



**Report on State Definitions, Jurisdiction and
Mitigation Requirements in State Programs
for Ephemeral, Intermittent and Perennial
Streams in the United States**

April 2014

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April 2014

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Prepared by

The Association of State Wetland Managers

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LIST OF ABBREVIATIONS AND ACRONYMS

ACOE = Army Corps of Engineers

ASWM = Association of State Wetland Managers

BPJ = Best Professional Judgment

Corps = Army Corps of Engineers

EPA = U.S. Environmental Protection Agency

FA = Functional Assessment

Federal JD = Army Corps of Engineers Federal Jurisdictional Determination

FEMA = Federal Emergency Management Agency

GIS = Geographic Information System

HUC = Hydrological Unit Code

ID = Stream Identification

ILF = In Lie Fee Program

LID = Low Impact Development

NHD = National Hydrography Dataset

NPDES = National Pollutant Discharge Elimination System

NRCS = Natural Resources Conservation Service

OHWL = Ordinary High Water Mark

PR = Permittee Responsible

TMDL = Total Maximum Daily Load

UAA = Use Attainment Assessment/Analysis

USGS = United States Geological Survey

WOS = Water of the State

WOUS= Waters of the United States

WQ = Water Quality

DEFINITIONS USED IN THIS STUDY

Stream Identification: In this study, the term stream identification is used to represent a wide range of practices, generally focused on determining points on the landscape that represent stream origins and reaches that are some distance downstream. Identification practices may include determining stream type, often using geomorphic, hydrologic and/or biological stream features.

Stream Delineation: The practice of stream delineation refers to establishment of the existence (location) and physical limits (size) of a stream for the purpose of federal, state or local regulations. Stream delineation is also an element of a “jurisdictional determination,” a process which identifies water bodies within a project’s boundaries meet the definition of a) a stream and b) “waters of the state, tribe or the United States.”

EXECUTIVE SUMMARY

This report identifies and compares the various ways states address stream jurisdiction, stream identification, and protection of ephemeral, intermittent and perennial streams. It also focuses on compensatory mitigation practices for streams used by states. It



provides a comparative analysis of how stream impacts are integrated into state dredge and fill permitting and 401 certification programs under the Clean Water Act. The report compares the estimated extent of waters covered from state to state under state law, and identifies methods used in each state for mitigating stream alteration and degradation. Finally, this report identifies both common and unique practices among states, including where stream mitigation is coordinated by the Corps or an interagency arrangement. The report is divided into four sections: 1) stream jurisdiction, 2) stream delineation and identification, 3) stream mitigation, and 4) stream mitigation-related gaps and needs.

To conduct this study, ASWM: a) established a national workgroup of state and federal agency staff, b) conducted nationwide telephone interviews with state staff coordinating or working with stream mitigation efforts, c) documented both common and unique mitigation practices, and c) compiled this report and online resources summarizing the varied practices and tools used in each state. This study includes data from 47 states and includes practices from all ten EPA regions. Corps staff was not interviewed as part of the study, unless they were asked by the state to participate in a joint interview along with state staff.

The report presents results and findings by interview question, as well as summary tables and maps for all appropriate questions. State-by-state breakdown tables listing more extensive details reported by states can be found in referenced appendices at the end of the report for most questions.

KEY PROJECT FINDINGS

Stream Definitions, Jurisdiction and Delineation

- The vast majority of states (n=47) include *all* of their streams in the definition of waters of the state. However, this does not necessarily mean that they *regulate* all streams.
- Approximately half of the states in the study report having a formal definition of the term “streams” in their state’s legal statutes.
- Twenty-three states formally define one or more of the terms “perennial,” “intermittent,” and/or “ephemeral.” However, definitions are not consistent between states and several states only define the terms perennial and intermittent in relation to streams, not defining ephemeral.
- Many states define streams (or other waterbodies if they do not define streams) in ways that do not directly mesh with the scientific definitions of perennial, intermittent and ephemeral stream types.
- It is important to note that some states use the term “intermittent” to include some or all streams which could also be *scientifically* be classified as “ephemeral” (Ephemeral was defined in the questionnaire for this question as “never in contact with groundwater”).
- Thirty-five states regulate at least some portion of ephemeral streams, but not all. Ten states have jurisdiction only over perennial and intermittent streams.
- Some states that do regulate ephemeral streams may only have jurisdiction over a portion of those streams. For example, some states have jurisdiction over all ephemeral streams except ephemeral streams found to be outside of federal jurisdiction (in MD), wetland conveyances (in TN), and those streams upstream from a wetland (in MA).
- Forty-three states regulate at least some ditches (including altered and modified streams, as well as those termed ditches). However, states that regulate ditches often have conditions and/or exemptions for specific types of uses, which are detailed in the report.
- In the vast majority of states, more than 98% of streams are subject to dredge and fill permitting. In only 13 states, some portion of the state’s ephemeral or intermittent streams are not subject to this permitting.

** Definitions on the left side of the page represent one of the widely accepted definitions. Interviewees were asked to report to what degree their state regulates waters that meet this definition.*

Stream Types*: Although there are no consistent definitions either in regulations or scientific literature, the following definitions capture the general components of the three stream types:

Ephemeral: A stream that has flowing water only during or for a short duration after precipitation events in a typical year. In many states, this term refers to streambeds that are located above the water table year-round and streams where groundwater is not a source of water for the stream.

Intermittent: A stream that has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from precipitation is a supplemental source of water for stream flow.

Perennial: A stream that has flowing water year-round during a typical year. The water table is located above the streambed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from precipitation is a supplemental source of water for stream flow.

Compensatory Stream

Mitigation: The restoration, enhancement, creation, or (for the purposes of streams of national or state significance) preservation of streams and their associated floodplains for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved. Compensatory mitigation should be designed to restore, enhance, and maintain stream uses and functions that are adversely impacted by authorized activities.

Compensatory Stream

Mitigation Activities: Activities may include restoration, creation, enhancement and (in some cases) preservation.

Compensatory Stream

Mitigation Options: Stream mitigation options take one of three forms: a) permittee responsible mitigation, b) buying credits from a mitigation bank, or c) paying into an in lieu fee program.

Stream Delineation and Identification

- The entities responsible for stream delineation for dredge and fill activities differ between states. Twenty-one states conduct their own delineations and seventeen states rely solely on the U.S. Army Corps of Engineers (Corps) to conduct stream delineations for the 404 program. The remaining nine states work collaboratively through joint processes – either relying on the Corps primarily but delineating where the Corps does not (5 states) or working through interagency arrangements (5 states). This study did not gather information on stream delineation for other water programs.
- The most common characteristic used in for stream identification is the presence of a bed and bank (53%), with others including presence of a channel (32%), various measures of flow (26%), and use of the ordinary high water mark (17%). At least 34% of reported identification/delineation practices in states include the use of some form of maps (USGS, NHD, etc.) and/or aerial photography. In most states, multiple criteria are used to delineate streams.
- If width of a stream is measured, it is usually documented by measuring either top of bank to top of bank or bankfull width.
- Twenty-four states report having supplemental procedures for identifying streams in addition to the jurisdictional determination conducted by the Corps. Fifteen states delineate about the same portion of streams as the Corps does (either because the Corps controls the process or the state parallels the Corps' process). Only Delaware and Maryland indicate that they delineate slightly less than the Corps.
- Twenty-two states shared identification tools that they use in their state to assist in identification. Shared tools are listed in the report.

Prevalence of Stream Mitigation in the United States

- This is a pivotal time for stream mitigation in the United States. The practice of stream mitigation is much newer than wetland mitigation, some of which have been in place since the early 1990s. The majority of stream mitigation programs have been initiated since the EPA and the Corps issued final regulations governing compensatory mitigation for authorized impacts to streams and other waters under Section 404 of the Clean Water Act in 2008.
- In most states, the state or the Corps either has some form of stream mitigation process in place or is currently developing a program or practices. For example, in Arizona, Minnesota, Montana, Ohio, Wisconsin, and Wyoming, stream mitigation programs are in early stages of development.

Stream Assessment: An evaluation of stream health, which may include data collection and analysis of physical, hydrologic, and ecological conditions/functions within a specific stream mitigation project area.

Functional Assessment: An approach to stream assessment that increases the emphasis on stream function, in addition to form. The approach pairs whole systems thinking with a parameter specific process-based evaluation. This assessment method measures ecological uplift in combination with functional lift, a measure referred to as “functional uplift.” Other types of assessment include condition and value-based.

Stream Mitigation Programs and Practices: For the purpose of this study, the term stream mitigation “program” refers to a formalized set of practices by the Corps or other authorized agency responsible for implementing compensatory stream mitigation. A “practice” refers to an action related to implementing stream mitigation, which may be formalized (part of a mitigation program) or informal

- The majority of formalized state-run stream mitigation programs are located in southeastern, mid-Atlantic and Midwest states.
- The amount of permitted stream activity happening in each state, as well as the amount of stream mitigation, varies widely, regardless of whether it is implemented by the state and/or the Corps. In sixteen states, mitigation is for mostly a mixed bag of projects annually (defined as mostly small project with less than four projects with large impacts). A large amount of stream mitigation activity was reported to occur in twelve states, while seven states conduct a small amount and another ten states conduct no or almost no stream mitigation.
- A number of states volunteered additional comments on the reasons more or less stream mitigation is occurring in their state. These states reported that the amount of mitigation has been impacted by limited access to resources that can support mitigation work, increasing impacts from high water events/stormwater, the economy’s influence on the number of permit applications, mining and the expanding U.S. energy industry.

Common Types of Stream Impacts Requiring Mitigation

- Across the country, by far the most significant number of dredge and fill permits are issued for what can be termed “infrastructure-related” projects. Forty-five states reported that transportation-related activities are the most common dredge and fill permits for stream impacts in their state, including installation/replacement of culverts, and permits for roads, bridges and other crossings. Other major infrastructure-related permits include those for commercial or residential development (24 states) and utility work (23 states).
- At least eighteen states are experiencing regular stream impacts from mining, sometimes including significant modifications to landscapes, including loss of streams.
- Not all impacts to streams are negative, a number of states are issuing dredge and fill permits for stream restoration (14 states) and channel stabilization/modification (21 states), which can in limited situations have positive impacts for severely eroded channels. The report lists other types of common stream impacts as well.

Stream Assessment

- The majority of assessment practices reported by interviewees are specifically related to the dredge and fill permitting process, either as part of the program or through collaborative data sharing with other programs to support dredge and fill permit decision-making.

Compensatory Stream

Mitigation Activities:

Activities may include restoration, creation, enhancement, and (in limited cases) preservation.

Definitions of these activities can be found in the report glossary.

Riparian Zone:

The riparian zone is defined as the transitional area between terrestrial and aquatic ecosystems. These areas are characterized by connected biophysical conditions that connect and link surface and subsurface hydrology with water ways and their adjacent uplands. Riparian areas are adjacent to perennial, intermittent, and ephemeral streams, lakes and estuarine-marine shorelines.

Low Impact Development:

An approach to land development/redevelopment that works with nature to manage stormwater as close to its source as possible, employing principles such as preserving/recreating natural landscape features, minimizing imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste.

- The majority of states report assessing habitat (30 states), water quality (29 states), and biological criteria (25 states), while a smaller number evaluate physical/stream structure (20 states) and hydrological measures (11 states).
- Ten states are currently utilizing stream functional assessments, while six states are in the process of developing functional assessment tools. An additional six states report having an interest in *developing* functional assessments for streams.
- Twenty-three states shared their assessment tools, which are listed in this report.

