categories, enabling activities as varied as timber operations, recreation, fire protection and general transportation. Originally some were built to allow mining or agriculture. The network of forest roads includes both active and inactive roads that vary in age and condition, and which often serve multiple purposes by multiple users at the same time. Because of the nature of timber growing, timber roads are often used just once every fifteen or twenty years. Endicott (2008) noted that:

> [e]ach forest road network commonly contains a collection of older and newer roads, designed to different standards, for various purposes, and crossing terrain of differing sensitivities. This mosaic of road segments has implications for how the forest road network will interact with the forest watershed, streams, and other downstream aquatic resources.

A single road may be subject to different owners and managers and used for different activities at different points. Often the owner of the road is not the owner of the forest land over which the road travels. For example, a BLM-owned road may pass through private property or a timber company-owned road may pass through a state-owned public forest. The purpose of a road may also change at different points; for example, most of a road may be used for recreation but a small part of it may service a timber operation. Legacy roads pose particular concerns for water quality. Built prior to the adoption of modern BMPs, they may be poorly sited or designed and frequently no owner or operator assumes responsibility for those roads.

As previously discussed in 80 FR 69655-69656 (November 10, 2015) and 77 FR 30476 (May 23, 2012), the Agency's research indicates that improperly designed, constructed, maintained, or decommissioned forest roads can impact water quality. These impacts are variable and may include increased sediment load and changes in stream network hydrology, which can cause physical, biological, and ecological impacts to water quality and aquatic organisms.

Erosion from many forest roads does not affect water quality. First, roads that are not hydrologically connected to a stream do not deliver sediment to water bodies. For example, Dube *et al*. (2010), found that in an inventory of forest roads in 60 random four-square-mile sections of forests in the Washington State, only 11% were connected to streams; Skaugset and Allen (1998) surveyed 287 miles of forest roads in 5 regions of Oregon and determined that 25% of forest roads drained directly to streams while another 6% were rated "possible" for sediment delivery. Second, a variety of factors play a role in how water quality is impacted by forest roads, including road design, road surfaces, construction, maintenance, rate of use, topography, soil

characteristics, precipitation patterns, and proximity of roads to surface water. The source of water quality impacts tends to be localized.

Available data suggest that the number of surface waters impacted by silvicultural operations, including forest roads, is a small percentage of Section 303(d) listed impaired waters. EPA's analysis of the data shows that this trend has been consistent over time, indicating that water quality impacts appear to have persisted over time, but comprise only a small percentage of all sources of impairment. Specifically, results of nationwide waterbody assessments from the EPA's Assessment and Total Maximum Daily Loads (TMDL) Tracking and Implementation System (ATTAINS),[1] which contains the most currently available data reported by states to the EPA under Sections 305(b) and 303(d) of the CWA, found silviculture, which includes a broad spectrum of forestry activities including regulated activities,[2] contributed to impairment of 40,637 miles of rivers and streams (7% of the total of 614,153 miles impaired) and 159,920 acres of lakes, reservoirs and ponds (1% of the total of 13,009,273 acres of impaired) (ATTAINS 2016). "Forest roads (road construction and use)" or "logging roads" are listed as the "probable source" of impairment for 31,076 miles of rivers and streams (5% of total impaired) and 7,627 acres of lakes, reservoirs and ponds (less than 1% of total impaired).

The extent of the impacts of silvicultural activities on water quality varies by region. Impairment data from states that report probable sources of impairments suggest that forest roads

[1] https://iaspub.epa.gov/waters10/attains_index.home

[2] Non-point source silvicultural activities include nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage in addition to road construction and maintenance from which there is natural runoff at issue here.

constitute a relatively low percentage of impairments. Examples of states where silviculture (a broader category that includes forest roads) is identified as a probable source of impairment and that document a percentage of the total river and stream miles impaired by 'forest roads' or 'logging roads' include: Idaho (0.62%; forest roads); Kentucky (0.04%; forest roads); Montana (5.71%); New Mexico (1.97%); and Pennsylvania (0.01%) (ATTAINS 2016). Road-related pollutant loading and impairments, however, may represent a higher percentage of impairments within specific regions. For example, within federal lands in the interior Columbia Basin, roads were identified as the largest source of sediment from any land management activity.[3]

EPA recognizes that the national water quality data discussed above have certain limitations. One limitation is that some states, when compiling their Section 305(b) reports, may not report the probable source of an impairment or may list probable impairment sources as unspecified, unknown, or in some other category, which may lead to underreporting of the source of the impairment. Additionally, some states may not assess all of their waters or may use different methodologies to collect or report water quality data, limiting the ability of drawing national-scale conclusions.

ATTAINS data indicating the effect of discharges from forest roads on water quality impairments may therefore not be fully representative due to reporting differences among states. For example, of the 40,637 miles of rivers and streams that ATTAINS indicates are impaired by silviculture, the database shows that California accounts for 34,443, or 85%, nationally

[3] http://www.fs.fed.us/pnw/publications/icbemp.shtml

(ATTAINS, 2016). Some regions in California use a particular approach toward classifying impairments that increases the reported percentage of impaired miles. Unlike other states, if a given reach of river is identified as impaired for a particular pollutant, some California regions categorize all of the river miles in the entire watershed as impaired.

It is also important to recognize that EPA's data collection methods have changed over time. While ATTAINS compiles state-level data, it relies on the states for this information. The National Water Quality Initiative (NWQI), conducted by EPA, provides very specific information on impairments and sources, but EPA no longer collects these data. EPA currently uses probabilistic approaches (such as the Wadeable Streams Assessment and the National Rivers and Streams Assessment) to collect national–scale data on water quality. While these assessment approaches are sound, they do not reveal specific impairments and causes and therefore are less informative for purposes of this analysis.

Estimating sedimentation specifically related to forest road discharges is also difficult as a practical matter. Unlike industrial and wastewater facilities, which typically have water quality monitoring to provide background data for assessing compliance with water quality standards, there is little to no regular monitoring of water quality in waters affected by forest road discharges. Endicott (2008) noted that "[e]ven a well-designed erosion experiment frequently results in variations from the mean of up to 50%." Investigators may also be unable to differentiate among sediment generated from forest roads and sediment generated from other silvicultural activities, background erosion rates, or other sources. Endicott (2008) further explains that: "Numerous studies have demonstrated that the biotic and chemical "noise" in

larger streams renders the water quality effects of forestry activities using BMPs undetectable." Finally, Endicott (2008) recognizes that quantitative data can be difficult to obtain because "impairments can be difficult to detect and/or measure" and "[e]rosion only usually occurs during wet weather."

V. Role and Effectiveness of Forestry Best Management Practices

The U.S. Forest Service defines Best Management Practices (BMPs) as the following:

> A practice or a combination of practices, that is determined by a State (or designated area-wide planning agency) after problem assessment, examination of alternative practices and appropriate public participation to be the most effective, practical (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals (USFS, 1988).

In the context of forest roads, BMPs focus on preventing and mitigating water quality impacts that may stem from the construction, maintenance and use of forest roads. Forest road BMPs are on the ground activities and structures that, in most cases, aim to prevent discharges of sediment from roads to streams. BMPs may also target other suspended solids, spills and residues, changes in water temperature, and alterations to flow regimes. In some cases they are designed to protect stream geomorphology and habitat for certain species.

BMPs for forest roads generally fall into three categories: BMPs addressing road planning and design, road construction and reconstruction, and road management (*e.g.*, Endicott

2008). Over the past several decades BMPs have been developed, evaluated, and improved based on ongoing research and technical innovation. BMPs are now widely implemented as standard elements of most private, state, and federal forestry programs (Ice *et al*., 2010). State-specific BMP programs and guidelines are available in most states (NCASI, 2009). Although the primary purpose of BMPs is to reduce environmental impacts, they must also be feasible and practical (Ice, 2004).

BMPs are generally selected based on site-specific needs and conditions, which vary tremendously. Proximity of the road to the stream, size of the road, local geology and climate all influence the occurrence and magnitude of erosion and consequently the types of BMPs that will be most effective. For example, use of gravel to cover a road surface can be a highly effective erosion control BMP in steep terrain. In flat terrain, that same BMP would be less effective and much more expensive than a properly maintained continuous roadside berm (Appelboom *et al*., 2002).

While BMP design is site-specific, many documents describe the most common BMPs (*e.g.*, NCASI, 2001; EPA, 2005; NCASI, 2009; USFS, 2012; NCASI, 2012). This notice does not provide a detailed discussion of the BMPs themselves; a number of comprehensive sources regarding different types of BMPs are available and included in the record for this decision (*e.g.*, NCASI, 2009; Endicott, 2008; North Carolina Forestry BMP Manual; Montana Forestry BMP Manual). Most BMPs are based on relatively few guiding principles (Megahan and King, 2004; Olszewski and Jackson, 2006). These include:

- Use existing roads when practicable;

- Inventory road and stream conditions;
- Identify and avoid high-erosion hazard areas;
- Minimize the total land area disturbed;
- Minimize road crossings and other incursions into waterbodies;
- Engineer stable road surfaces, drainage features and stream crossings to reduce erosion;
- Separate bare ground from surface waters and minimize delivery of road-derived sediments to streams;
- Provide a forested buffer around streams;
- Design and install stream crossings to allow passage of fish, other aquatic biota, and large wood;
- Anticipate and mitigate erosion from precipitation events, including especially large ones;
- Regularly inspect all BMPs and erosion-prone areas, including during and/or immediately following precipitation and snowmelt events that may generate runoff; and
- Maintain forest roads and all BMPs.

EPA notes that BMPs currently play and historically have played a significant role in wet weather[4] and non-point source control programs. The scientific literature increasingly demonstrates the effectiveness of BMPs in preventing, minimizing, and mitigating discharges affecting water quality and aquatic habitats (Ice, 2004; Anderson and Lockaby, 2011; NCASI, 2012; Cristan *et al*., 2016; Endicott (2008)). Although existing research has significantly improved the effectiveness of forest road BMPs, reducing water quality impacts from road construction and other practices, many discharges still occur (Anderson and Lockaby, 2011).

[4] 40 CFR 122.44(k).

Further research would help to optimize operation and maintenance and provide guidelines for adapting BMP implementation to site-specific needs.

Several commenters cited a report by Cristan *et al*. (2016) –"*Effectiveness of Forestry Best Management Practices in the United States: Literature Review*" – which summarized 81 BMP effectiveness studies: 30 studies of southern states, 20 studies of northern states, and 31 studies of western states.

The review concluded generally that:

- Forestry BMPs minimize water quality effects of forest operations when implemented as recommended by state forestry and water quality agencies.
- Forest roads, skid trails, and stream crossings warrant considerable attention because they have the greatest potential for erosion and sediment delivery.
- Many studies across the U.S. have shown BMPs to be effective and reduce sediment delivery to streams.

Several of the studies in the review assessed BMP performance and effectiveness in tandem and individually, including:

- Appelboom *et al.* (2002) sampled runoff from seven road practices in North Carolina and found that roads with continuous berm treatment had a 99% reduction in sediment loss compared to roads that did not have a continuous berm.

- Aust *et al.* (2011) evaluated four types of operational forest stream crossings at 23 crossings and approaches for total dissolved solids, pH, conductivity, temperature, and sediment concentration in the Piedmont region of Virginia during initial, installation, harvest, and closure stages. The authors found that bridge crossings had the least impact on water quality, that the installation and harvest phases had the greatest impact on water quality, and that BMPs should be followed during all phases.

- Wisconsin DNR (2006) published a BMP manual in 1995 and assessed the first ten years of their water quality program. The average BMP compliance rate was 83% and BMP effectiveness was 99% when the appropriate BMPs were applied and maintained. When BMPs were not applied, water quality was affected 71% of the time.

- Pannill *et al*. (2000) evaluated Maryland BMPs in a paired watershed study and, based on TSS, stormflow, stream temperature, and macroinvertebrate data, found no significant water quality differences between pre-harvest and post-harvest, *i.e.*, proper BMPs will help protect water quality, biology, and habitat.

- Vowel (2001) conducted stream bioassessments using a stream condition index (SCI) for sites before and after silvicultural treatments incorporating Florida BMPs and found no significant differences in the SCI. The study concluded that Florida BMPs were effective in protecting water quality.

Cristan *et al.* (2016) also indicated that, in certain conditions, water quality effects can occur even when BMPs are used.

- Maryland DNR (2009) evaluated state BMPs from 2004-2005 on 75 forest harvested sites using a Maryland-specific BMP implementation checklist. Maryland found that 81% of those sites were in compliance with state BMPs standards. Maryland also found that BMPs were 77% effective in protecting water quality; however, they found that 19% of the sites evaluated delivered measurable sediment to waterways.

- Rice (1999) estimated the mean erosion rate from older logging roads (installed in the 1950s, maintained to standards of the 1980s) in the Redwood Creek watershed (northern California) to be 177 m^3 km^{-1} from 1980 to 1997, mainly from the road cut banks, but noted that changes in forest practice rules (especially proper placement of culverts and sizing of culverts) reduced erosion on logging roads.

- Bilby *et al.* (1989) assessed road surface sediment production from five roads in two southwestern Washington watersheds including two heavily trafficked roads built in the 1950s and three haul roads build between 1968 and 1974 and found that sediment entered first and second order streams 34% of the time.

- Nolan *et al.* (2015) examined the effectiveness of BMPs at a number of stream crossings in Virginia. The study conducted an audit of BMP implementation rates, which it found can often function as surrogates for BMP effectiveness. In general, the study found that the majority of stream crossings were performing properly, but that

performance varied. The study also cited Edwards and Williard (2010), which "found only three studies that provided BMP efficiencies with regard to sediment loading reductions and reported BMP efficiencies ranging from 53%–94%."

- The USFS evaluated its Pacific Southwest Region BMP program from 2008-2010, conducting 2,237 BMP inspections, and found that BMP implementation was 91% and effectiveness was 80%, with stream water quality impacts at 12% of the sites (USFS, 2013). BMPs for timber harvesting, fuels treatments, and vegetation management were effective; BMPs for roads, range management, recreation, and mining were not as effective, although effectiveness could be increased by imposing erosion control plans and wet weather standards.

EPA also considered other recently-published literature. Below are some of the major findings:

- The literature review *Assessing the Effectiveness of Contemporary Forestry Best Management Practices (BMPs): Focus on Roads* (NCASI, 2012) reviewed hundreds of studies and found that "implementing a suite of contemporary BMPs reduces sediment loads to streams by 80% or more relative to uncontrolled forestry operations." The document further concluded that "Specific BMPs for roads have been tested in controlled studies and proven effective by road inventories conducted by forestry agencies in several states. Those inventories show that road BMPs are being implemented at high rates and are effective in reducing risks to water quality; road drainage structures are being disconnected from streams; poor road/stream

crossings are being identified and corrected; and landslides from forest roads are being reduced."

- The USFS (2012) National Best Management Practices for Water Quality Management on National Forest System Lands (Volume 1: National Core BMP Technical Guide), provides highly detailed guidance on silvicultural BMPs, including those for forest roads. BMP effectiveness ratings were 93% (Pacific Southwest Region) and 98% (Montana), with North Carolina effectiveness rates showing an increase from 73% to 93% between 1992 and 2010. Guidance to standardize BMP monitoring protocols is under development.
- Ice *et al.* (2010) estimated national BMP implementation rates at 89%.
- Sugden *et al.* (2012) found that BMP implementation rates in Montana have increased over time, corresponding with a significant drop in the number of observed water quality impacts.

Below are findings from national-scale studies:

- Cristan *et al.* (2016) concluded that BMPs implementation rates and quality are critical to BMP effectiveness for reduction of erosion and sediment yield. Important BMP practices for forest roads include proper drainage structures, surfacing, erosion control of cut and fill slopes, traffic control, and closure. Sediment control structures applied to stream crossing approaches can significantly reduce runoff and sediment delivery.

- Ice *et al.* (2010) concluded that the combination of effective BMPs and a high rate of BMP implementation helps protect the water quality and beneficial uses of streams, lakes, and wetlands in forested environments.

VI. Existing BMP-Based Programs and Other EPA Tools

A broad array of BMP-based programs – including state and federal programs and private third-party certification programs – has been established to address forest roads in every state with significant forestry operations in the country. The following sections outline the nation's current landscape of state, federal, and third-party BMP based programs designed to control discharges from forest roads, and discuss the role of existing EPA tools in addressing stormwater discharges from forest roads. As highlighted below, available information indicates that these programs are tailored to address regional and local differences, that implementation rates are generally high, and that meaningful improvements have been and continue to be made in these programs over time. EPA did not obtain significant data about tribal programs addressing discharges from forest roads, so does not report on tribal programs in this section. EPA will seek to learn more about efforts to address stormwater discharges from forest roads on tribal lands as part of its continuing efforts to gather best practices data going forward.

A. State BMP-based programs

Data EPA obtained during the comment period indicates that all states with significant forestry operations have developed BMP manuals and most states have established forest management programs tailored to state-specific conditions (*e.g.*, topography, climate, and industry activity) that address runoff from forest roads. The data also indicates that BMPs are

being implemented at increasing rates across the nation. A team of researchers from Virginia Polytechnic Institute and State University (Virginia Tech), in consultation with the National Association of State Foresters (NASF), surveyed all 50 states in 2013 to identify silvicultural activities addressed by BMPs, characterize the approaches to BMP implementation adopted by each state, determine the extent to which states are implementing BMP effectiveness monitoring, and summarize BMP implementation rates (NASF, 2015). The survey showed that most states have established forestry BMPs designed to protect water quality. According to the survey, these programs are a mix of regulatory (11 states), quasi-regulatory (19 states), and non-regulatory (20 states) programs. Those states with regulatory programs generally have some form of forest practices law or silvicultural BMP legislation. In states with quasi-regulatory programs, state law specifies desired outcomes but does not require specific BMPs to achieve that outcome.[5]

Existing state programs vary because they are designed to address state and site-specific factors. Prior assessments of state forestry BMP programs have found similar, generally consistent information.[6,7] The following number of states have established forest road specific BMPs (Table 1).

Table 1. States with Forest Road BMP Programs Based on Endicott (2008)	
Category of Forest Road BMP	Number of States
Construction	44

[5] Such programs can include states where BMPs are not mandatory but enforcement actions can be taken against polluters.

[6] See 80 FR 69657-69658 (Nov. 10, 2015). Characterizations of state forestry BMP programs differ in some ways because of the way reviewers categorize the programs, aspects of the programs they review, different interpretations of program elements, and the fact that state forestry BMP programs have evolved and continue to evolve over time.

[7] Endicott, 2008. See Section 4 and Tables 4-1 and 4-2.

Table 1. States with Forest Road BMP Programs Based on Endicott (2008)	
Category of Forest Road BMP	Number of States
Drainage	41
Location/ Spacing	38
Maintenance	40
Road Closure	24
Stabilization/ Soils/ Slope	32
Stream Crossings	40
SMZs/ Bank Stabilization/ Buffer Strips	36
Wet Weather Use	10
Winter Operations	10
Training/ Technical Assistance	23
Implementation/ Effectiveness Monitoring	32
Compliance/ Enforcement	30

1. Existing state programs are tailored to address state and site-specific factors

One of the primary mechanisms for addressing water quality impacts of forest roads is individual states' forest practices polices, which generally establish standards for the design, operation and maintenance of forest roads applicable to conditions in their state. State forest road programs vary to some degree in their structure, requirements, and administration. Differences are based on legal, and socioeconomic factors as well as variations in climate, soils, topography, and aquatic biota. State programs generally establish both guiding principles and specific management practices that must be applied and adapted to a broad range of settings and conditions. Site-specific flexibility is important because no single set of requirements will be effective across the country. As EPA stated in its November 10, 2015 notice, "[t]he diversity of the forest road networks, the different classes of roads, the different local physical conditions,

and the broad range of road conditions and uses indicate the importance of site specific BMP selection and implementation to protect water quality" (80 FR 69656). For example, commenters correctly pointed out that Florida's forest road BMPs need not recommend or discuss full-bench road construction and end hauling techniques, as Oregon's rules do, because Florida does not have landslide-prone terrain, while Oregon has steep terrain with the potential for landslides, where such construction and end hauling techniques would be appropriate (EPA-HQ-OW-2015-0668-0089).