Compensatory Stream Mitigation Programs and Practices

- Thirteen states report having their own formal state-coordinated stream mitigation program, while an additional nine states report having state stream mitigation “practices,” but no formal program. Six states operate as part of an interagency stream mitigation program arrangement. Eighteen states leave mitigation decisions to the Corps.
- Although in thirty-three states, the entity implementing stream mitigation in the state does differentiate between types and uses of streams when they determine mitigation requirements, in only thirteen states has this mitigation requirement been formalized. Most of this in-kind matching process is an informal one (20 states), usually relying on best professional judgment (BPJ).
- Mitigation matching is most commonly based on stream type, stream location, water quality or stream condition.

Activities that Qualify as Stream Mitigation

- In most states, whichever entity coordinates stream mitigation entertains a wide range of mitigation options, with a focus on selecting mitigation to address the impacts brought about by the permitted activity. Twenty states report that they would consider any proposed stream mitigation activities. However, this does not mean that they would *approve* all proposed activities.
- For those who also identified specific types of allowable stream mitigation activities in their state, the most commonly reported include in-stream (i.e. channel) restoration (29 states), stream stabilization (26 states), buffer/riparian zone restoration (24 states), stream enhancement (20 states), stream preservation (19 states), and hydraulic modification (18 states).
- Riparian zone protection and enhancement is of growing interest across the country. In a large number of states, riparian work is either allowed as a

Mitigation Bank: A stream, wetland or other aquatic resource area that has been restored, established, enhances or preserved for the purpose of providing compensation for unavoidable impacts to aquatic resources permitted under Section 404 or a similar state or local regulation. The permittee, upon approval of regulatory agencies, can purchase credits from a mitigation bank to meet requirements for compensatory mitigation.

In Lieu Fee Mitigation: In Lieu Fee (ILF) mitigation occurs when a permittee provides funds to an in lieu fee sponsor (a public agency or non-profit organization). Usually the sponsor collects funds from multiple permittees in order to build and maintain mitigation sites.

Permittee Responsible Mitigation: Permittee Responsible (PR) mitigation occurs when a permittee undertakes restoration, establishment, creation, enhancement, or in some cases preservation, of a stream in order to compensate for stream impacts resulting from a

stand-alone mitigation activity (without other mitigation activities) or as a component of a set of mitigation activities (in conjunction with in-stream restoration, hydraulic modification, etc.). There is also growing interest in developing legal instruments to protect stream buffer zones, extending regulation beyond the stream channel itself.

- Low impact development (LID) practices and installations are also starting to be considered in at least states; however, there are concerns about double-crediting with point source discharge permits among other issues.
- Twenty-eight states report that mitigation for at least a portion of stream impacts related to the creation or removal of impoundments occurs in their state.
- For the purposes of this report, stream creation is defined as the establishment of a stream where a stream has never existed before. No states formally provide mitigation credits for stream creation. However, a number of states report that stream creation would be considered, even though in a number of them there is limited ability to do so due to arid or other environmental conditions. It is not allowed in 24 states. Kentucky has a few isolated examples of work similar to stream creation, but not as mitigation. Other practices were thought of to be similar to stream creation and in some states were provided credits, including increasing sinuosity, daylighting and stream relocation around an impacted area.

Stream Mitigation Options:

- Interviewees were asked to identify which of the following three stream mitigation options were offered in their state: mitigation banks, in lieu fee (ILF) programs, and permittee responsible mitigation.
- Access to mitigation options differs widely among states.
- Permittee responsible stream mitigation is the most commonly offered mitigation option (39 states). However, permittee responsible mitigation may not be the preferred method where mitigation banking or in lieu fee programs have been well-established (e.g. Georgia).
- In twenty-six states there are currently one or more mitigation banking options with stream credits. In six additional states, they are in the process of approving or developing mitigation banks with stream credits.
- An in lieu fee (ILF) mitigation option for streams is currently offered in twenty-two states, while ILF programs are under development in two states.

Stream Mitigation Site Selection and Design Evaluation

- Mitigation site selection and design is most frequently established on a case-by-case basis (29 of the 34 states answering this question).

Compensatory Stream

Mitigation Credits: In a compensatory mitigation system, stream mitigation activities are valued in “credits.” The value of these credits is determined by quantifying the stream functions or linear feet restored, enhanced or created.

Compensatory Stream

Mitigation Debits: In a compensatory mitigation system, stream impacts are valued in “debits.” The value of these debits is determined by quantifying the stream functions and/or linear feet disturbed or lost, and with what impact.

- Despite the lack of formal siting and design guidance, most states report that when they do mitigate for stream impacts, siting and design criteria support locating mitigation that is a somewhat close (17 states) or close (14 states) match of landscape position and/or other criteria for the stream that was impacted. Only four states reported they did not match these closely.
- Among the specific considerations for mitigation commonly identified by states were replacing specific functions lost and mitigating within the same area (e.g. within same watershed).

Assignment of Stream Mitigation Debits and Credits and Measuring Mitigation Success

- In twenty-one states, formal procedures for assigning debits and credits are offered, either through the state or the Corps. Links to mitigation guidance and protocol documents used in 17 states are listed in this report.
- Measures for stream mitigation success that are formalized beyond adherence to what was outlined in the permit plan are reported in only a few states. In some states there is a formal process in place to inspect the site, but in others there is no formal follow-up at all to ensure the site fully replaces the aquatic resources lost by the permitted impacts.
- Functional assessment procedures or tools are being used in 10 states. However, this area of program development is of significant interest to the majority of states either with established programs or those seeking to develop a more robust program.

Conclusions and Recommendations

This study focuses on identification, delineation and mitigation practices for streams in the United States. Looking at identification and delineation, findings indicate that most states have a definition of waters of the state that includes all streams with a bed and bank and evidence of flow. They may or may not regulate dredge and fill activities in streams, and, if they do, may do so in a subset of the streams included in the definition of waters of the state.

There is significant variability in the terms that are used to define types of streams and how they are defined to describe streams in state statutes and regulations. Consequently, findings indicate that any comparison of state jurisdiction over streams must include a not only a definition but a description of the types of streams covered by the various terms such as ephemeral and intermittent in state law, regulations or guidance.

There is variability in delineation methods, particularly in the field evidence used to identify the beginning of a stream. However, despite the diversity, most criteria do include the concept of bed and bank and evidence of flow. Specific field criteria used to identify these features are variable across the United States, with some criteria used by many of the states. It was beyond the scope of this study to determine if the various criteria would lead to consistent determinations. Consequently, while some criteria that may be useful on a regional basis, most are not likely to be applicable nationwide (for example: those that are influenced by local precipitation patterns).

At this time, due to the rapid growth of stream mitigation programs and practices, this report provides a snapshot of where stream practices stand today and where they are trending. Stream mitigation is currently a growing practice in the United States. While there are well-established programs in some parts of the country, many parts of the United States are just beginning to work on developing programs and practices. However, because of the diversity in systems within which states need to address stream impacts, (e.g. regional conditions, resources, and socioeconomic and political variation) an important finding of this report is that there are no one-size-fits-all solutions, practices or models. Consequently, while states may benefit from looking at other models and templates, they must select and modify practices appropriate to their local needs, regulatory context and environmental conditions.

State interviewees indicate that a wide range of data is being collected on streams and that there are benefits to sharing this data and coordination with other programs at the state level. This study supports the idea that there should be greater integration between Dredge and Fill, and point source discharge permits as well as other water quality programs implemented by the state.

A common theme among states is the connection between the amount and quality of stream mitigation and evaluation of mitigation projects and a lack of resources, ranging from too few staff, budget restrictions, scientific support and access to training and model practices and measures. It is essential for states to capitalize on available resources. States are in need of multiple sources of information, engaged dialog and access to support in terms of research, training, political will and examples of lessons learned.

Report Recommendations:

A full list of recommendations and associated support and actions is provided later in this report. The findings of this study identify the following key areas where action and supports are needed to encourage the effective implementation of stream protections through compensatory stream mitigation and its alternatives:

Report Recommendations

Address National Variability

- 1) Encourage decision-makers and practitioners to take into consideration the highly diverse regulatory systems and terminology within which stream identification, delineation and mitigation occur and that there are few on-size-fits-all approaches or tools
- 2) Develop a list of stream mitigation options and engage in a national discussion on activities that constitute stream mitigation
- 3) Identify models and regulatory frameworks that allow for greater regulation and mitigation of riparian zones/stream buffer areas

Provide Support to Decision-makers and Practitioners

- 4) Help practitioners develop a better understanding of the fundamental components of streams and their response to stream restoration/preservation/ enhancement compensatory activities
- 5) Help regulators evaluate the options for and components of compensatory stream mitigation in order to support the expansion of mitigation practices
- 6) Help regulators evaluate the challenges and opportunities related to implementing stream mitigation
- 7) Provide guidance on non-compensatory mitigation alternatives, including avoidance and minimization

Facilitate Learning Opportunities and Discussion

- 8) Provide opportunities for cooperative sharing, learning and training on stream identification, delineation and mitigation issues, ranging from regional working groups to online training resources
- 9) Facilitate engaged debate about the pros and cons of different identification, assessment and evaluation methods and measures as supports for stream mitigation
- 10) Provide training and guidance on key topics identified in the training section of this report, including functional assessment
- 11) Create opportunities to learn about alternative practices that can protect and improve streams, such as incorporating low impact development (LID) into stream mitigation options and stream creation.

Track Change/Progress Over Time

- 12) Finally, because this report represents a snapshot in time, it should be used as a baseline for measuring changes in stream mitigation practices in the future. A copy of the questions used to gather data are included in Appendix A of this report. Future investigation into the status and trends of stream mitigation can benefit from replicating data collection from this report. Ideally, ongoing research on change would include efforts to identify indicators and drivers of change.

INTRODUCTION AND STUDY BACKGROUND

Stream Identification and Delineation

States implement a variety of water protection programs including Clean Water Act programs such as the Section 402 National Permit Discharge Elimination Program (point source permitting), the Section 319 Nonpoint source program and the Section 401 water quality certification program. In addition, 20 states administer a state dredge and fill permitting program. In general, states have very broad definitions of waters of the state that include all streams, wetlands and other waterbodies, as well as groundwater. Many of these state definitions include terminology to identify and describe streams in statute or regulations. In addition they have developed field methods to delineate streams in the field. Both the terms and definitions used to describe streams and the field methods used to identify them have been developed independently. Differences in the terminology and criteria make it very challenging to make direct comparisons, particularly given the differences in precipitation, landscapes and climate across the country. However, despite this variability in words and methods, it appears there is also a great deal of consistency with respect to what is ultimately identified as a stream.



Stream Mitigation as a Growing Practice across the United States

The history of mitigation of both wetlands and streams is relatively short. Wetland mitigation became a common practice as part of implementation of the Section 404 program following issuance of the Mitigation Memorandum of Agreement (MOA) between the Corps and EPA in 1990. The Mitigation MOA for the first time formalized the process of avoiding, minimizing and mitigating dredge and fill permit impacts. Initially, mitigation focused almost solely on wetland mitigation with little attention given to streams. Even when there was a stream impact, mitigation was often accomplished through wetland mitigation. However, as mitigation of wetlands became more common and emphasis was placed on mitigating for specific functions lost from a site, it became logical to begin developing similar requirements for streams. Stream mitigation began to be practiced regionally in the mid-to late 1990s, but only became a formalized practice following publication of the Mitigation Rule in 2008. Even then, there was concern expressed by stream scientists and others that the science of stream mitigation lagged far behind wetland mitigation. Wetlands and streams represent two very different aquatic environments and many lessons learned about how to mitigate successfully for wetlands were not applicable to streams. Stream restoration methods, practices and measures needed to be developed.

Today, in each state, the Army Corps of Engineers, an approved state authority, or some combination of the two, is responsible for determining whether adequate avoidance and minimization of stream impacts has occurred for proposed activities. If not, this authority is responsible for deciding whether or not compensatory mitigation is required to replace the loss of existing functions and area (often measured in linear feet).

Stream mitigation is part of a complex regulatory framework that connects the River and Harbor Act of 1899, Section 404 of the Clean Water Act, Section 404(b)(1) guidelines, Section 401 Water Certification Program, and even the Endangered Species Act with state authorities to permit dredge and fill activities, stream water quality standards and other regulation of state waters. This complexity, in combination with relative newness of stream mitigation practices, leads to a great variability in how stream mitigations is carried out from state to state. As with stream identification and delineation, terminology, methods and practices differ across the country.

State Independent dredge and fill permitting programs, Section 401 and their Relationship to Section 404/Corps Permitting

State authority to issue or condition permits for dredge and fill activities in streams is derived from state statutory and regulatory authorities. These generally fall into two categories. First, there are 20 states that implement a state authorized dredge and fill permitting program. In these states, the state issues a dredge and fill permit and does so under state statutes and regulations. Second, states without independent permitting authority condition federal Section 404 permits issued by the Corps based on the state's water quality standards and other relevant statutes and regulations. There are a number of variations within the 20 states with dredge and fill permitting authority with respect to how this is carried out. The majority of these states have a state permitting process that runs concurrently and often jointly with the Section 404 permitting program. Two states have taken over the Section 404 program – Michigan and New Jersey. There is no Corps involvement in those two states except in coastal and certain navigable waters. A few other states, such as Wisconsin and Indiana, condition Section 404 permits when the Corps issues a permit. But where is no federal permit required, then these states issue a state permit (for example in the case of isolated wetlands). Some states are independently developing stream mitigation practices. Finally, some states are very active members of Interagency Review Teams (IRT's) that are comprised of federal and state agencies that review mitigation bank and in lieu fee proposals. IRT's may also work collectively on the development of stream mitigation practices. Some states have a small role in development of stream mitigation practices and defer largely to the Corps.

Identifying the Status of Stream Mitigation and Trends

In 2013, the Association of State Wetland Managers was awarded an EPA Wetland Program Grant to conduct a national study on stream identification, delineation and mitigation. This study has been designed to identify the status and trends of compensatory stream mitigation in the United States, as well as stream identification, delineation, assessment practice, as they relate to the implementation of the 404 Dredge and Fill and 401 Water Quality Certification Programs of the Clean Water Act, as applied to federal Dredge and Fill permitting. The study documents the range of terms, definitions, programs, practices and systems used to conduct these practices among the states, identifies both common and unique practices, and provides examples of guidance documents and tools that can be shared with other states.

A Focus on Stream Mitigation from the State Perspective

There are many different regulatory scenarios for implementing stream mitigation in states. This study focuses on state mitigation programs and practices, with information also gathered from state agencies about Corps practices and tools in their state, in locations where the state is not responsible for stream mitigation. In some states, state agencies are responsible for implementing stream mitigation. A few states have an interagency relationship with the Corps, where the state is part of a collaborative group of regulators working to implement and evaluate stream mitigation activities. In one case, the state has a parallel process to the Corps, yet the state does have its own program with similar reach (e.g. Oregon). The remaining states have no programs or practices, leaving stream mitigation solely to the Corps. Interviewees were also asked to identify any active tribal mitigation programs. Only two states were able to identify potential tribal programs, making comparative analysis of limited usefulness. However, many ideas and recommendations documented in this report may have applicability to identification, delineation and mitigation of streams on tribal land.

A Study Goal: Capturing Diversity in Terms and Practices

Utilizing a qualitative, semi-structured interview methodology, this study has been designed to capture the *range* of terms, definitions, and practices used across the United States.

Analysis in this report did not seek to aggregate practices into broader categories, but instead document diversity. *It is important to note that the diversity documented in this report should not be interpreted to mean that states have little in common between their practices.* There is more than one way

to run a successful program. Given the newness of stream mitigation, this study selects to document the full range of approaches so that professional staff implementing or seeking to develop a stream mitigation program can benefit from learning about the diversity of approaches currently practiced and move toward developing more cohesive and consistent best practices over time. Terminology for describing these practices is also new and, consequently, some reported practices may actually refer to the same practice despite being referred to by different terms, while in other cases, two practices referred to by interviewees by the same name may actually represent different practices.



How to Read this Report

The following report is broken down into four primary sections: 1) Stream Jurisdiction, 2) Stream Delineation and Identification; 3) Stream Mitigation and Associated Assessment and Measures of Success; and 4) Stream Mitigation Gaps and Needs Identified by State Staff. The report presents results and findings by interview question, as well as summary tables and maps for all appropriate questions. State-by-state breakdown tables listing more extensive details reported by states can be found in referenced appendices at the end of the report. Consequently, the reader is welcome to review summary text, look at comparative tables, view regional distribution on maps, or review more detailed data on individual states by looking at appendices.

PROJECT METHODOLOGY

This project provides a comparative analysis of data collected through semi-structured interviews and follow-up communications with state staff working on stream identification, delineation and mitigation from forty-seven U.S. states. Three states did not participate in either interviews or provision of data for the report. These states were Alaska, Louisiana and Mississippi.

Study Sample

Current ASWM state contact lists were used to make initial contacts with states, with follow-up snowball sampling to find the appropriate contact(s) who could speak specifically to stream identification, delineation and mitigation practices being used in their state (N=50). Contact was made with staff from forty-nine states. An effort was made to conduct at least one interview per participating state, with as many additional staff members on the call as recommended by the contact staff and as much potential follow-up as time allowed. Formal interviews were completed with staff from 45 states and two additional states sent data. A total of 47 states (n=47) are represented in the study, for a response rate of 94%.

Data Collection

Data collection consisted of telephone interviews with state stream regulation and/or mitigation staff based on a series of semi-standard questions to ensure comparability, which were then adapted for use with each state based on specific state regulatory systems and programs (not all questions were asked to all interviewees based on their state circumstances and additional clarifying questions were asked to follow-up on unique state practice/program attributes and/or conditions). All interviews were conducted by a trained ASWM staff policy analyst. Interviews gathered information in two segments: 1) stream identification and delineation practices and 2) stream mitigation practices. A list of the general questions for the interviews can be found in Appendix A. Following the first ten interviews, the list of potential questions was revised with the inclusion of questions to solicit information about buffers and low impact development as a mitigation option. At the same time, the interview question about stream creation was refined to include a definition of stream creation. Interviews were scheduled using email and Doodle electronic scheduling tools. Interviews lasted between 60-120 minutes and were conducted between July 1, 2013-January 13, 2014. Two states submitted written answers to the general questions, as they were unable to participate in interview calls during the project period.

Data Entry

The first ten interviews were transcribed and used to develop a set of comparison tables. The remaining interview data entry was entered directly into comparison tables, with notes and recordings saved as documentation. Comparative tables allowed for between-state analysis and searchability by program, geography, and content area.

Quality Assurance

All telephone interviews were recorded to supplement interview note-taking and were reviewed during data entry and analysis. Follow-up calls and emails were conducted as needed to ask additional clarifying questions during the data entry process. The dataset was sent to each interviewee to confirm accuracy. Any changes submitted by states were incorporated into the final data set, analysis and report document. A total of 26 states provided edits to their data by the deadline for the draft report submission to EPA. Consequently, data for those specific states may potentially be more accurate than those states for which interviewees did not submit edits.

Data Analysis

Data analysis was conducted by the same ASWM policy analysis that conducted all telephone interviews for the project. Comparative analysis between and among all 47 states was conducted based on the data entry matrix. State by state tables were developed and used to create summary tables and descriptive statistics for each question. Complete data is provided in the state tables in Appendices B-M. Additional information was reviewed from recorded interviews and notes to place data in context.

Study Limitations

Snapshot in Time: ASWM acknowledges that this report is a snapshot in time. Data collected for this report is time-sensitive, meaning that findings may not reflect the status of stream practices after the date of publication, since stream mitigation is evolving so quickly across the United States. Consequently, the value of this report is in creating a baseline for comparison and identification of some practices, models and templates that can be shared with other states and, ideally, be used to improve overall practices.

Qualitative Data Collection: Both a strength and a limitation of this study's methodology is its focus on qualitative interviews as a data collection method. The selection of interview-style research was based on both a desire to capture the range of practices and options being employed across the country and the lack of existing information required to develop categories for a quantitative survey. The comparative analysis of interview findings allowed for the creation of categories of practices. This required states to complete review of the data in order to ensure that accounting for additional practices was documented. States with completed review and edits are listed in Table 1.

Question Interpretation: In some cases, analysis of the data indicates that the question was interpreted in different ways by interview participants. This is especially true for the questions relating to stream assessment. Some of the states limited their reporting to assessment practices they only used associated with their dredge and fill programs, others on all assessment, including for other programs. Consequently, the results of this section provide a broad brush analysis of the types of assessment available in each state. Further clarification is needed. During the review process, a few states clarified differences, which are noted in state-by-state tables located in the report Appendix.

Limits to Knowledge Shared by Interviewees: The sample of interviewees represented a state staff member or representative with knowledge about the information requested for this study. However, it is important to note that the responses to interview questions represented only what was known by the interviewee. In some cases, the interviewee may not have been aware of the full range of applicable state statutes, practices by the Corps or other information relevant to fully answering the questions posed. In some cases, the interviewee was aware of the limits of their knowledge. This is usually documented in the report as follow-up required with other entities. However, some reporting may have been inaccurate due to an interviewee's limited knowledge about other programs and regulatory information in the state.

Evolution of Interviews: Some of the questions in the survey became more refined as the interview process was implemented over time. Specific clarifying and guiding questions could be used as prompts to ensure that the information needed to complete the comparative analysis were asked. As a consequence, states in the first ten interviews required more editing by states when they conducted their review.