2. State programs show high implementation rates

Data from the 2013 NASF survey indicated that both forestry and forest road BMPs are implemented broadly. BMP implementation surveys in 32 states (*i.e.*, those with significant forest management activity) between 2005 and 2013 showed an average forestry BMP implementation rate of 91% (NASF, 2015). Nationally, the survey suggests that implementation rates for forest road BMPs averaged 91.5% and stream crossing BMPs averaged 86.7% (NASF, 2015). The 2012 Southern Region Report published by the Southern Group of State Foresters (SGSF) found forest road BMP implementation rates for 11 states[8] range from 78-99%, with an average of 88%. In the SGSF report, stream crossing BMP implementation rates ranged from 72-98% and averaged 89% (SGSF BMP Report, 2012).

The NASF survey also indicated that forest road BMP implementation rates do not vary significantly regardless of whether the state program is regulatory, quasi-regulatory, or non-

[8] Alabama, Arkansas, Florida, Georgia, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

regulatory. The NASF survey indicated that implementation of forest roads BMPs in 8 regulatory reporting states averages 93.9%, while the implementation rates in the 11 quasi-regulatory reporting states and 13 non-regulatory reporting states averages 90.6% and 90.5%, respectively (NASF, 2015).

Plus, BMP implementation rates have improved and continue to improve over time. For example, from 2008 – 2012, the implementation rates for all forestry BMPs (including forest road and stream crossing BMPs) trended upward in the SGSF report. This included forest road BMP implementation rates and stream crossings BMP implementation rates, which increased from 87 to 90%, and from 85 to 89%, respectively (SGSF BMP Report, 2012).

In addition to state forest road BMP programs, several efforts have emerged over the past 10 years to improve monitoring of BMP programs. Regional groups have undertaken efforts to promote consistent and comparable forestry BMP program monitoring data. The SGSF and the Northeastern Area Association of State Foresters (NAASF) have developed regional BMP monitoring protocols that states in those regions are using.

SGSF developed *Silviculture Best Management Practices Implementation Monitoring, A Framework for State Forestry Agencies* (2007) to improve and maximize the integrity of BMP implementation monitoring in southern states (SGSF Regional BMP Framework Protocol, 2007). The framework, which is implemented by 13 southern states, Puerto Rico, and the U.S. Virgin Islands, is designed to provide guidance for monitoring forestry BMP implementation that results in data that are statistically sound, objective, and promote analytical consistency among states. The framework addresses monitoring frequency, site selection, practices to be evaluated, the

basis for practice evaluation and reporting, scoring methodology, risk assessment, and follow-up actions.

Similar to the SGSF BMP monitoring framework, the USFS Northeastern Area State and Private Forestry and the Northeastern Area Association of State Foresters–Water Resources Committee have developed the Forestry BMP Protocol Project. The BMP Protocol is a standard method for monitoring the use and effectiveness of BMPs commonly used in timber harvesting. The BMP Protocol, which is available to 20 states, serves three functions: (1) data collection, (2) data analysis, and (3) report generation. It collects data using a branched question set designed to address those areas of the timber harvest with the greatest potential to impact water resources (including haul roads and water crossings). The protocol was developed to document the use and effectiveness of BMPs in protecting water resources during forest harvesting operations; document the degree of compliance with the CWA, as well as the Coastal Zone Management Act and various state laws and regulations; assess water resource protection based on the effectiveness of a collective set of BMPs; increase credibility through the measurement of results; respond to public concerns regarding the potential effects of timber harvesting based on measured evidence; and identify opportunities for improvement in water resource protection by identifying causes of BMP failure. Both a Desk Reference and Field Guide have been developed for the monitoring protocol (BMP Manual Desk Reference, 2007; BMP Field Guide, 2007).

Other factors are also facilitating the increasing rate of BMP implementation. For example, third-party certification programs, as discussed in detail in section VI.C of this notice, all require BMP implementation and third-party audits to verify that timber companies conform to state

standards. Forest certification programs have made important contributions to improved BMP implementation through logger training, landowner outreach, and water quality requirements. Other examples are the logger training and certification programs established by states and third-party programs, such as the SFI Logger Training and Education (2015) program, to ensure loggers are educated about the use and maintenance of appropriate forest road BMPs. Training is particularly important given the site-specific customization BMPs require. The best way to ensure optimal BMP selection and installation is through localized knowledge of climate, soils, forestry operations, and other factors, in combination with state-specific BMPs. Some commenters noted that the Forest Resources Association reports having trained more than 150,000 logging professionals since the inception of the forest certification program (EPA –HQ-OW-2015-0668-0089). For fiscal year 2015, West Virginia noted that 1,454 loggers received certification to supervise logging operations and assure BMPs were applied (EPA-HQ-OW-2015-0668-0075). Also, as one commenter noted, effective outreach and training programs have served to foster a culture of high BMP implementation rates such that BMPs have largely been institutionalized in the forestry community.

3. State programs continue to evolve and improve

States frequently revise their forest roads management guidance/regulations. States with significant forestry operations have mechanisms in place to evaluate the effectiveness of forestry BMPs and use monitoring and research results to revise these practices when necessary (typically by government appointed forestry boards, forestry commissions, or a mix of agencies, councils, or departments). For example, California Department of Forestry and Fire Protection

revised its Forest Practice Rules in 2015 to better manage drainage and erosion from logging roads (EPA-HQ-OW-2015-0668-0055); Wisconsin DNR-Division of Forestry revised its Forest Management Guidelines in 2011,[9] including updating forestry BMPs for water quality; and the Oregon Board of Forestry increased the riparian zone buffer width for fish-bearing streams in 2015 (Oregon Riparian Rule, 2015). States, federal agencies and various stakeholder groups continue to enhance BMP prescriptions and identify the site-specific factors that influence their effectiveness. For example, industry commenters identified 36 states that have revised their forest road BMPs within the last ten years (EPA-HQ-OW-2015-0668-0089), and according to a recent state survey conducted by the National Association of State Foresters, 31 states (62%) have updated their forest roads management guidance/regulations since 2006.[10] EPA's own analysis also indicates that many states have revised their programs, with some being revised as recently as 2016 (State Program Summary, 2016).

B. Federal BMP-based programs

At the federal level, the USFS and the BLM have established programs to manage stormwater discharges from forest roads on federal lands. These agencies manage large tracts of forested lands, including lands that are actively being used for road building, road maintenance, logging operations, public and recreational use or other activities, and generally demonstrate sound environmental stewardship in managing these lands.

[9] http://dnr.wi.gov/topic/forestmanagement/guidelines.html

[10] http://www.stateforesters.org/action-issues-and-policy/state-forestry-BMPs-map-o-o

1. Summary of U.S. Forest Service Programs

The 193 million acres (780,000 km^2) of public land that are managed as national forests and grasslands are collectively known as the National Forest System. These lands are located in 44 states, Puerto Rico, and the Virgin Islands and comprise about 9% of the total land area in the U.S. The USFS manages approximately 20% of the Nation's forested area and nearly 10% of the Nation's rangelands (USFS Strategic Plan FY: 2015-2020). The lands are organized into 154 National Forests and 20 National Grasslands. The mission of the National Forest System is to manage the national forests and grasslands to meet the Agency's sustainable multiple-use mandate.

The USFS uses several tools and strategies, such as the Legacy Roads and Trails program, Watershed Condition Framework, and the National Best Management Practices Program, in addition to local programs, to maintain and improve watershed health and manage discharges from forest roads.

The Legacy Roads and Trails program assists the USFS in identifying legacy roads in national forests and grasslands. USFS targets projects that will minimize the discharge of stormwater by decommissioning, maintaining, or upgrading various roads. From 2009-2015, the USFS decommissioned 5,504 miles of National Forest System Roads and an additional 6,714 miles of unauthorized roads; reconstructed 13,413 miles of roads; and maintained 57,333 miles of roads per year during that period.

The USFS Watershed Condition Framework helps the USFS to assess watershed health in national forests and grasslands, identify and implement protective measures, and conduct

ongoing watershed monitoring. Watershed conditions are categorized into three discrete categories or classes that reflect the health of the watershed. One primary emphasis of the watershed assessment is indicators that directly or indirectly impact soil and hydrologic functions as well as riparian and aquatic ecosystems. Initial watershed condition framework assessments for all watersheds on USFS lands were completed in 2011.[11]

In 2012 the USFS also initiated and began to implement a National BMP program integrating water resource protection into landscape management activities. The National BMP program is designed to improve agency performance, accountability, consistency, and efficiency in protecting water quality. The program consists of National Core BMPs, standardized monitoring protocols to evaluate BMP implementation and effectiveness of the National Core BMPs, and a data management system to store and analyze the resulting monitoring data. National Core BMPs address 11 subject areas affecting water quality. One of those subject areas is road management activity, which includes BMPs for travel management planning and analysis, road location and design, road construction, and stream crossings (USFS, 2012). The National BMP based program enables the USFS to document compliance with the management of nonpoint source pollution at local, regional, and national scales as well as address the 2012 land management planning rule requirement for national BMPs at 36 C.F.R. 219.8(a)(4).

The USFS monitors road management BMP implementation and its effectiveness at protecting water, aquatic, or riparian resources through nine evaluation categories and/or time

[11] http://www.fs.fed.us/biology/watershed/condition_framework.html

periods, some of which include: construction and reconstruction of USFS system roads and/or waterbody crossings; after construction or reconstruction has been completed; long-term management and maintenance of USFS system roads; decommissioned roads after decommissioning activities have been completed; and roads, parking areas, and snow storage areas during snow removal and storage activities.

The USFS has also developed a National Core BMP Technical Guide intended to improve USFS accountability and performance in managing water quality programs. Many of the core BMPs in the National Core BMP Technical Guide address water quality. The Technical Guide also provides administrative directives to allow for the use of state, tribal, and local requirements and information to develop site-specific BMPs where needed (USFS, 2012). The USFS is currently developing a second volume of the National Core BMP Technical Guide that will provide standardized protocols for monitoring BMP implementation and effectiveness across all USFS lands.

Further, USFS has developed a suite of tools to identify and prioritize road segments at risk of impacting water quality. These tools operate at scales of detail ranging from using corporate road databases and digital elevation data to using detailed GPS surveys. These tools apply in watershed sediment load reduction plans for waters listed as impaired under the CWA and in forest restoration projects under the Collaborative Forest Landscape Restoration Program in the states of Idaho, Montana, and California. For example, the Geomorphic Road Analysis and Inventory Package (GRAIP) tool includes methods to inventory roads and analyze the inventory

for surface erosion, and risks for gullies, landslides, and stream crossing failures. This tool can be used in combination with other field observations to assess forest roads.

As an example of implementation of the USFS's BMP programs, the USFS evaluated its Pacific Southwest Region BMP program from 2008-2010 through 2,237 BMP inspections. It found that BMP implementation was 91% and effectiveness was 80%, with water quality affected at streams on 12% of sites. The USFS is continually improving and updating its programs and tools as accomplishments are monitored and verified. In 2013, the USFS completed an interim National BMP monitoring database for the National BMP program. The USFS expects to integrate this interim database into an enterprise data management system in the future which will extend reporting and analysis capabilities of the database.

In fiscal year 2014, 97 USFS administrative units completed a total of 600 BMP evaluations as part of implementing in the National BMP monitoring program. As discussed above, the USFS national core BMPs address 11 subject areas that potentially could affect water quality, including ''road management activities.'' Nine monitoring protocols have been developed for the road management activity BMPs. At least 1 BMP evaluation was completed on 87% of the USFS administrative units; over 100 evaluations were conducted for road management activity BMPs. Of the 600 total evaluations, 94% included implementation assessments, 90% included effectiveness assessments, and 85% included both implementation and effectiveness assessments.

Overall, 61% of the BMP implementation evaluations were rated as "fully implemented" or "mostly implemented." In addition, 65% of the BMP effectiveness evaluations were rated as

"effective" or "mostly effective." For sites where BMP implementation and effectiveness were both evaluated, 56% had composite ratings of "excellent" or "good." For road management activities, approximately 70% of the evaluations identified BMPs that were fully or mostly implemented. With regard to road management BMP effectiveness, approximately 50% of the completed evaluations were found to be effective or mostly effective. In the study the USFS acknowledges that these data show room for improvement in BMP implementation and effectiveness but observes that prior to development of the National BMP Program, it was impossible to report on BMP implementation and effectiveness on a national scale in a coherent, understandable, and useful way.

In December 2015, the USFS published the National Best Management Practices Monitoring Summary Report for the two-year BMP phase-in period of fiscal years 2013 and 2014 following the launch of the 2012 National Best Management Practices program. That report summarizes the national results of the two year phase-in period of national BMP monitoring. The report demonstrates the capabilities of a consistent nationwide monitoring program to document BMP performance (USFS, 2015). In addition, as part of the Watershed Condition Framework, the USFS is currently undertaking a five year re-assessment to assess changed conditions of USFS watersheds.

For example, USFS is using outputs from the GRAIP tool, mentioned previously, in combination with associated field observations to assess the effectiveness of road decommissioning in Idaho, Montana (Cissel *et al*., 2014a), Oregon, Utah, and Washington.

BMPs implemented as part of the decommissioning efforts resulted in a 79% reduction in fine sediment delivery to streams (Cissel *et al.*, 2014b).

The USFS implements best practices to control stormwater from forest roads on a program-wide scale in a number of ways, as well as ensuring that specific projects are implemented properly. Where a USFS road crew is in place, the agency performs maintenance and construction/reconstruction to the extent the law allows. BMPs are followed according to USFS policy, incorporating any national, regional, and local level BMPs. Crews work closely with local resource specialists to ensure work is being performed according to BMPs. When a project is awarded under a contract, clauses, provisions, mitigation measures, and BMPs are incorporated into the plans, specifications, and contract documents. For example, some contract provisions require the contractor to preserve, protect, and minimize the impacts from soil erosion to streams, lakes, and reservoirs.[12] A Contracting Officer or their certified designees monitor work performed by the contractor to ensure work compliance with the terms and conditions set forth in the contract.

The USFS is a recognized leader in establishing road crossing techniques that provide for aquatic organism passage, or the ability for fish and other aquatic life to move up or downstream under roads. In 2005, the USFS created the National Inventory and Assessment Procedure to evaluate the effectiveness of current and remediated fish passages (USFS, 2005). Over 1,600 miles of habitat were restored in fiscal years 2011-2013 by aquatic organism passage projects

[12] See BLM. (2011). Contract for the Sale of Timber and Other Wood Products Lump Sum Sale.

funded through the USFS Legacy Roads and Trails Restoration program among others (USFS, 2014).

2. Summary of Bureau of Land Management Programs

BLM manages approximately 246 million acres of public lands (BLM, 2015). Most BLM lands are concentrated in 11 western states with scattered tracts in the various eastern states. Of the 246 million acres, approximately 50 million acres are forest or woodlands where approximately 6-7 million acres are managed for sustainable timber harvests. These areas are generally mesic sites with annual average precipitation that usually exceeds 15 inches per year. Traditional timber harvesting on BLM property occurs primarily in northern California, Colorado, Idaho, Montana, Oregon, and Wyoming, with minimal harvest occurring in Alaska, Arizona, Nevada, New Mexico, and Utah. BLM uses several tools including land use plans, Memoranda of Understanding ("MOU") with states and other federal agencies, timber sale contracts, and training to ensure protection of water resources.

Most BLM lands are managed pursuant to the Federal Land Policy and Management Act of 1976 (FLPMA), at 43. U.S.C. 1712, which requires public lands to be managed under the principles of multiple-use and sustained yield. BLM's land use planning regulations at 43 C.F.R. Part 1600 establish a land use planning system for BLM-managed public lands. Similar to the USFS, a full suite of activities are authorized and managed on BLM forests and woodlands, including timber harvesting, hazardous fuel reduction treatments, recreation, fish and wildlife conservation, oil and gas activities, and grazing. Authorized uses in forests and woodlands such

as timber harvesting often include road construction and maintenance[13] which are broadly governed by policies, standards, and right-of-way agreements that ensure proper design and upkeep.[14]

One source of guidance for proper development of BLM land use plans is BLM's Land Use Planning Handbook. The Handbook provides broad agency direction for BLM to use BMPs to meet the standards and goals of the CWA and address various protection measures to mitigate impacts to human health concerns, ecosystem health, riparian areas, and overall watershed conditions, and to meet state and local water quality requirements (BLM, 2005).

BLM state offices enter into interagency MOUs with state and other federal agencies designed to ensure that they cooperatively meet state and federal BMPs and water quality rules and regulations related to point and nonpoint source water pollution from BLM managed lands.[15] These MOUs clarify such issues as jurisdictional and statutory authorities, monitoring responsibilities, implementing effective BMPs, prioritizing restoration activities, and developing strategies to meet water quality standards. The Idaho Nonpoint Source Management Plan provides one example of such an MOU (Idaho DEQ, 2015). In addition, several components of

[13] Bureau of Land Management estimates that as of 2014 there were approximately 72,300 miles of roads on Bureau of Land Management lands (Public Land Statistics Table 6.2, pg. 246). Only a subset of these roads are located in forested environments that would have the potential to contribute to stormwater runoff (Bureau of Land Management Supplemental Response 3/29/16).

[14] http://www.blm.gov/wo/st/en/prog/more/forests_and_woodland.html

[15] An example of an interagency MOU between Bureau of Land Management, other federal agencies and the Idaho Department of Environmental Quality, can be found at http://www.deq.idaho.gov/media/1041346-nps_program_implementation_mou_2013.pdf

BLM state and national level manuals apply to ground-disturbing activities and provide for consistent implementation of BMPs.[16]

Finally, all BLM timber sales contracts contain standard contract requirements that expressly require that the purchaser must comply with all applicable state and federal laws and regulations pertaining to water quality. Often, they include special provisions deemed necessary (*e.g.*, restrictions on wet weather operations, conditions addressing Endangered Species Act requirements, soil and aquatic protection requirements, *etc.*).[17] Individual BLM offices consistently add special provisions to timber sales as well as other ground disturbing activity contracts to ensure effective BMP implementation. Appropriate BMPs are identified at the Resource Management Plan level, analyzed during site-specific NEPA review process, and implemented in various ways such as direct performance by BLM crews or through a timber sale contract.

BLM also provides training for their specialists in all aspects of resource management including engineering (to include roads and facilities), forest management, fish and wildlife management, and hydrology. Training curricula include: review of existing and new state and federal regulations, manuals, handbooks, and policies including compliance with BMPs; preparing and administering contracts; review of interagency agreements or MOUs; review of

[16] Bureau of Land Management Manual 9113 (Roads), 9115 (Primitive Roads including BMPs from the *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development*), 7240 (Water Quality), Manual 5000 Forest Management (pertaining to timber sale contracts and specific contract provisions to apply to forest roads to address water quality protection).

[17] "Bureau of Land Management Standard Timber Sale Contract Language," Bureau of Land Management Form 5450-004, Sections 26, 27, & 28.

updates on monitoring, evaluating, and reporting protocols and agency monitoring databases; review of Resource Management Plans and amendments; and conducting National Environmental Policy Act reviews.

BLM incorporates BMPs into land use plans that include management of forest roads. The recently released western Oregon Proposed Resource Management Plan/Final Environmental Impact Statement, Appendix J provides one example of such a plan (BLM RMPWO Vol. 3 Appendix J, 2016). The BMPs for the western Oregon Proposed Resource Management Plan address various anticipated resource management actions including: road and landing maintenance and construction, timber harvest activities, silviculture activities, surface source water for drinking water, and recreation management. These BMPs were developed in coordination with Oregon Department of Environmental Quality to cooperatively meet state and federal water quality regulations. Additional BMPs could be required for a particular project depending on site-specific needs and subsequent implementation and effectiveness monitoring. BLM field offices review the land use plan BMPs and select and apply the appropriate and applicable BMPs for a particular project. Those BMPs are incorporated into on-the-ground operations like timber sales, road maintenance, road construction, and riparian restoration projects.

Although the BLM does not have a national BMP monitoring database like the USFS, it works closely with a number of state and federal agencies to annually monitor, evaluate, and report BMP compliance and effectiveness. One example demonstrating the success of resource management plans to protect water quality is the Northwest Forest Plan (NWFP). Approximately

2.5 million acres of forested BLM land falls within the area covered by the NWFP and those acres have been managed consistent with the NWFP standards and guidelines. All of those standards and guidelines were incorporated into the 1995 western Oregon resource management plans.

The Aquatic Conservation Strategy is an important element of the NWFP, which incorporates into the resource management plans the implementation of a riparian reserve system (*e.g.*, buffers) along streams as well as reducing road densities. Since 1995, western Oregon BLM Districts have decommissioned or obliterated over 883 miles of roads.