PARTICIPATING STATES

State	Interviewee	Agency/Institution(s)	Interview	Edited*
1. Alabama	Richard Hulcher	AL DEM	12-16-13	√
2. Arizona	Jason Jones	AZ DEQ	11-22-13	
3. Arkansas	Johnny McLean	AR DEQ	1-3-14	√
4. California	Bill Orme	CA State Water Board	9-6-13	
5. Colorado	Brad Johnson	CO State University	11-25-13	
6. Connecticut	Robert Gilmore	CT DEEP	11-4-13	
7. Delaware	Scott Figurski	DE NREC	1-10-14	
8. Florida	Doug Fry et al	FL DEP	9-9-13	√
9. Georgia	Welte & Sammons	GA DNR	8-23-13	√
10. Hawaii**	Rebecca Alakai	HI DNR	1-17-14	√
11. Idaho	Miranda Adams	ID DEQ	11-15-13	√
12. Illinois	Malone & Sauer	IL DNR	12-20-13	√
13. Indiana	Marty Maupin	IA DEM	11-4-13	√
14. Iowa	Schwake & Weiss	IA DNR	11-18-13	√
15. Kansas	Debra Baker	Kansas Water Office	10-28-13	√
16. Kentucky	Adam Jackson	KY Division of Water	8-5-13	√
17. Maryland	Bill Sieger	MD DOE	10-18-13	√
18. Maine	Mike Mullen	ME DEP	12-2-13	√
19. Massachusetts	Lisa Rhodes	MASS DEP	9-16-13	√
20. Michigan	Amy Lounds	MI DEQ	9-9-13	√
21. Minnesota	Mark Tomasek	MN Poll Cont. Agency	11-15-13	√
22. Missouri	Stacia Bax	MO DNR	10-21-13	√
23. Montana	Jeff Ryan et al	MT DEQ	1-3-14	√
24. Nebraska	Jason Garber	NE DEQ	10-30-13	√
25. Nevada**	Hegeness & Stone	NV DEP	11-19-13	√
26. New Hampshire	Sommer & Tilton	NH DES	8-21-13	
27. New Jersey	Lockwood & Mazzei	NJ DEP	8-19-13	√
28. New Mexico	Maryann McGraw	NM Environment Dept.	12-9-13	√
29. New York	Josh Theil	NY SDEC	11-18-13	
30. North Carolina	Eric Kulz	NC DENR	7-29-13	√
31. North Dakota	Peter Wax	ND Dept. of Health	10-23-13	√
32. Ohio	Ric Queen	Ohio EPA	12-4-13	
33. Oklahoma	Mark Derishweiler	OK DEQ	10-28-13	√
34. Oregon	Dana Hicks	OR DEQ	8-5-13	√
35. Pennsylvania	Goerman/Freyermuth	PA DEP	1-8-14	
36. Rhode Island	Chuck Horbert	RI DEM	8-30-13	√
37. South Carolina	Heather Preston	SC DHEC	11-6-13	√
38. South Dakota	John Miller	SD DENR	1-10-14	√
39. Tennessee	Robby Baker	TN DEC	8-30-13	

*The heading "Edited" refers to whether or not the interviewee completed review of the data tables sent to them for review after data entry from interviews was complete

** States that sent data only, did not participate in a formal telephone interview

PARTICIPATING STATES, CONTINUED

State	Interviewee	Agency/Institution(s)	Interview	Edited
40. Texas	Gregg Easley	TX CEQ	12-4-13	√
41. Utah	Daren Rasmussen	UT Div, Water Rights	1-8-14	√
42. Vermont	Mike Kline	VT DEC	10-21-13	√
43. Virginia	Bettina Sullivan	VA DEQ	8-7-13	√
44. Washington	Johnson & Thurston	WA ECY/DF&W	1-10/13-14	√
45. West Virginia	Danny Bennett	WV DNR	1-7-14	√
46. Wisconsin	Liesa Lehmann	WI DNR	1-10-14	√
47. Wyoming	Jeremy Zumberge	WY DEQ	12-9-13	√

Note: No interviews could be secured with Alaska, Louisiana or Mississippi

Results and Findings - Section 1: Stream Jurisdiction

Study findings document that language and guidance are variable for stream terminology and practice on multiple levels. First, most states have highly comprehensive definitions of waters of the state, most including all surface waters as well as groundwater. Second, in addition to this overarching definition of waters of the state, individual programs within states often have different or narrower definitions of state waters. Methods for delineating streams in the field are also highly variable and often based on best professional judgment. This variability provides further insight into the extent of state waters regulated under the dredge and fill program.

Third, to add to this complexity, the study finds that states do not use consistent terminology in either identifying waters of the state, waters identified under a regulatory program, or methods for identifying streams in the field. In some cases, even when the same terms are used, they may have a different meaning. For example, in different states the term “ephemeral” has been defined as a) a stream with a bed and bank not in contact with groundwater in one state, b) a stream that’s flow is derived wholly from local rainfall in another state and c) the area upslope of where a bed and bank and evidence of flow is identified. These differences represent a true challenge for creating comparisons and guidance across boundaries. Lastly, comparative review of which entities are responsible for identifying/delineating streams shows a wide diversity, with some states deferring to the U.S Army Corps of Engineers to identify streams, others working collaboratively with the Corps through a joint approach, and yet others implementing their own independent state methodology.

Comparative analysis of state terminology and practices highlights this variability. State similarities and differences are apparent when viewing state terminology and practices documents in Appendix D (column labeled “Definition of Waters of the State”), Appendix B: (column labeled “Regulatory focus”) and Appendix C (column labeled “Identification Practices”)

LEGAL DEFINITION OF STREAMS

Q. How does your state legally define streams subject to state water quality standards and other regulations? (n=47)

The most common regulatory foci are surface waters, water use classifications, and water quality criteria. Flow requirements that do not necessarily match with the scientific terms perennial, intermittent and ephemeral are also used in a number of states. A state-by-state summary of the status of stream definitions is provided in Appendix B.

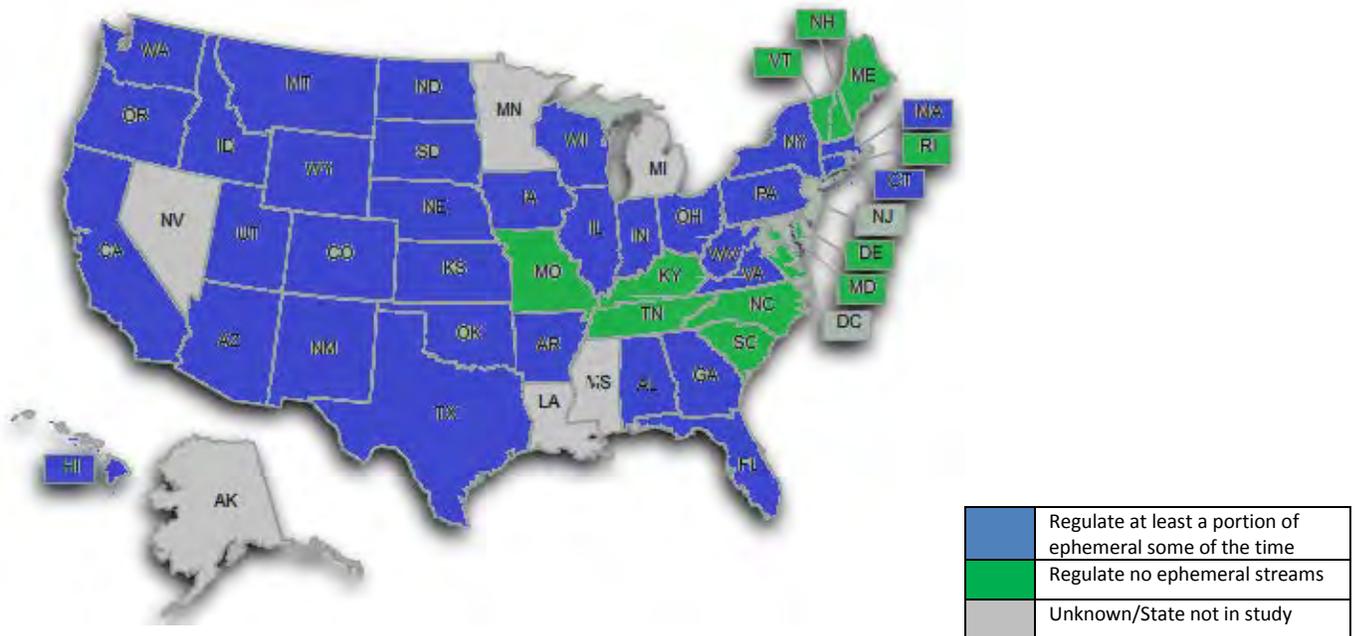
Q. Does your state regulate all perennial, intermittent and ephemeral streams? (n=47)

For the purpose of this study, perennial streams were defined as flowing all year round, intermittent as being in contact with groundwater part of the year, and ephemeral as never in contact with groundwater. Thirty-six states (74%) regulate at least a portion of ephemeral at least some of the time. Ten states (21%) do not regulate *any* ephemeral streams (DE, KY, ME, MD, MO, NH -only a few cases, NC, RI - unless connects to wetland, TN, and VT). Complete information was not provided by two states in the study (MN and NJ). Additionally, fourteen states (30%) have certain stream types regulated only under specific conditions.



It is important to note that definitions make a difference, as four states (8%) regulate some or all of their streams which would scientifically be termed ephemeral streams under their state’s definition of “intermittent” streams (CT, KS, MA, and TX).

Figure 2 - State Regulation of Ephemeral Streams



STATE REGULATION OF DITCHES

Q. Does your state regulate ditches? If so, how are they defined? How does your state distinguish between streams and ditches? (n=47)

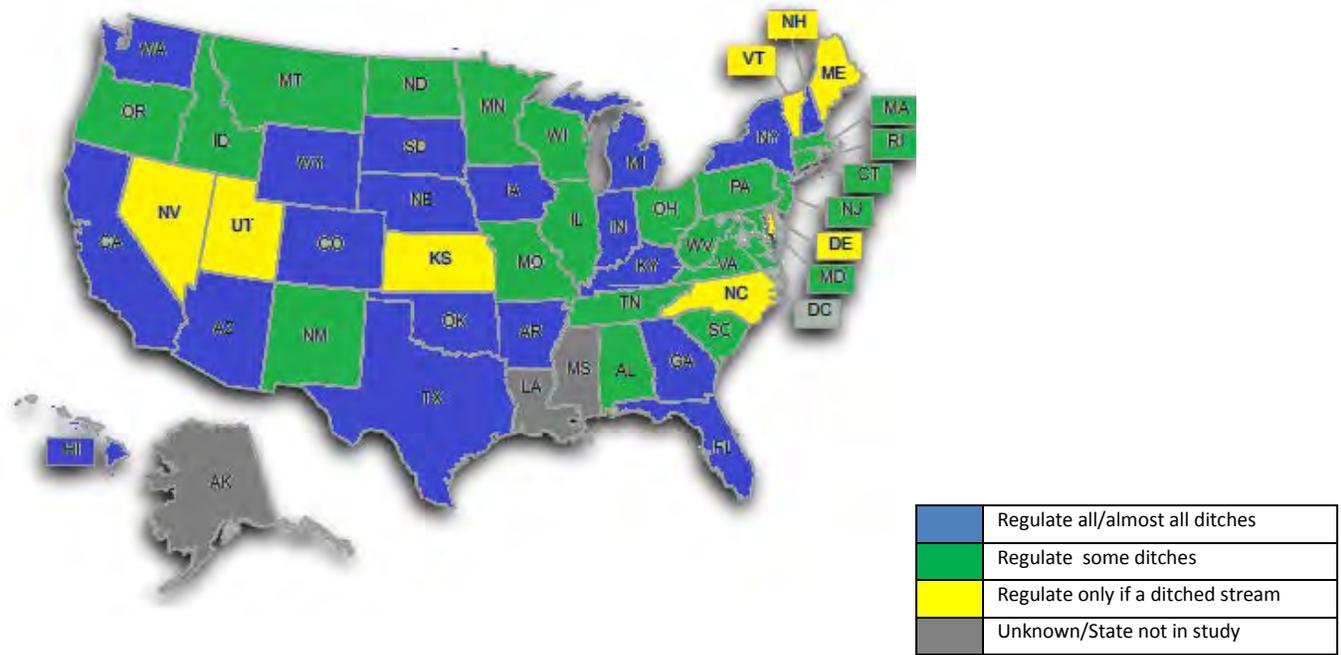


In most cases, regulation focuses on either altered streams or ditches that have stream-like characteristics (i.e. not upland ditches). Some states do not use the term “ditch” in their statutes or regulations. Results for this question include state-reported waterbodies that identified as ditches, modified streams and altered streams (those that have the appearance of a ditch). Forty-three states (91%) regulate at least a portion of these specific waterbodies.

Seven states (15%) base their authority to regulate ditches on water quality-related requirements (AL, AZ, GA, IL, NM, WA, WY). Six states (13%) regulate ditches only if the ditch is actually a stream, or was one at some point in time (KS, ME, MA, MI, ND, and WV). Four states (9%) base their regulation of ditches solely on whether or not the Corps has jurisdiction over the ditch (MN, OH, OR, and SC). A

state-by-state summary of ditch/altered stream regulation is provided in Appendix C.

Figure 3 - State Regulation of Ditches (Including Modified/Altered Streams)



States usually have many conditions on regulation and/or exemptions for specific ditch types or uses. Criteria for determining whether a ditch is or is not regulated may include whether or not the ditch has specific characteristics. Such requirements are entirely state-specific and do not indicate what would or would not be jurisdictional for other states. For example, in some states, a ditch may be...

Regulated if...

- Actually a stream or former stream
- A conduit of pollutants
- Draining a certain amount/area of water
- Identified as such because it has a defined bed and bank
- Downcut to groundwater
- Containing food fish
- Able to sustain obligate lotic species
- Containing standing or flowing water

Not regulated if:

- Artificial/manmade
- Agricultural
- Not connected to commerce
- Non-contiguous
- All on one property
- Made up of waters that are absorbed or used up onsite/internally-draining
- Used for stormwater conveyance or wastewater
- Designed for the purpose of erosion control
- Subject to specific maintenance exemptions
- An upland ditch
- A grassy swale
- Non-Corps JD
- Regulated at another level (regional, county)



**Types of Streams Subject to Dredge and Fill Permitting
Under the State’s Definition of ‘Waters of the State’**

Interviewees were asked to first identify the types of streams regulated in their state and second, how the regulation of streams related to the scientific definitions of perennial, intermittent and ephemeral streams. The following stream types are identified as subject to dredge and fill permitting in each state.

**Table 1 - Types of Streams Subject to Dredge and Fill Permitting
Under the State’s Definition of ‘Waters of the State’**

All streams (Perennial, Intermittent and Ephemeral)* (26)	AL, AR, AZ, CA, CT, ID, FL, GA, HI, IA, IL, IN, KY, MI, MN, MO, MT, ND, NY, PA, SC, VA, WA, WI, WV, WY
All streams that meet fishery or water quality criteria	SD
All streams except wet weather conveyance (similar to ephemeral)	TN
All streams except those intermittent streams upgradient to wetlands	MA
All streams except isolated streams	NM, OH
Perennial and intermittent with some ephemeral	MD, NE, OK, OR, RI, TX, UT
<i>Perennial and intermittent (including isolated)</i>	NC
<i>Perennial and intermittent only</i>	DE, NH, OR
<i>Perennial and some intermittent</i>	ME, NJ, VT
Don’t know	CO

**Intermittent is in contact with groundwater; ephemeral is not in contact with groundwater*

Results and Findings - Section 2: Stream Delineation and Identification

Q. Who does delineation of streams in your state for dredge and fill activities? (n=47)

Twenty-one states (45%) delineate their own streams. Seventeen states (36%) rely solely on the Corps to conduct delineations in their state. In Kansas, Kentucky and Tennessee there is an option to either have the Corps do the delineation or another non-state entity (e.g. other agency, independent consultant). Nine states (19%) rely on a combination, with either the state relying on Corps delineation except in areas not regulated by the Corps (CA, IN, MD, MN, WV) or the state working collaboratively with the Corps, with the ability to go beyond the Corps JD (AR, ID, MA, NC and OK). A state-by-state summary of responsible parties for stream delineation is provided in Appendix G.



Photo Credit: U.S. Army Corps of Engineers

Figure 5 - Responsible Party for Stream Delineation in Each State for Dredge and Fill Activities

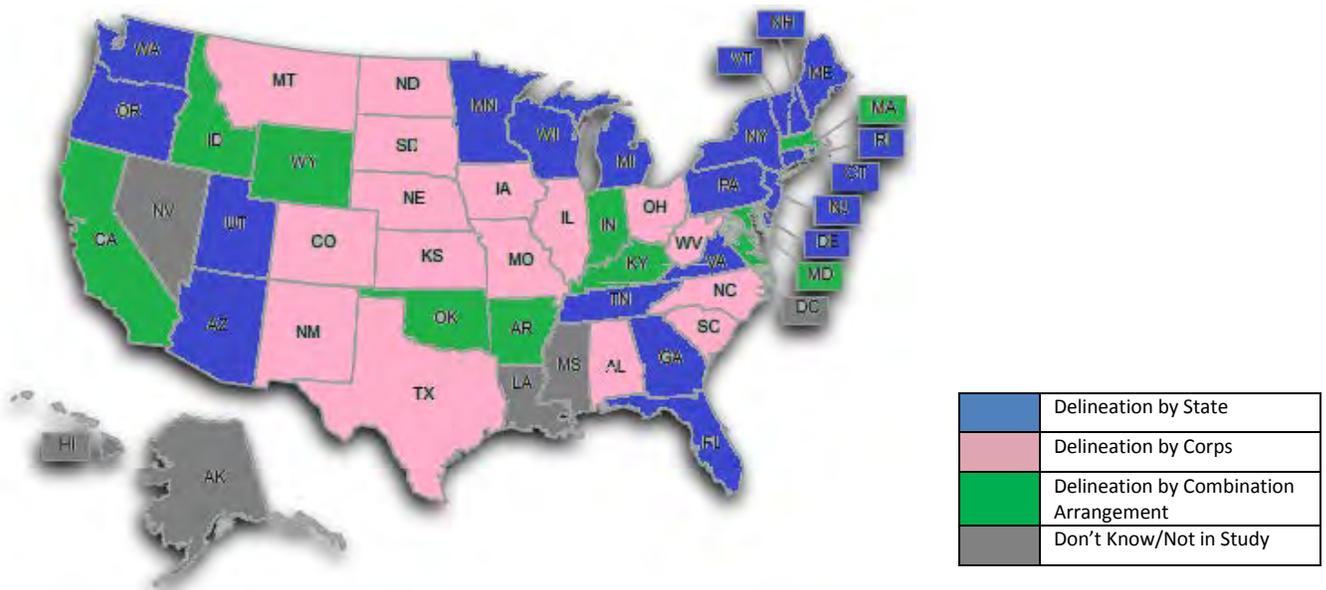




Table 2 - Responsible Party for Stream Delineation

State does own jurisdictional determination (JD)	AZ, CT, DE, FL, GA, HI, ME, MI MN, NH, NJ, NY, OR, PA, RI, TN, UT, VA, VT, WA, WI
Rely on Corps determination, but does determination if Corps has not	CA (water boards), MD, MN; IN (state does isolated)
Collaborate with Corp, but can go beyond Corps JD Can be done by Corps or other non-state entity	ID, MA, OK KS (KS W&P staff or consultant), KY
Relies solely on Corps	AL*, CO, IA (404/401), IL (404), KS, MO, MT, NC, ND, NE, NM, OH, SC, SD, TX, WV, WY
Not pertinent (all are regulated, delineation not required)	AR
Not Provided	NV

*In Alabama, some additional delineation beyond the Corps JD is done by the state in the coastal zone.

Q. How are streams, particularly small streams and headwater streams, identified in the field? (n=47)

The most common stream identification practices identified by interviewees include identification of bed and bank (25 states; 53%), including requirements in some states for the bed and bank to be well-defined (6 states, 13%); the presence of a channel (15 states; 32%), with some requiring the presence of a well-defined channel (5 states; 11%); ordinary high water mark (8 states; 17%), and various measures of flow (13 states; 28%). In at least seventeen states (36%), some type of maps are used in the stream identification processes. Missouri only uses maps for their identification process. Other primary measures include types of flow, sediment, stream order, and hydric indicators. Most states use more than one criteria to identify streams.



While specific measures, methods and practices were reported by some states, twenty interviewees indicated that best professional judgment (BPJ) was employed when identifying streams. A state-by-state summary of identification practices is provided in Appendix E.

Important Note: The table below is provides a list of the range of identification measures identified through interviews. As the study did not provide a survey with all answers for each state to indicate yes or no on a practice, the table offers a tabulation of measures that were offered in interviews and may not represent the full range of options used by each state.

Table 3 - Stream Identification Practices

Presence of bed and bank	CA, CO, HI, IN, KS, MD, MI, NJ, NC, NM, PA, RI, SD, UT, TX, VA, VT, WA, WY. Where bed and bank becomes well-defined: DE, HI, IA, KY, PA, WV
Presence of a channel	CO, HI, KY, MA, MD, NC, NJ, TX, VT. Presence of well-defined channel: CO, HI, RI, TN, VT
Beginning of headcut	GA
Ordinary high water mark	DE, HI, MI, NM, NY, OR, VA, WA
Evidence of flow (general)	HI, IA, MI, RI, VA, VT, WI
Presence of water	MD, PA, SD
Presence of flowing water (beyond storm event ~>24 hrs)	CT, MD
Minimum flow	NM
Flow during runoff events	KS
Bankfull flow/Bankfull width/Bankfull dimension	KS, NY, UT
Indicators of groundwater	GA, MD, NC

Table 3 - Stream Identification Practices, Continued

Above groundwater	KS
Most landward extend of wetland/edge of surface water	FL
Average width at base flow	IA, ID
Average depth at base flow	IA, ID
Stream ecosystem	UT
Hydric Indicators	GA, MD, NC, UT
Hydrophytic vegetation	DE, RI, UT
Hydric soils	MD
Moss covered rocks, aquatic habitat	RI
Macroinvertebrates	MD, NC
Wrested Vegetation	GA
Scour	NH, RI
Sediment transport	NH
Stream Order	ID
Geomorphic indicators	NC, NM
Bedload sediment transport	NC
Associated Bedload	UT
Fluvial geomorphic processes	VT
Hydrological determination/eruption of spring	TN
Longitudinal flow data	RI
Sinuosity	DE, MD
Use Designations/Use Attainability	IA, OH
Tied to TMDL Process	IA, MT
Accessibility	PA (specific access requirements)
Can it be navigated by a kayak (saw log test)	WI
Use of Some Type of Maps	IA, AZ, DE, MD, MO, ND, NY, PA, RI, SD, TX, UT, VT, WA, WI, WY
Aerial maps	RI, MD, TX
USGS topographical maps	AZ, DE (current and historic), RI, MD, NY, PA, VT, TX, UT, WI
24K Hydro GIS Layer	WI
Soil classification maps (e.g. NRCS, County)	RI, MD
NHD Maps	AZ, IA, KS, MO, SD*, TX, WY
EPA RF3 Maps	ND
Water Typing Maps	WA
Predevelopment Maps	WA
Stream Catalogs (1940s and 1950s)	MD, WA
FEMA floodplain maps	PA

*South Dakota looks only at *historically named* streams on NHD maps

Q. How is the width (lateral extent) of the stream determined? (n=47)

In those states indicating that one or more specific measures for stream width are used, the most common measures are top of bank to top of bank (ten states; 22%), bankfull width (7 states; 15%) or ordinary high water mark (5 states; 11%). A range of other measures were included (see below table), ranging from wetted width and scour marks to breaks in slope and maps. Five states indicated that the Corps makes the determination in their state and three states indicated that they had no measures at all.