As mentioned above, BLM has released a proposed resource management plan and a final environmental impact statement for western Oregon BLM Districts to revise the 1995 resource management plans. Under the proposed resource management plan, the riparian reserve system, along with a late successional forest reserve system, would increase from 57% following the 1995 resource management plan to 64% following new guidelines. BLM has worked closely with over 20 cooperating agencies including U.S. Fish and Wildlife Service, National Marine Fisheries Service, and EPA to continue a comprehensive and regional strategy to maintain and improve aquatic resources in alignment with the overarching ecosystem principles and intent of the Aquatic Conservation Strategy of the NWFP under the new RMP.

The recently released "*Northwest Forest Plan Interagency Regional Monitoring: 20 Year Report, Status and Trends of Watershed Condition*" report summarizes the results of the twenty year interagency effort to implement an array of water quality protective measures in the Aquatic Conservation Strategy to maintain watershed health in that region (Northwest Forest Plan, 2015).

The NWFP Aquatic Conservation Strategy consists of four components: riparian reserves, key watersheds, watershed analysis, and watershed restoration. Once watershed conditions were evaluated and resource needs were identified, multiple agencies, as well as public stakeholders, partnered to complete millions-of-dollars' worth of watershed restoration work include: providing fish passages through culvert removals, replacements, or bridge construction; obliterating, closing, or relocating streamside roads; vegetating disturbed areas; reducing hazardous fuel loads; upgrading road surfaces to reduce sediment runoff; and removing dams. Implementation of these four components has resulted in improved watershed conditions in many watersheds.

The recently released monitoring report's objective was to evaluate whether the NWFP Aquatic Conservation Strategy is achieving the goal of maintaining and restoring the condition of watersheds throughout the region covered by the NWFP. The report evaluated two subject areas: upslope riparian areas for all watersheds with at least 5% federal ownership, and in-channel stream data (*e.g.*, temperature, sediment, and macroinvertebrates). The report compares the effectiveness of management practices under the aquatic conservation strategy direction for two periods: 1993 and 2012 for upslope riparian assessment, and rotational sampling between 2002-2009 and 2010-2013 for in-channel stream assessment. These monitoring data were used to detect trends and evaluate stream and upslope riparian conditions for 1,974 watersheds in the Pacific Northwest.

The report signified that there has been a slight positive shift in upslope riparian condition. Sediment scores were generally very high, indicating a low risk of roads delivering

sediment to streams. Sharp declines in assessment scores were mainly driven by large wildfires, and were offset by moderate, broad-scale improvements in vegetation, and focused improvements related to road decommissioning.

BLM also uses technical tools for evaluation, planning, and assessment of water quality. BLM is applying the USFS GRAIP tool, as well as others, in western Oregon watersheds to assess the effectiveness of road decommissioning and in sediment load reduction plans for waters listed as impaired under the CWA. These tools will also be used to prioritize the backlog of deferred maintenance needs that are later identified in the western Oregon Final Environmental Impact Statement, Chapter 3, Trails and Travel Management.

Outside of western Oregon, BLM is involved with various state, regional, and national water quality monitoring efforts to assess management effectiveness including indirect effectiveness of BMPs related to forest management and roads. For example, BLM cooperates with the Montana State Environmental Quality Council to monitor how forest practices are affecting watersheds in Montana. Montana conducts BMP field reviews on state, federal, and private industrial and non-industrial forest lands to monitor BMP implementation and effectiveness. Montana's 2014 BMP review concluded that 96% of BMP practices were effective on federal lands (Montana DNRC, 2014).

BLM has conducted a number of successful watershed restoration efforts to improve water quality on BLM lands. One example is the BLM Headwaters Forest Reserve Road Restoration Project in California. Since 2000, BLM has worked with the Pacific Coast Fish, Wildlife and Wetlands Restoration Association to decommission and restore 26 miles of old

logging roads throughout headwaters. An additional 5 miles of decommissioning is planned for the next several years.[18]

3. Federal programs are evolving and improving

Both the USFS and BLM have improved their programs that address water quality and stormwater from forest roads over the last several years. As noted above, the USFS launched a new National BMP program in 2012 and is currently monitoring the program for results. In addition, the USFS has enhanced its Road Preconstruction Handbook on Design[19] as well as the Transportation Structures Handbook on Hydraulics and Watershed Protection[20] to include design considerations for the construction and reconstruction of forest roads which minimize road and drainage impacts to the watershed. USFS Technology and Development Centers have created a number of publications to assist designers when addressing road/water interactions.[21] BLM has taken extensive efforts to improve its protection and restoration efforts of watersheds by addressing key resource areas and improving resource management plans. Even with limited resources, federal programs are using new technology to target highest priority problems in watersheds to mitigate water quality impacts and monitor watershed health and project effectiveness. Improved resource management plans and technology will likely continue to evolve and lead to greater improvements.

[18] http://blm.gov/ca/st/en/prog/nlcs/Headwaters_ForestReserve/restoration.html

[19] See FSH 7709.56 Chapter 40 at http://www.fs.fed.us/dirindexhome/dughtml/fsh_1.html

[20] See FSH 7709.56b Chapter 60 at http://www.fs.fed.us/dirindexhome/dughtml/fsh_1.html

[21] http://www.fs.fed.us/eng/pubs/

C. Third-party certification BMP-based programs

In addition to state and federal forest road BMP programs, participation in third party forest certification programs has been increasing rapidly in the U.S. Forest management certification arose to foster an improved stewardship of working forestlands. Programs such as certifications, which provide information and disclosure to consumers, can generate significant beneficial impacts on the environment while imposing fewer costs on industries and producers than direct regulatory programs.[22] Requirements to disclose information to citizens and consumers can lead to beneficial change without specific behavioral mandates. Certification provides a market incentive to encourage landowner commitment to sustainable forest management. It also offers a stamp of approval for forest management practices that meet standards considered to be environmentally appropriate, socially beneficial, and economically viable.

The three largest forestry certification programs in the U.S. are the Forest Stewardship Council (FSC), the Sustainable Forestry Initiative (SFI), and the American Tree Farm System (ATFS). These programs promote higher rates of BMP implementation by mandating compliance with applicable state and local laws and applicable BMPs, whether regulatory or voluntary. They promote training/education (including continuing education) and the use of trained loggers, promote monitoring of forestry BMP implementation, and include mechanisms for addressing instances where BMP nonconformance is observed. FSC requires expanded

[22] From Thaler, R., & Sustein, C. (2009). Nudge.

protection for waterbodies where it deems state programs or existing guidelines insufficient to protect water quality.

EPA received comments from state forestry agencies highlighting the large areas of state forested land under one of the third-party certifications identified above. For example, the Idaho Department of Lands notes that over 1.5 million acres of forest lands in Idaho are privately held or owned and managed by industries that maintain third-party certification through SFI, FSC or ATFS (EPA-HQ-OW-2015-0668-0072). Maine has almost 8 million acres of forest land which is third-party certified (EPA-HQ-OW-2015-0668-0058); and in Mississippi almost 470,000 acres of public forest land is certified through the ATFS and audited annually to ensure proper BMP implementation (EPA-HQ-OW-2015-0668-0081).

The discussion below provides a brief description of the three major programs in the U.S., focusing on how they promote management practices for mitigating water quality impacts resulting from stormwater discharges from forest roads.

1. Forest Stewardship Council (FSC)

FSC is an independent group with open membership that first convened in 1993 to improve forest practices internationally through a voluntary, market-based approach. FSC's program places an emphasis on whole-forest conservation, including protecting water resources from effects of stormwater discharges from forest roads. FSC is the only standard that prohibits the use of certain pesticides and herbicides in the timber industry and prohibits large clearcuts where they threaten the ecological integrity of the forest.

FSC's program includes a series of overarching principles and more specific performance criteria. An example forest management certification criterion is Forest Management Standard Criterion C6.5, which states, "[w]ritten guidelines shall be prepared and implemented to: control erosion; minimize forest damage during harvesting, road construction, and all other mechanical disturbances; and protect water resources." One "indicator" of this criterion provides that "[f]orest operations meet or exceed BMPs that address components of the Criterion where the operation takes place." Another provides,

> [t]he transportation system, including design and placement of permanent and temporary haul roads, skid trails, recreational trails, water crossings and landings, is designed, constructed, maintained, and/or reconstructed to reduce short and long-term environmental impacts, habitat fragmentation, soil and water disturbance and cumulative adverse effects, while allowing for customary uses and use rights. This includes: access to all roads and trails (temporary and permanent), including recreational trails, and off-road travel, is controlled, as possible, to minimize ecological impacts; road density is minimized; erosion is minimized; sediment discharge to streams is minimized; there is free upstream and downstream passage for aquatic organisms; impacts of transportation systems on wildlife habitat and migration corridors are minimized; area converted to roads, landings and skid trails is minimized; habitat fragmentation is minimized; unneeded roads are closed and rehabilitated.

Yet another indicator requires that, "[a] monitoring program is in place to assess the condition and environmental impacts of the forest-road system." Certifiers are independent of FSC itself and the companies they audit.

2. Sustainable Forestry Initiative (SFI)

SFI is an independent, nonprofit organization that is responsible for maintaining, overseeing, and improving the SFI certification program. Across the U.S. and Canada, more than 280 million acres are certified to the SFI Forest Management Standard and additional acres are influenced by SFI Fiber Sourcing. SFI administers standards that address forest sustainability broadly and water quality specifically. The SFI 2015-2019 Forest Management Standard applies to any participating organization in the U.S. or Canada that owns or has management authority for forestlands and consists of measures designed to protect water quality, biodiversity, wildlife habitat, species at risk, and forests with exceptional conservation value. The measures require developing a program for certification and compliance that include monitoring BMPs during all phases of forestry activities, mapping of water resources, and recordkeeping. For example, Objective 3 in the Standard addresses "Protection and Maintenance of Water Resources - To protect the water quality of rivers, streams, lakes, wetlands, and other water bodies through meeting or exceeding best management practices." Under Objective 3, Performance Measure 3.1 provides that "Program Participants shall meet or exceed all applicable federal, provincial, state and local water quality laws, and meet or exceed best management practices developed under Canadian or EPA–approved water quality programs." Performance Measure 3.2 further provides, "Program Participants shall implement water, wetland, and riparian protection measures based

on soil type, terrain, vegetation, ecological function, harvesting system, state (BMPs), provincial guidelines and other applicable factors." Objective 11 addresses "Training and Education" and Performance Measure 11.1 provides that "Program Participants shall require appropriate training of personnel and contractors so that they are competent to fulfill their responsibilities under the SFI 2015-2019 Forest Management Standard."