Table 4 - Measures of Stream Width

Top of bank to Top of bank	AR, CT, KS, KY, MD, NJ, NM, PA, TN, VT
Bankfull width/elevation/Bankfull to bankfull	DE (non-tidal), MA, MI, UT, VT, WA, WY
Ordinary high water mark	CA, IN, MI, VA, WA
Ordinary low water mark	PA
Defined bed and bank	HI, WV
Scoured edge and marks on rocks and trees	RI
Horizontally back from edge where vegetation starts	GA
Active channel and buffer	CO
Geographic cross-section	VT
Average of three measures within a reach	AZ
Breaks in Slope	VT
Maps	MO
Look at aerial context	TN
Designated Uses	IA
No specific measures/not relevant due to regulatory structure	AR, NY, OK
Corps Determination	AL, IL, NE, NM, SC, VA

Note: Some measures listed in the table above were reported but not defined. The study documented but did not define these terms when definitions were not provided.

Stream Identification Guidance Documents

Sample stream identification guidance documents were provided by twenty-two states. These documents are listed in Table 5 of this report.

Figure 6 - Examples of Guidance Documents for Stream Identification

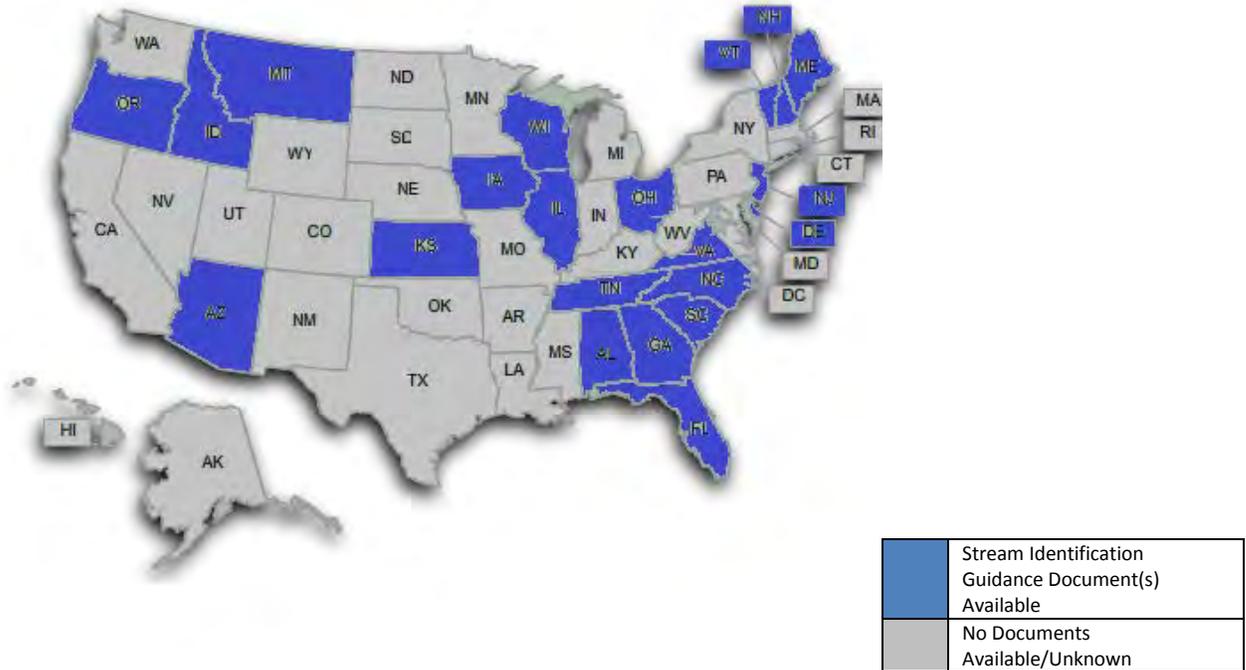


Table 5 - Available State/Corps Stream Identification Guidance Documents

Alabama Corps Guidance	AL
Arizona Surface Waters Procedures Manual	AZ
Metadata in Maps	AZ
Delaware Tech Sheets	DE
Chapter 62-340, F.A.C., including the	FL
Florida Wetlands Delineation Manual (DEP, 1994)	
Field Guide for Determining the Presence of State Waters that Require a Buffer	GA



Table 5 - Available State/Corps Stream Identification Guidance Documents, Continued

Draft Illinois Stream Mitigation Methodology (not avail yet)	IL
Chicago USACE District Stream Mitigation Methodology	IL
Iowa Warm Water, Cold Water and Recreational Use Sampling Protocol Guidance Documents	IA
Water Body Identification (WBID) System (see Idaho DEQ Waterbody Assessment Guidance)	ID
Five specific state criteria for stream identification	ME
Equations for Estimating Bankfull Channel Geometry and Discharge for Streams in Massachusetts (USGS Scientific Investigations Report 2013-5155)	MA
Kansas Corps Stream Mitigation Guidance	KS
TMDL Stream Identification Document	MT
New Hampshire Stream Assessment Protocol	NH
North Carolina Stream Identification Methodology	NC
New Jersey Draft Flood Hazard Area Technical Manual	NJ
Primary Headwater Habitat Assessment Protocol	OH
Oregon Removal-Fill Guide	OR
Streamflow Duration Assessment Guide	OR
US Army Corps Charleston District Guidance	SC
Tennessee Hydrological Determination Forms	TN
Riparian corridor or flood-prone (regularly floods) or 2X bankfull (max 30 ft.) = Utah Formula	
Unified Stream Methodology	VA
Ditch Guidance	VA
Vermont Guidance on Identification of Perennial Streams ('11)	VT
Wisconsin State Administrative Procedures	WI

Q. How do the state’s identification/delineation procedures differ from those used by the Corps to delineate the extent of stream systems – or are they the same? (n=47)

In twenty-four states (51%), stream identification and/or delineation procedures involve additional/supplemental procedures beyond the federal jurisdictional determination (JD). Of these states, Missouri reports having mostly the same procedures as the Corps, but greater, due to multiple Corps Districts and procedures within the state (Mississippi is one of several states with two or more Corps districts and currently there is no national guidance for the Corps districts to use to identify streams. Thus, practices used by Corps districts to identify streams are not always consistent with each other). Oregon and Washington State indicate that their delineation procedures are generally in keeping with the Corps delineation, but that their states sometimes include more or less of the headwater reaches due to different definitions of streams.

Fifteen states (32%) indicate that procedures in their state are the same as the Corps’, resulting in the same outcomes. Two states (DE and MD) indicate that the state sometimes has subtractions/exemptions from the Corps’ delineation. Interviewees from Nevada and Virginia were not sure how their stream identification methods compared with the Corps’. A state-by-state summary of how each state’s procedures compare to the federal JD for stream systems is provided in Appendix E.

Figure 7 - How States’ Identification/Delineation Procedures Differ from Those Used by the Corps to Delineate the Extent of Stream Systems

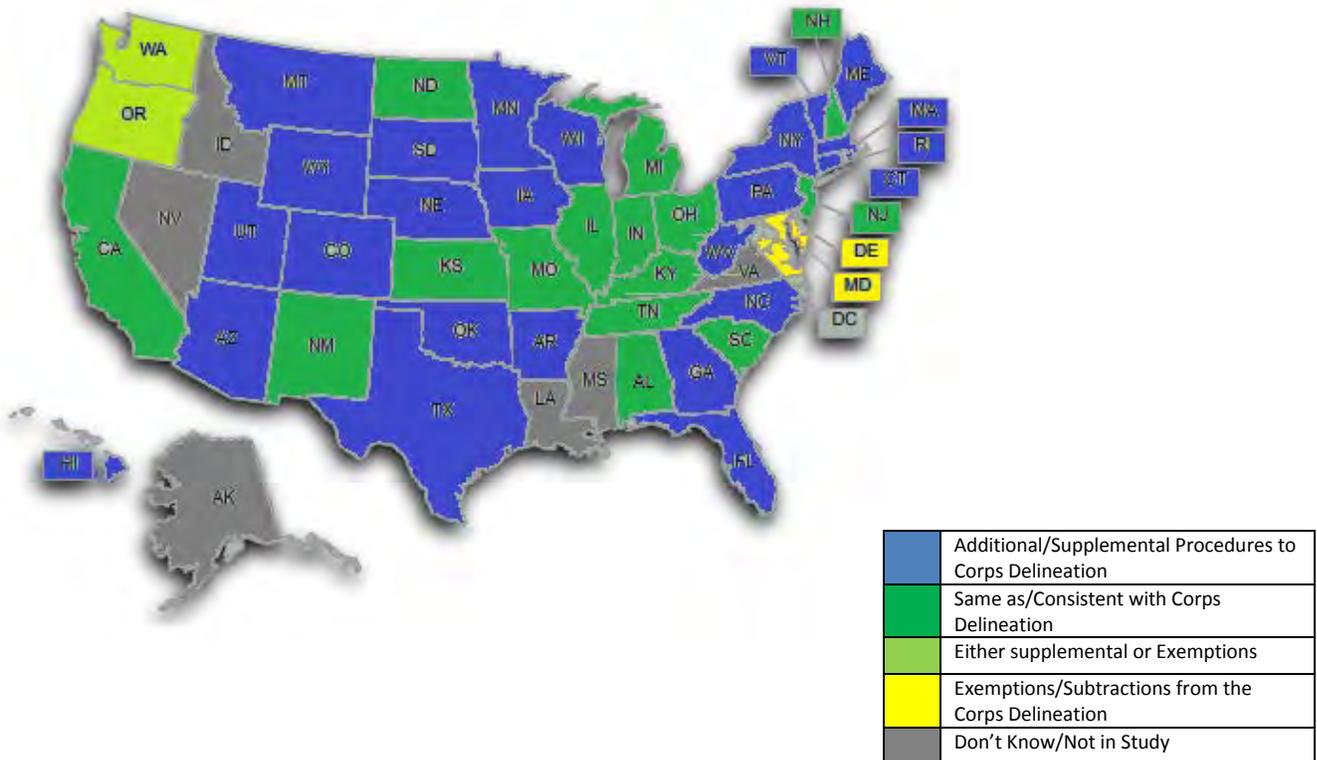




Table 6 - How State Procedures Differ from the Corps Delineation

Status	State
Additional/Supplemental Procedures to the Corps Delineation	AR, AZ, CO, CT, FL, GA, HI, MA, ME, MN, MT, NE, NC, NJ, NY, OK, PA, RI, SD, TX, UT, VT, WI, WV
Mostly the same, but more consistent than corps due to multiple districts	MO
Mostly the same, but sometimes additional procedures or exemptions due to different definitions	OR, WA
Same as Corps delineation	AL, CA, IA, IL, IN, KS, KY, MI, ND, NH, NM, OH, SC, TN, WY
Exemptions from the Corps Delineation	DE, MD
Not Sure	VA, NV

**Results and Findings - Section 3:
Stream Mitigation, Assessment and Measures of Success**

Q. What are the most common types of dredge and fill stream permits in your state? (n=47)

The vast majority of dredge and fill permits issued across the nation are for activities that could theoretically fit under a broader category of activities called “infrastructure development” (i.e. for interrelated transportation, utility and development work). Across the country, by far the most significant source of stream impacts is transportation-related projects. Transportation-related activities are the most common dredge and fill permits for stream impacts in 45 states (96%). The most commonly cited transportation-related activities include the installation or replacement of culverts, roads, bridges, and other water crossings. Permitting of development (24 states; 51%) and utility work (23 states; 49%) round out the infrastructure-related permitting activities identified. This is consistent across the country.