SFI noted in its comments that 95% of the fiber delivered to SFI Program Participant mills is delivered by harvesting professionals who have been trained in sustainable forestry practices (EPA-HQ-OW-2015-0668-0099). Additional Forest Management Standard Objectives address Forest Management Planning (Objective 1) and Legal and Regulatory Compliance (Objective 9).

3. American Tree Farm System (ATFS)

ATFS is a program of the American Forest Foundation, and has a forest certification standard that applies to small landowners in the U.S. In 2009, ATFS had certified more than 25 million acres of privately owned forestland managed by over 90,000 family forest landowners. To become certified, ATFS landowners must own at least 10 acres of forestland and implement a written forest management plan; and follow ATFS and AFF's 2015-2020 Standards of Sustainability for Forest Certification for Private Forestlands. Tree farms are inspected and certified to assure proper forest management that includes the conservation of soil, water and wildlife. Standard 4: Air, Water, and Soil Protection provides that "[f]orest-management practices maintain or enhance the environment and ecosystems, including air, water, soil, and

site quality." Performance Measure 4.1 provides that each "[l]andowner shall meet or exceed practices prescribed by state forestry BMPs that are applicable to the property."

4. Third-party certification programs are regularly updated

All three certification programs described above continue to update standards on a regular basis. FSC has continually revised its Principles and Criteria since 1994, with the most recent revision in 2012. FSC also developed a U.S. Forest Management Standard in July 2010, which was updated in September 2012. SFI revises its standards every five years, and has most recently updated them in January, 2015. ATFS is required to review its standards every five years as part of its conditions for endorsement by the Programme for Endorsement of Forest Certification, an umbrella organization that works with national certification programs to promote sustainable forest management.[23] All programs include opportunities for public and other stakeholder input through public comment periods, webinars, and surveys.

D. Existing EPA tools that address stormwater discharges from forest roads

In addition to the state, federal, and third-party BMP-based programs described above, EPA administers other programs under the CWA that address forest road discharges. Stormwater point source discharges from forest roads have traditionally been treated similarly to nonpoint sources of pollution under the CWA. EPA has addressed these discharges under Sections 303, 305, and 319 of the CWA, and for the coastal areas, under Section 6217 of the Coastal Nonpoint

[23] http://www.pefc.org/

Source Pollution Control Program under the Coastal Zone Act and Reauthorization Amendments (CZARA).[24]

1. Section 319 of the CWA

Under Section 319 of the CWA, EPA provides technical and financial support to states in their administration of programs that address pollution from nonpoint sources and activities that are not required to be regulated by NPDES permits. Many state nonpoint source management programs, which include components for the implementation of forestry-related BMPs, were initiated and continue to be supported, in part, through the use of Section 319 grant funds. According to EPA's 2011 National Evaluation of the Section 319 Program of the CWA, at least 15 state programs (AL, AR, CA, GA, KY, LA, MT, NC, OK, OR, SC, TX, VA, WV, WY) administer state-wide forestry nonpoint source management programs aimed at addressing problems associated with forest harvesting operations. At least ten of these states (AL, AR, GA, KY, LA, NC, OK, SC, VA, WV) rely on Section 319 grant funding through the relevant state forestry agency to support water pollution controls associated with forestry activities. In many of these states, the state nonpoint source management control agency has a formal relationship with the state forestry commission (or agency or department) to jointly implement the forestry program. EPA guidance provides that states are expected to revise and update their programs every 5 years as part of ensuring eligibility for continued funding. (Nonpoint Source Program and Grants Guidelines for States and Territories, 2013).

[24] 16 U.S.C. 1455b.

States have flexibility under the Section 319 program to address problems not addressed by the NPDES program. State Section 319 programs may encompass watershed or water quality-based approaches aimed at meeting water quality standards directly; iterative, technology-based approaches based on best management practices or measures, applied on either a categorical or site-specific basis; or a mix of these approaches. State forestry BMP-based programs apply these approaches using forestry BMP prescriptions and monitoring to address water quality impairments including forest road runoff, and EPA approves these program as part of the Agency's review of state nonpoint source programs.

EPA has developed a Grants Reporting and Tracking System (GRTS) to track projects that receive Section 319 grant funding. It also enables EPA and the states to characterize the types of projects funded with the use of Section 319(h) grant funds. A sample GRTS query of projects shows that a number of Section 319(h) grants have been provided to address forest roads, such as road construction and maintenance projects, across the country. (Grants Reporting and Tracking System Forestry Data Pull, 2016). Section 319 funding remains available to address forest roads impacts in those states which have prioritized this as an issue in their nonpoint source management plans.

EPA has published various guidance documents to assist forest owners in protecting waters from forestry related runoff, and to help states to implement their Section 319 control program. For example, EPA published the *National Management Measures to Control Nonpoint Source Pollution from Forestry* (EPA, 2005) which includes BMPs for road construction, reconstruction, and management. In 2007, EPA also provided funding assistance to the

Pennsylvania Department of Transportation to develop a manual which provides national guidance on effective and efficient practices to apply on dirt and gravel roads to reduce erosion, sediment, and dust pollution.[25]

2. Section 6217 of CZARA

Section 6217 of CZARA addresses enhancements to state Coastal Zone Management Act (CZMA) programs through development and implementation of management measures for nonpoint source pollution control to restore and protect coastal waters. This program, which is administered jointly by EPA and the National Oceanic and Atmospheric Administration (NOAA), directs states and territories with approved CZMA programs to provide for implementation of management measures for controlling runoff from activities within six categories of nonpoint source activities, including forestry. Each coastal state or territory administering a CZMA program (approved by NOAA) is required to describe its program to implement nonpoint source pollution controls, known as management measures, in conformity with a guidance published by EPA under CZARA Section 6217(g). The guidance describes ten management measures for forestry, including management measures for planning, road construction/reconstruction, and road management. As implemented under a state's CZMA program, CZARA requires enforceable policies and mechanisms, as well as monitoring and tracking of management measure implementation. NOAA and EPA are required to review and approve coastal nonpoint programs of state and territorial CZMA programs, and state authorities

[25] https://www.epa.gov/polluted-runoff-nonpoint-source-pollution/environmentally-sensitive-maintenance-dirt-and-gravel

are responsible for implementing these programs. In all, EPA and NOAA have reviewed the programs submitted by 33 states and territories and, in many cases, approved such submissions with conditions. Over time, affected states and territories took action to address the program conditions incrementally. Since the federal agencies' initial approvals with conditions, all but 10 states have now met all of the outstanding conditions.[26]

3. Sections 305(b) and 303(b) of the CWA

Under Section 305(b) of the CWA, states are required to assess the quality of their surface waters and report this information to EPA. In addition, every 2 years Section 303(d) requires states to identify on their Section 303(d) lists, which they submit to EPA for approval, those waters that are not attaining water quality standards, referred to as "impaired waters," and waters not expected to attain water quality standards by the next two-year listing cycle, referred to as "threatened waters." 33 U.S.C. 1313(d)(1)(A); 40 CFR 130.7(b). States must also establish a priority ranking for establishing total maximum daily loads (TMDLs) of pollutants for those waters. *Id*. TMDLs are "pollution budgets" that calculate how much of a given pollutant a waterbody can assimilate, including a margin of safety, without exceeding its applicable water quality standards. 33 U.S.C. 1313(d)(1)(C). TMDLs also allocate shares of the waterbody's assimilative capacity for that pollutant to all of its point and nonpoint sources. 40 CFR 130.2(i). Pollutant allocations may be assigned to individual sources or aggregated to sectors such as forest roads. Like Section 303(d) lists, states submit TMDLs to EPA for approval.

[26] https://coast.noaa.gov/czm/pollutioncontrol/

Impaired waters lists and TMDLs established for those impaired waters are "informational tools," *Pronsolino v. Nastri*, 291 F.3d 1123, 1129 (9th Cir. 2002), that help states evaluate the significance of pollutant sources like forest roads in contributing to water quality impairments in the U.S and guide implementation of measures to address those impairments. Nationally, pathogens, mercury, other metals, sediment, nutrients, and organic enrichment/oxygen depletion are identified as the leading causes of impairment of all assessed water bodies, based on state electronic data submissions from 2004 through 2010.

While TMDLs at their core are pollutant loading calculations and allocations, they also can provide a "comprehensive framework" for pollution reduction in a body of water that fails to meet state water quality standards. *Amer. Farm Bureau Fed'n v. EPA*, 792 F.3d 281, 287-288 (3rd Cir. 2015). While approving or establishing a TMDL, EPA requires "reasonable assurance" from the states that their TMDL implementation plans will meet their stated goals, *i.e.*, achieve the TMDL's allocations and implement the applicable water quality standards. *Id*. at 300. In support of EPA's recently revised TMDL for Lake Champlain, for example, Vermont detailed specific actions it would take to reduce the flow of sediment into Lake Champlain, including enhancing its forest roads forest management practices to reduce erosion (EPA Region 1, 2016).

EPA considered national TMDL data to determine whether forest roads have been identified as sources of water quality impairment and addressed in TMDL load allocations designed to help meet water quality standards.[27] For example, Endicott (2008) indicates that in

[27] Unfortunately, EPA's national-level TMDL data does not contain detailed information on specific impairment sources such as forest roads. See, for example, the state report "2012 Pennsylvania Integrated Water Quality

California TMDLs were required for 10 river basins where silviculture was identified as a potential source. EPA reviewed three of these TMDLs (Upper Main Eel River and Tributaries TMDL, 2004; Mad River TMDL, 2007; Redwood Creek TMDL, 2011) and found that roads and road related landslides were the leading anthropogenic cause of sediment loading in these watersheds. While EPA is unable to develop national-level summary data to describe the degree of impairments from forest roads, EPA notes that these and other TMDLs serve as existing CWA planning tools that guide silviculture-related pollutant reduction activities on a watershed-specific basis. See also *Pronsolino v. Nastri* supra at 1129, where the Ninth Circuit upheld an EPA-established TMDL addressing sediment pollution to the Garcia River caused by roads, timber-harvesting, road surfaces, and road and skid trail crossings.