Dredge and fill permitting is common for mining activities in eighteen states (38%), often resulting in major stream impacts. In several states, mining has resulted in massive modification of landscapes. It is important to note that not all mining impacts to streams are addressed through the dredge and fill program, with other agencies coordinating permitting and controls of mining in some states through the Surface Mining Control and Reclamation Act (SMCRA) and other statutes and regulations.

Not all dredge and fill permits are issued for negative impacts. Fourteen states commonly issue dredge and fill permits for stream restoration (14 states; 30%). Twenty-one states (45%) commonly issue dredge and fill permits for channel stabilization/modification, which can, in limited cases, have positive effects in badly eroding streams. A full list of common activities for dredge and fill permits is provided in Table 7.

Table 7 - Common Types of Dredge and Fill Permits

Transportation	AL, AR, AZ, CA, CO, CT, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, MA, MD, ME, MI, MO, MN, MT, NC, ND, NE, NH, NJ, NM, NY, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, WA, WI, WV, WY
Culverts (including temporary)	CT, FL, HI, IA, IL, IN, KY, KS, MA, MD, MI, MN, MO, MT, NC, ND, NH, NE, NJ, NM, NY, OH, OR, RI, SC, UT, WA, WY
Roads	AR, CA, CT, GA, HI, IA, IL, IN, KS, KY, MI, MO, MT, NC, ND, NH, NJ, NY, OH, OR, PA, RI, SC, TX, UT, WA, WI, WY
Bridges and crossings	CA, CO, CT, HI, IL, IN, KS, MD, ME, MT, NC, ND, NE, NJ, NM, NY, OR, PA, TX, UT, WA, WI, WV, WY

Table 7 - Common Types of Dredge and Fill Permits, Continued

Transportation, Continued	
Driveways	NC, RI
Highways	AR, CA, KS, MT, NC, NH, NJ
Utility Lines/Pipeline Work (incl. oil & gas)	AR, CT, ID, FL, GA, IL, IN, KS, KY, MA, MD, ME, NC, NJ, OR, PA, RI, WI, UT, WA, WI, WV, WY

Development	
Box Stores	AL, AR, CA, FL, GA, IA, IN, KS, KY, ME, MI, MO, MT, NC, ND, NE, NJ, OH, OR, PA, TN, TX, VA, WA
Commercial Development	KS, ME, NJ, TN
Urban Development	IA, KS, MO, NC, NE, NJ, TX, WV
Residential/Private/Housing Dev.	CA, KS, NC, NJ

Channel/bank maintenance/stabilization	AR, FL, IA, KS, ME, NC, ND, NE, NJ, TX

Channel/bank maintenance/stabilization	CA, CT, HI, IL, IN, KS, KY, MT, NC, NJ, NM, NJ, OK, OR, RI, TX, UT, VT, WA, WI, WY

Stream restoration	CA, CT, HI, IL, KS, KY, NC, NM, NJ, OR, UT, VT, WA, WY

Navigational dredging	IL, KY, OR, SD, VA, VT, WA, WI

Flood Hazard Protection/Control	CA, HI, IN, KS, NJ, OR, TX, UT, WA

Mining	
Coal mining	AL, AZ, CO, CT, IL, IN, FL, KY, MI, MN, MT, NC, NE, OH, PA, TX, UT, WY
Aggregate/hard rock mining	AL, IL, IN, MT, NE, OH, TX, WY
Phosphate mining	CT, CO, MT, NC
Surface mining	NC
	MT, PA

Gravel and Sand Extraction	AR, CT, KS, MO, MT, NC, NE, OR, TN, UT



Photo Credit: Daniel Foster

Table 8 - Other Types of Common Dredge and Fill Permits Referenced by One or More States

Shale Gas Exploration	MT, OH
Hydraulic fracking for natural gas	AR, KS
Erosion-related projects/Scour protection	IN, KS, NJ, OR, RI
Ditch maintenance	IN, KS, NM
Water Development	CO (streams depleted to augment others)
Indirect effects on flow regime	CO
Amenity lakes	AL, NC
Uncategorized (as largest category)	OR
Fish passage projects	KS, NJ, WA
Municipal water withdrawal projects	HI, RI
Boat ramps and docks	IN, KS, NC, NJ, OR, WA
Railroads	MT
No dredging approved for any reason	RI
Golf courses	HI, IN, NC, RI
Agriculture (small)	AR, HI, NH

Illinois: IEMA has buy-out programs focused on the restoration of areas that are prone to flooding; land is purchased and reverted to functioning wetlands.

Q. How much stream mitigation is happening? (n=47)

Interviewees were asked to estimate how much stream mitigation is happening in their state annually. Amounts were broken down into the following options: 1) a large amount (tens of thousands of linear feet of streambank), a mixed bag (quantified in interviews as mostly small stream mitigation projects with less than five large-scale projects), a medium/small amount (hundreds – a few thousand linear feet) and none/almost none (less than 500 feet). In seventeen states (36%), a “mixed bag” of stream mitigation is happening annually. The next largest category of states is those that do a large amount (12 states; 26%). Nine states (21%) report that they have no/almost no stream mitigation (10 states; 19%) and the remaining six states (13%) report that a small amount of stream mitigation is happening in their state annually. Follow-up is still needed with Georgia and Kentucky.



Figure 8 - General Amount of Stream Mitigation Occurring Within the State

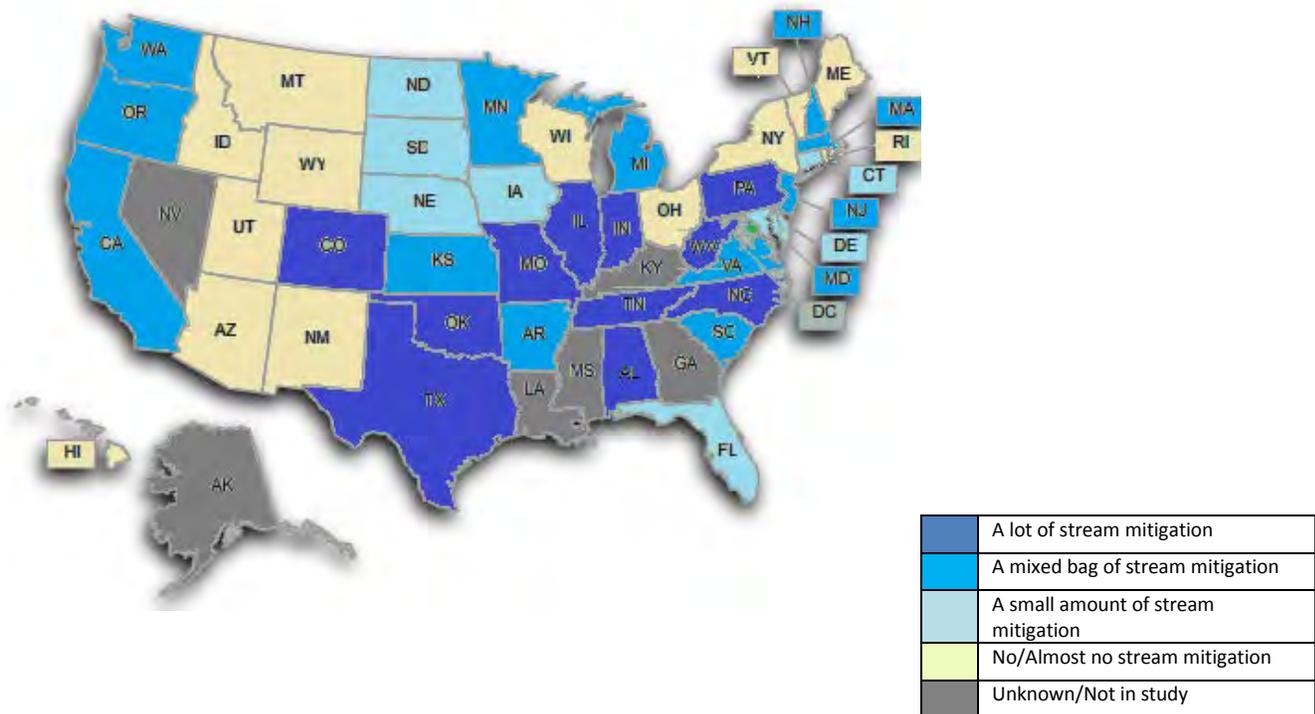


Table 9 - General Amount of Stream Mitigation Occurring Within the State

None/Almost None	AZ, ID, ME, MT*, NY, OH, VT, WI, WY**
Small Amount	CT, DE, FL***, NE, ND, SD, RI****
Mostly small projects w/ a few large projects	AR, CA, HI, IA, IL, KS, MA, MD, MI, MN, NM****, NH, NJ, OR, SC, UT, WA
Large Amount	AL, CO, IN, KY, MO, NC, OK, PA, TN, TX, VA, WV
Follow-up Needed	GA

* Montana’s program is only two years old; positioned to grow significantly in near future

**In Wyoming, no stream mitigation is being required, though the Interagency Review Team (IRT) recently developed a stream mitigation procedure

***Florida does not track stream mitigation separately from wetland mitigation.

***New Mexico & Rhode Island are pushing avoidance and minimization, though if a project cannot be avoided it is mitigated

Notable Influences on Amount of Stream Mitigation

During the interview process, interviewees indicated that there are many influences on the amount of stream mitigation that is happening in their state. In some cases, stream mitigation was not required for stream impacts. A number of states cite a lack of resources as a major impact on the ability to develop and/or implement a stream mitigation program in their state, whether by the state or the Corps. In some cases, an interagency approach has been adopted to share resources in order to accomplish mitigation tasks that would not otherwise be possible for any of the agencies independently.

Influences cited by interviewees are outlined below:

- **Increasing High Water Events** - In some states, the number of permit requests is also driven by the demand to address high water events. High water events result in more permit applications for alterations. If high water events continue to increase, the number of permits for these activities may also continue to increase.
- **Increases in stormwater Impacts** - Many states are seeing wider, shallower channels, and more streambank erosion, especially in urbanized areas. Some states are reporting a huge increase in stormwater impacts over the last 30-40 years (e.g. CT).
- **The Economy** – There has been a decline in the number of permits and the amount of stream impacts/mitigation from development, especially housing, but also commercial with the economic downturn in recent years. Many states are expecting a significant increase in the number of permit applications for these activities when the economy improves.
- **Addressing the Impacts of Mining** - Significant mining activities are taking place in some states. These mining operations often impact large areas of land and require innovative solutions to address stream losses. Mining may even drive the creation of stream mitigation programs, as in

Washington State where mining has resulted in approval of a targeted stream mitigation program to specifically address the impacts from new mining efforts.

- **New/Expanding Energy Industry-related Impacts** - Some states report growth in other areas of the energy industry. Shale gas exploration, fracking, and the installation of oil and gas pipelines are impacting streams in a number of states. Stream mitigation programs in those states are directed to address these impacts. Many interviewees discussed that companies often try to use directional drilling to decrease impacts to streams from utility lines. However, contractors often file permits “in case” they need to have an impact.
- **A Potentially Non-Addressable Impact to Streams: Indirect Impacts from Flow Redirection** - The negative impact of flow redirection on several Colorado streams was mentioned by the Colorado interviewee, a practice that may be occurring in other states as well. This practice takes flow from one stream and redirects it to another waterbody in order to move water to where demand is greater. This redirection is based on water rights. More research should be done to better understand if any states are addressing this issue. Although we have not provided extensive discussion of water rights in stream mitigation in the west, water rights may affect whether stream mitigation will be required for a particular permit. If a proposed stream mitigation project cannot include the necessary water rights (or allocation of water to support a well-functioning stream), stream mitigation might not be required.