VII. Rationale for EPA's Determination Not to Establish New Regulatory Requirements for Forest Roads Discharges

As discussed above, many rigorous programs exist at every level of government as well as in the private sector to address stormwater discharges from forest roads in the United States. The programs are regularly updated to reflect new technology and research findings, are specifically tailored for the locations in which they are implemented, and have high implementation rates. While these programs have limitations and may vary in their effectiveness, EPA has concluded that providing support for further improvement to these programs will be

Monitoring and Assessment Report," which identifies silviculture as responsible for 19 miles of impairments on state waters. Even with state-level data such as this report (which still does not make an explicit connection between forest roads and impairments), EPA found it exceedingly difficult to gather and assess this type of data.

more effective in further addressing discharges from forest roads than would the establishment of a new federal regulatory program under CWA Section 402(p)(6).

A number of practical considerations also militate against the establishment of a new federal regulatory program for forest roads. These include the site-specific nature of the environmental problem, the complex ownership arrangements of forest roads, and the limited financial resources and legal tools for addressing these roads, all discussed further below. A new program could require the expenditure of substantial resources while duplicating or displacing existing programs, with limited incremental environmental results. EPA has determined that the theoretical benefits of creating a "federal floor" do not outweigh its certain implementation problems, high costs, and potential duplication or displacement of longstanding and maturing federal, state, and private initiatives to address stormwater discharges from forest roads.

A primary difficulty in establishing a new, nationwide regulatory regime is the variability in water quality impacts from forest roads across the country. Many factors affect the extent to which BMPs are needed and those best suited to particular locations, including physical and meteorological factors (*e.g.*, climate, topography, soil type), which affect the nature of erosion and sedimentation; the intensity of timber operations; and localized scientific research and water quality data. A national regulation addressing such site-specific issues would likely be either too general or too complicated to be successful. The current multi-faceted, multi-layered landscape best supports the site- and region-specific nature of effective BMPs.

The options laid out in Section 402(p)(6) of the CWA, the authority pursuant to which EPA could have designated stormwater discharges from forest roads for regulation, resemble the

existing universe of forest roads control programs in the U.S. The types of regulatory actions that EPA could hypothetically take under Section 402(p)(6) are similar to the types of requirements and programs that states and other entities across the U.S. have already established, as described above. Section 402(p)(6) authorizes EPA to: "establish priorities, establish requirements for state stormwater management programs, and establish expeditious deadlines" which may include "performance standards, guidelines, guidance, and management practices and treatment requirements, as appropriate." 33 U.S.C. 1342(p)(6). Many "state stormwater management programs" already exist and address discharges from forest roads in a manner specifically tailored to conditions in each state. *See Decker v. Nw. Envtl. Def. Ctr.,* 133 S. Ct 1326, 1338 (2013) ("Indeed, Congress has given express instructions to the EPA to work 'in consultation with State and local officials' to alleviate stormwater pollution by developing the precise kind of best management practices Oregon has established here. 33 U. S. C. § 1342(p)(6)"). In addition, states, agencies and organizations, including the USFS and EPA, have published "guidelines" and "guidance" discussing "management practices." Every state and state organization that submitted comments to inform EPA's determination strongly opposed additional federal regulations. EPA has decided to help states strengthen their programs rather than supplant them, consistent with the CWA's policy to "recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution" and to plan the "use…of land and water resources." 33 U.S.C. 1251(b).

Supporting rather than duplicating state programs is also consistent with the CWA's policy of fostering governmental efficiency: to "encourage the drastic minimization of

paperwork and interagency decision procedures, and the best use of available manpower and funds, so as to prevent needless duplication and unnecessary delays at all levels of government." 33 U.S.C. 1251(f). An EPA program would add another layer of bureaucracy for both regulators and the private sector, sow confusion about program requirements and responsibilities, and lead to an inefficient use of already thin management resources, all for potentially limited environmental benefit.

While Section 402(p)(6) could otherwise generally allow for regulation through some sort of permitting, Congress has specifically foreclosed that option for discharges "resulting from the conduct of the following silviculture activities conducted in accordance with standard industry practice: nursery operations, site preparation, reforestation and subsequent cultural treatment, thinning, prescribed burning, pest and fire control, harvesting operations, surface drainage, or road construction and maintenance." 33 U.S.C. 1342(*l*). Congress has also precluded third-party citizen suits to enforce any non-permitting program established under Section 402(p)(6) or any other limitations applied to silviculture activities. In the absence of these implementation and enforcement mechanisms, it would be difficult to provide for effective federal implementation and compliance assurance for a new set of national forest road discharges.

Some commenters urged EPA to establish mandatory requirements pursuant to Section 402(p)(6), including prioritization of forest management areas, requiring road inventories, and monitoring for water quality standards. Many of these elements are part of state programs already. Requiring all forest landowners in the country to submit data to EPA about roads on

their properties would necessitate a resource-intensive outreach operation. The large number of private family forest owners in the U.S. and internet broadband limitations in rural areas, among many other factors, would make it difficult to ensure that forest road owners and operators are aware of and comply with such this requirements; legacy roads with no apparent owner would present even greater challenges. Additionally, as one commenter pointed out, many programs are targeted at certain impacted watersheds or aquatic species. An inventory of all forest roads, many of which do not cause water quality problems, does not necessarily provide information needed to address these particular impacts. Obtaining forest roads inventory information would likely be easier where large areas of forest are managed by a single entity, such as the USFS, but those entities are the ones most likely to already be engaging in inventory efforts (as described in section VI.B.1 of this notice). Given these challenges, EPA does not believe that creating a new federal inventory of forest roads is a cost-effective use of EPA's limited resources.

Requiring water quality monitoring poses another distinct set of problems. Water quality monitoring is in-situ (ambient water) sampling for one or a selected set of environmental indicators. These metrics can be biological (*e.g.,* macroinvertebrates or fish community health), chemical (*e.g.*, pollutant concentrations), or physical (*e.g.*, geomorphology). This approach is not typically used to assess one or a few BMPs because in-situ water quality is influenced by multiple local and upstream factors/sources, and statistical distinctions between these factors and determining relative contributions may be impossible. Endicott (2008) reported findings "that the biotic and chemical 'noise' in larger streams renders the water quality effects of forestry activities using BMPs undetectable."

EPA recognizes that existing forest road BMP programs have limitations, including limited funding. Resource constraints are a primary difficulty facing both state and federal programs, limiting their abilities to implement and monitor BMPs. Yet a new set of requirements from EPA would not address the funding gap. Indeed, another federal program could divert resources from on-the-ground stream protection efforts to bureaucratic reshuffling. EPA has decided not to expend resources on creating, implementing, and enforcing a new national program that may not tangibly improve water quality.

VIII. Facilitating Continuous Improvement of Forest Road Programs

As discussed above, programs at the state, federal, and local levels, as well as within the private sector, have demonstrated positive momentum in strengthening efforts to address stormwater discharges from forest roads. EPA seeks to further facilitate continuing improvements in working to address water quality impacts from forest roads. Thus, rather than superimposing additional EPA-regulatory programs over existing programs, EPA plans to help strengthen these existing programs by forming an ongoing dialogue with all relevant stakeholders (including industry, environmental groups, academics, and government agencies at the federal, state, tribal, and local levels) on program improvements, technical and policy issues, research results, state of the art technologies, success stories, and solutions to problem areas. This forum could provide an opportunity for stakeholders to exchange information and expertise. EPA envisions that a major part of these discussions will focus on specific problems and solutions to forest roads, such as existing/legacy roads or stream crossings as well as particularly effective forest road programs and best practices. Working with stakeholders collaboratively, the

forum could develop a national compendium of highly effective components of private or governmental forest roads programs to serve as a resource for states, tribes, federal agencies, local government, and industry. The compendium could serve as an indicator of expectations for development, implementation, and/or revisions of forest road programs by highlighting existing robust efforts and the latest developments of evolving strong programs.

IX. Response to Key Comments on Existing BMP-Based Programs

The discussion below responds to significant issues commenters raised with regard to the effectiveness of existing BMP-based programs.

Some commenters expressed concerns about the effectiveness of BMPs. In response, EPA makes an important distinction between the well documented ability of properly implemented BMPs to adequately control the discharge of pollutants, and situations where BMPs are improperly implemented or maintained (see multiple studies discussed in Part V). As these studies generally conclude, most BMPs are highly effective when appropriately designed and implemented; this includes choosing the right practice for particular situations and ensuring proper operation and maintenance. BMPs are ineffective or perform sub-optimally when not properly sited, installed, or maintained. These paradigms hold true for all water quality control technologies, not just BMPs, and underscore the importance of vigilant operation and maintenance rather than a conclusion that BMPs are not effective at protecting water quality. For example, Wisconsin DNR (2013) found that when BMPs were applied correctly no adverse impacts to water quality were found 99% of the time, and Montana DNRC (2014) reported that Montana's forestry BMPs were effective in protecting soil and water resources 98% of the time.

In addition, as with most technologies, it is important to note that BMP science continues to evolve and improve.

One commenter mentioned a study of two watersheds in the U.S. Pacific Northwest region, which found that 44% of 80 sediment debris slides were associated with roads, even though roads comprised only 3.1% of the area. However, the authors of the study concluded that standard BMPs were the best approach to reducing erosion and sediment delivery rates. This is the approach that states and others are already pursuing in that region.

Another commenter pointed to low BMP efficiency data in Edwards and Williard (2010, as cited in Nolan *et al.,* 2015) but the cited article examined the efficiency of forest harvesting BMPs in reducing sediment, not BMPs related to forest roads in particular. EPA also recognizes that state BMP-based programs have limitations, including that they may not be fully implemented, that their effectiveness differs based on numerous variables, and the difficulty in measuring quantitative results.[28] A new federal regulatory program under CWA Section 402(p)(6), however, would not necessarily improve implementation rates, especially given the new limitations in CWA Section 402(*l*), which preclude the use of permits to implement any such program or of citizen suits to enforce any new federal requirements.

A few commenters discussed specific state forest road programs, such as Oregon's and Washington's. One commenter stated that Oregon's forest roads program is too flexible and is

[28] For example, Virginia has an implementation rate of 78% for forest road BMPs (SGSF BMP Report, 2012). In addition, the following states report lower than the national average of 86.7% for BMP implementation rates of stream crossing BMPs: Vermont, 68%; North Carolina, 72%, Ohio, 78%, Maryland, 67%, and Oregon, 71%. (NASF, 2015).

not adequately enforced. The commenter specifically identified the approval/rejection process for written plans as not being sufficiently stringent because there is no requirement to approve or deny a plan. With regard to Oregon (and other states), given the nature and scope of the concerns posed by forest road runoff, a reasonable degree of flexibility is valuable, as it allows for a tailored approach to addressing forest road discharges. *See Decker v. NEDC*, ("Oregon has invested substantial time and money in establishing these practices. In addition, the development, siting, maintenance, and regulation of roads – and in particular of state forest roads – are areas in which Oregon has considerable expertise").

Another commenter stated that, in addition to requiring BMPs, Washington State also requires water quality-based numeric criteria for turbidity and has rules for antidegradation, and that this should be required of all states. With regard to Washington State, EPA recognizes that states currently have various approaches to addressing sedimentation concerns (*e.g*., numeric and narrative turbidity standards, dissolved oxygen standards, temperature standards, *etc*.) as part of their water quality standards programs. EPA agrees that applying numeric standards can be extremely effective in protecting water quality. However, states are well situated to understand the scope and nature of environmental concerns posed by forest road runoff in their states and apply state water program requirements to those concerns accordingly.

Some commenters, urged EPA to implement a national water quality-based monitoring program for forest roads. Requiring water quality monitoring for stormwater discharges from forest roads is infeasible for the reasons discussed in Section VII. Examining forest road BMP implementation on existing roads indicates whether existing programs are taking available and

reasonable steps to address water quality concerns. EPA recognizes that most evaluations and determinations of BMP implementation are qualitative, but nonetheless, that information constitutes the best available information for EPA to make its decision. Extreme storms can pose challenges to the use and performance of BMPs, but BMPs can be tailored to some degree in areas subject to such events. A federal regulation would not alleviate risks posed by extreme storms because it would not be fair or reasonable to impose BMPs in all extreme storm events.[29]

One commenter stated that forest road BMP programs tend to focus on construction of new roads and fail to address older roads, often built before BMPs were in place (*i.e.*, they are either "grandfathered in" or subject to requirements only when brought back into use, reconstructed, or at risk of significant failure). The commenter observed that older roads can be significant sources of sediment since they may be poorly located and built with few if any features to control erosion (citing Endicott 2008, which includes some studies that identify legacy roads as sources but do not provide data regarding sediment discharged by legacy roads). EPA recognizes that legacy roads present a challenge and a potential source of sediment. Legacy roads are also the most challenging types of roads to address through regulation, however. Legacy roads are often no longer in use, so there may not be an ongoing silvicultural operation to fund BMPs. They may have non-forest uses, also complicating responsibility and liability assignment, or they may not be used for a period of time while timber is growing and then they

[29] NPDES Bypass and Upset provisions at 40 CFR Sections 122.41(m) and (n) providing relief in certain circumstances to NPDES dischargers.

may be placed back into use when it is ready for harvest. Legacy roads may also be so overgrown with vegetation that their presence is no longer detectable.

Nonetheless, several state programs require older roads to be upgraded to current BMP standards if they are brought back into service. Endicott (2008) indicates that 24 states had forest road BMPs that address road closure. A more recent review indicates that 34 states have BMPs that address forest road retirement (State Program Summary, 2016). Comments indicate that California, Washington, and Oregon are among those states having programs addressing legacy road issues.

A few commenters stated that stream crossings for forest roads are especially vulnerable locations that can lead to significant erosion. One commenter stated that 5% of truck road stream crossings in the southern Piedmont region of Virginia were not meeting the relevant stream crossing BMPs (Nolan *et al.*, 2015) and that failure to meet BMPs in these areas will have a disproportionately negative impact on water quality as compared to upland BMP violations. Another layer of regulations from EPA, however, would not guarantee that the remaining 5% of stream crossings would incorporate appropriate BMPs. While stream crossings are indeed a high risk area for forest road runoff, a recent EPA analysis of state programs showed that 46 states (92%) have developed BMPs for stream crossings.(State Program Summary, 2016). Additionally, BMP guidance documents addressing road placement make clear that roads should avoid or minimize stream crossings and riparian areas. Thus, a BMP based approach reduces the incidence of road-stream crossings and, when deemed unavoidable, BMPs have been developed to install stream crossings while minimizing erosion.

A commenter also stated that some states do not consider the effects of diversion and natural disturbances when designing BMPs for stream crossings. These are important factors to consider. They are not, however, the only variables considered in a stream crossing design; stream flow and volume, soil type, volume and type of vehicle traffic, climate, and many other factors also play a role in determining the optimal design for a stream crossing. Effective stream crossing BMPs depend on site-specific conditions, reflecting the difficulty of setting one-size-fits-all federal requirements. In one study, researchers examined the effects of upgrading poorly designed stream crossings and concluded that the enhanced stream crossings produced little sediment and that improved stream crossings could significantly reduce sediment contributions from forest roads (Nolan *et al*., 2015). One commenter spoke favorably of several BMPs developed by the USFS for use at stream crossings and recommended that EPA adopt them nationally. EPA encourages state programs to consider USFS stream crossing BMPs for their menus of BMPs.

EPA also received several comments regarding the compliance and monitoring aspects of state programs. One commenter stated that BMP effectiveness rates are overstated and suggested that the appropriate baseline for comparison should be forests in their natural conditions with no roads, whereas most studies compare forest roads with BMPs to forest roads with no BMPs. The commenter also asserted that, based on three studies, the actual efficiency of forest road BMPs is 53-94%. EPA notes in response that forest roads play a critical role in silviculture, recreation, fire suppression, and other uses. EPA does not expect forest roads to be absent from the

landscape and therefore does not think that virgin forest must always necessarily serve as the baseline for measuring BMP effectiveness.

A commenter also pointed out that most BMP monitoring[30] is conducted during dry periods, when effectiveness at preventing stormwater runoff may be more difficult to discern. The commenter noted that variability in BMP performance monitoring can be as high as 50-100%, which would require frequent sampling to distinguish sediment derived from forest roads versus other sources. A number of BMP performance studies are conducted under wet weather conditions, including most of those cited in Section V of this notice. However, BMP effectiveness also can be assessed to a large extent in dry weather, as evidence of soil movement is often visible for a significant time period after rainfall events. For example, gullying or landslides will be clearly visible while sediment deposition in low areas or waterbodies will also be visible.

Another commenter stated that standardizing BMP compliance assessments and reporting protocols is necessary. They add that most monitoring focuses on whether a BMP has been implemented, rather than monitoring water quality for compliance with water quality standards. The commenter cited data from Virginia that noted a 32% non-compliance rate for stream crossing BMPs. EPA recognizes that states have used a variety of monitoring and reporting mechanisms over time and that this can inhibit broader analyses about BMP compliance. However, as discussed in Section VI.A.2 of this notice, two large groups of states have adopted

[30] BMP monitoring refers in this case to assessment of BMP performance effectiveness, which includes verifying that the structure/measures are in place and functioning. BMP monitoring is different from water quality monitoring, which involves monitoring a waterbody for particular environmental indicators.

regional standardized monitoring protocols to promote consistency in compliance assessment and reporting.

First, the SGSF has been implementing a broad monitoring program in 13 southeastern states for nearly a decade. Second, the joint effort between USFS and NAASF developed a similar standardized protocol for evaluating BMP implementation and effectiveness. These two protocols have spread a standardized monitoring process to a significant number of states with active forestry programs. Such standardization efforts are examples of the type of intra-state consistency that a federal EPA program could theoretically institute; their spread in the absence of EPA regulations provides an example in which a new EPA program would be duplicative.

Some commenters stated the lack of a national BMP program leads to inconsistent BMP application and insufficient water quality protections. EPA sees the range of designs in BMP programs as an appropriate response to the diversity of conditions these programs are intended to address. State or regional timber operations vary in intensity, as do the types of forest management programs states or other oversight agencies implement. BMPs used at a site will differ depending on the factors above, as well as others, such as localized scientific research that determines the most effective approaches to managing stormwater. Within different state frameworks, certain aspects of BMP programs are largely consistent. For example, state BMP categories typically encompass forest road location/design/construction; road maintenance; stream crossings; stream management zones/bank stabilization/buffer strips; and many states address forest road retirement and wet weather/winter use.

Many states are taking the lead in enhancing their programs to encompass newly developed methods to reduce water quality impacts from forest roads. For example, CA's "Road Rules, 2013", which was first implemented in January 2015, requires that all forest roads used as part of an approved plan be hydrologically disconnected from waters (EPA-HQ-OW-2015-0668-0055). In the Southern region, the Southern Group of State Foresters Silviculture Best Management Practices Implementation Monitoring framework requires all southern states to include in their implementation monitoring reports counts of water quality risks. Finally, while "traditionally a problem area within all states, compliance with stream crossing BMPs continues to improve as a result of increased education of landowners and managers as well as increased acreage of certified forestland in the region (Schilling *et al.,* 2009)." [Ice *et al.,* 2010.]

One commenter stated, "Congress has failed to adequately invest in the National Forest System roads budget. Annual spending has declined from over $236 million to less than $159 million in the last six fiscal years, when adjusted for inflation." This has helped to contribute to the development of a more than $5 billion deferred maintenance backlog on the National Forest System. This commenter also suggested that, "[r]egulating stormwater discharges from USFS roads will do nothing to address either the forest health crisis or the disinvestment in maintaining the existing Forest Road system" (*Id.).* EPA acknowledges that both the USFS and BLM face resource constraints, often must address higher priority issues such as fire suppression to protect lives, and confront other challenges that limit the ability to fully address all issues arising from forest road activity when it comes to maintaining their transportation networks. Another layer of EPA regulations, in addition to existing federal programs addressing water resources protection

and restoration, would not address these resources constraints and would likely do little to enhance water quality.

In conclusion, none of these comments alters EPA's determination not to establish a new regulatory program for discharges from forest roads under CWA Section 402(p)(6). While EPA recognizes that discharges from forest roads have significant impacts on water quality in many parts of the country, the Agency has concluded that the most effective way to make further progress in addressing these issues is to support existing state, tribal, federal, and third-party programs. Given the diversity of forest roads programs in this country, some programs will necessarily be more rigorous than others. EPA has considered this variability, but concluded that any consistency that a national regulation could theoretically achieve is far outweighed by the challenges of its implementation.

X. References

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