Q. How does your state assess streams? What functions or conditions do you assess (e.g. habitat, water quality, stream structure, etc.)? (n=47)

The majority of assessment practices reported by interviewees in this study are specifically related to the dredge and fill permitting process, either as part of the program or through collaborative data sharing with other programs to support dredge and fill permit decision-making. However, some states may have reported about assessment activities that support other related programs (e.g. water management, fisheries). Consequently, findings in this section may not be reflective of a specific set of measures used for dredge and fill-related assessment only, nor comprehensively cover the full gamete of assessment activities occurring across all state agencies.



In the vast majority of states, a complement of assessment practices is used, usually measuring more than one condition or function. Assessment was most commonly cited to include habitat (30 states; 64%), water quality (29 states; 62%), biological (25 states; 53%) and to a lesser extent physical/structural (20 states; 43%) and hydrological (11 states; 23%) assessment. In most states the focus is less on using a specific set of measures and more on using assessment to target improvements (e.g. NH, CA). In states where the Corps does their own assessment, state staff were at times unable to report what specifically was being assessed.

While assessment methods may look at value, condition, function or other measures, there is a growing use of functional assessment for streams. In ten states (21%) functional assessment is currently used to assess streams (Table 10). These states are Florida, Kansas, Nebraska, Ohio, Oregon, Pennsylvania, South Dakota, Texas, Vermont (only to assess physical variables) and West Virginia. Six additional states (13%) are in the process of developing functional assessment tools and practices. While many states do not have (nor plan to have) functional assessment methodologies for streams in the near future, many states (states; 13%) have shown an interest in developing functional assessment for streams. The opportunity to review the tools developed by the other states, as well as discuss lessons learned with states that have implemented functional assessment have been indicated as having great value to these interviewees.

Table 11 lists all assessment practices shared by interviewees. The table does not group practices by type, instead illustrating the array of practices and terms used to describe assessment practices. A state-by state summary of assessment practices is provided in Appendix H.

Table 10 - The Status of Functional Assessment for Streams

Have Functional Assessment	FL, KS, NE, OH, OR, PA, SD, TX, VT (physical), WV
Developing Functional Assessment for Streams	AL, CO, GA, NC, OR, SC
Don't have but would like Functional Assessment	IA, IL, TN, VT, VT (biological), WA

State interviewees indicate that a wide range of data is being collected on streams and that there are benefits to sharing this data and coordination with other programs at the state level. This study supports the idea that there should be greater integration between Dredge and Fill, and point source discharge permits as well as other water quality programs implemented by the state.

In several states where rapid assessment tools are used, concerns were raised. Some interviewees expressed concern that rapid assessment tools are not always well-matched for streams and may miss important information, because they do not take the time required to fully assess a stream. However, resources and political pressure require efficient approaches that can only be achieved through rapid assessment practices. Consequently, reliance on rapid assessments may be a necessary compromise for some states.

Other observations:

- Many states are using an amalgamation of methodologies, working to combine biological assessments with geomorphic and water quality assessments (VT, WV, PA, etc.).
- A few states are using assessment tools not specifically designed for use with streams (potentially limiting its usefulness for stream assessment) (CA).
- In other states, stream assessment work is conducted using methods from other states to meet their needs (Mississippi, Ohio and Kansas methodologies are popular) (OK, IN, IA). These methods are not always well-matched for local conditions.
- In many states, the selection of stream assessment measures being used is a reflection of broader statutory authorities and laws (e.g. fish habitat, the Endangered Species Act, beneficial uses).

Table 11 - Assessment Practices for Permitting

Biological	AR, GA, HI, IA, ID, IL, IN, KS, KY, MA, MI, MO, NC, ND, NE, NH, NJ, NM (only if probability of impairment), OK, OR, PA, RI, TX, VT, WV
Wildlife/fish habitat	AR (fish), AZ, DE, GA, HI, IA, ID, IL, IN, KY, MA, MD, ME, MI, NC, ND (Fish), NE, NJ, NM, NY (trout), OH, RI, OK (trout), SD, TX, UT, WI, VT, WA, WV
Aquatic organisms (general)	HI, IA, NH
Macroinvertebrates	AR, AZ, DE, GA, HI, ID, IL, ND, OH, PA, TX, VT
Molluscs	HI, IA, IL
Salamanders	OH
Endangered species	HI, IA, KS, NJ
Aquatic Surveys	CT, HI, SD
Riparian/buffer health/continuity/width	NE, NM, UT, WA
Disturbance of riparian corridor	MO, NJ, VT
Grassed	IN
Water Quality/Chemical	AR, AZ, CT, DE, FL, GA, HI, IA, ID, IL, IN, KS, MA, MD, ME, MI, MO, ND, NJ, NM, NY, OK, OR, RI, SC, UT, WI, WA, WV
Water quality classification	ME, NC, NJ
Groundwater quality	MA, RI
Surface water quality	HI, MA, NJ, RI
Physical/stream structure/physical integrity	AR, AZ, IA, ID, IN, GA, KS, MA, MI, MO, ND, NJ, OK, OR, SC, TX, UT, VA, VT, WA
Bank	HI, MA, TX, VT
Land under water	MA
Channel stability	HI, NJ, VA, VT
Physical Stability	MA, VT
Erosivity/Erosion Resistance	CT, NH, NJ, TX
Physical condition serves as proxy for functions	VA
Meanders	IN, TX, VT
Geomorphology	WA, VT

Table 11 - Assessment Practices for Permitting, Continued

Hydrological	AR, HI, ID, IN, MI, NC, NH, KY, OR, PA, VT
Flow	HI, IA, KY, NH, SD
Pool-riffle complexes	IA, IN, TX

Other Assessment	
Floodplain Calculations	NJ, RI, VT
Conductivity	NH, E.KY
Temperature	IA, NY, RI
Water carrying capacity	MA
Canopy Cover - Water from the canopy/overhead cover	IN, NJ, NY
Recreational environment	IA, HI, OR, RI, UT
Flood control/management	HI, NE, RI, UT
Adjacent Land Use	IA, NE, RI, TX
Use Attainment Assessment/Designated Uses	IA, IL, KS, RI, TX, WY
Related to TMDL Process	IA, MT, RI

Note: In SC, for NPDES and 303d, assessment includes WQ, macroinvertebrates and fish tissue.

Figure 9 - Sample Assessment Guidance Documents

Sample stream assessment guidance documents were provided by twenty-three states. These documents are listed in Table 12 of this report.

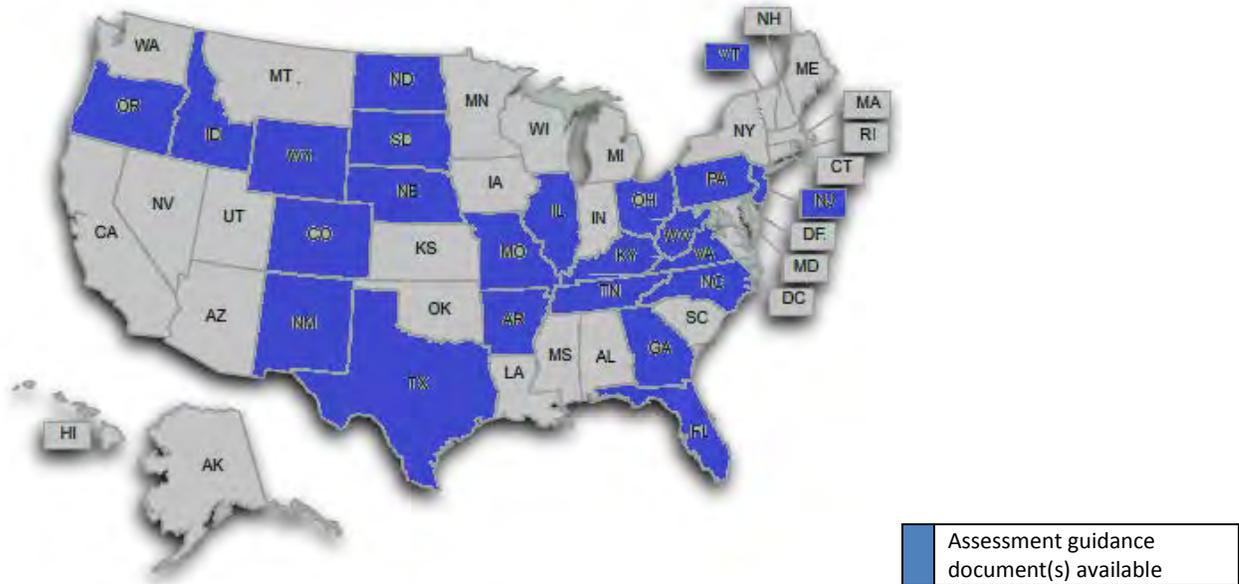


Table 12 - Sample Assessment Guidance Documents

Little Rock District Method	AR
Colorado Functional Assessment (Beta 2015)	CO
Stream Bio Index	FL
Unified Stream Assessment Methodology	FL
Field Guide for Determining the Presence of State Waters that Require a Buffer	GA
Idaho Small Streams Assessment Framework	ID
Water Body Assessment Guidance	ID
Illinois EPA Field Methods Manual (incl. Use Attainment)	IL
Illinois Biological Stream Rating System	IL
LTRM and LTEF Monitoring Protocols for "Great Rivers"	IL
Kentucky Rapid Bio Assessment	KY
Kentucky RBP Sheet	KY
Missouri Stream Mitigation Method (2013)	MO
NCSAM Functional Assessment	NC

Table 12 - Sample Assessment Guidance Documents, Continued

Corps Stream Quality Assessment Worksheet	NC
Nebraska Stream Assessment and Mitigation procedure	NE
New Jersey Draft Flood Hazard Area Technical Manual	NJ
New Mexico Assessment SOPs	NM
North Dakota Macroinvertebrate Collection SOP	ND
RBP – Rapid habitat Assessment Forms	ND
Oregon Stream Assessment Methodology (under development)	OR
Ohio Use Attainability Assessment	OH
Pennsylvania – 4 related functional assessment documents	PA
South Dakota Functional Assessment (Doc?)	SD
Tennessee Use Support Assessment	TN
Surface Water Quality Monitoring Procedures, Vol. 2 - Methods for Collecting and Analyzing Biological Assemblage & Habitat Data	TX
Unified Stream Methodology	VA
Vermont Stream Geomorphic Assessment	VT
West Virginia Stream and Wetland Valuation Method	WV
Wyoming Stream Biological Assessment Models (Multimetric and RIVPACS)	WY

Q. Does your state have its own stream mitigation practices and or programs or does your state work largely through the IRT and Corps Districts? (n=47)

Twenty-two states (47%) either currently have or are actively in the process of developing a formal stream mitigation program. Thirteen states (28%) have a formal program. In nine states (19%) the state itself has some form of stream mitigation *practices*, despite a lack of formal program. Six states (13%) have interagency arrangements that the state participates in to coordinate stream mitigation in their state. In eighteen states (38%) there is neither a state program nor state practices, with stream mitigation either run by the Corps/Interagency Review Team (IRT) or no stream mitigation happening at all in their state. New York has authority for stream mitigation, but no formal program or practices. A state-by-state summary of stream mitigation programs and practices is provided in Appendix I.

Figure 10 - Stream Mitigation Programs and Practices

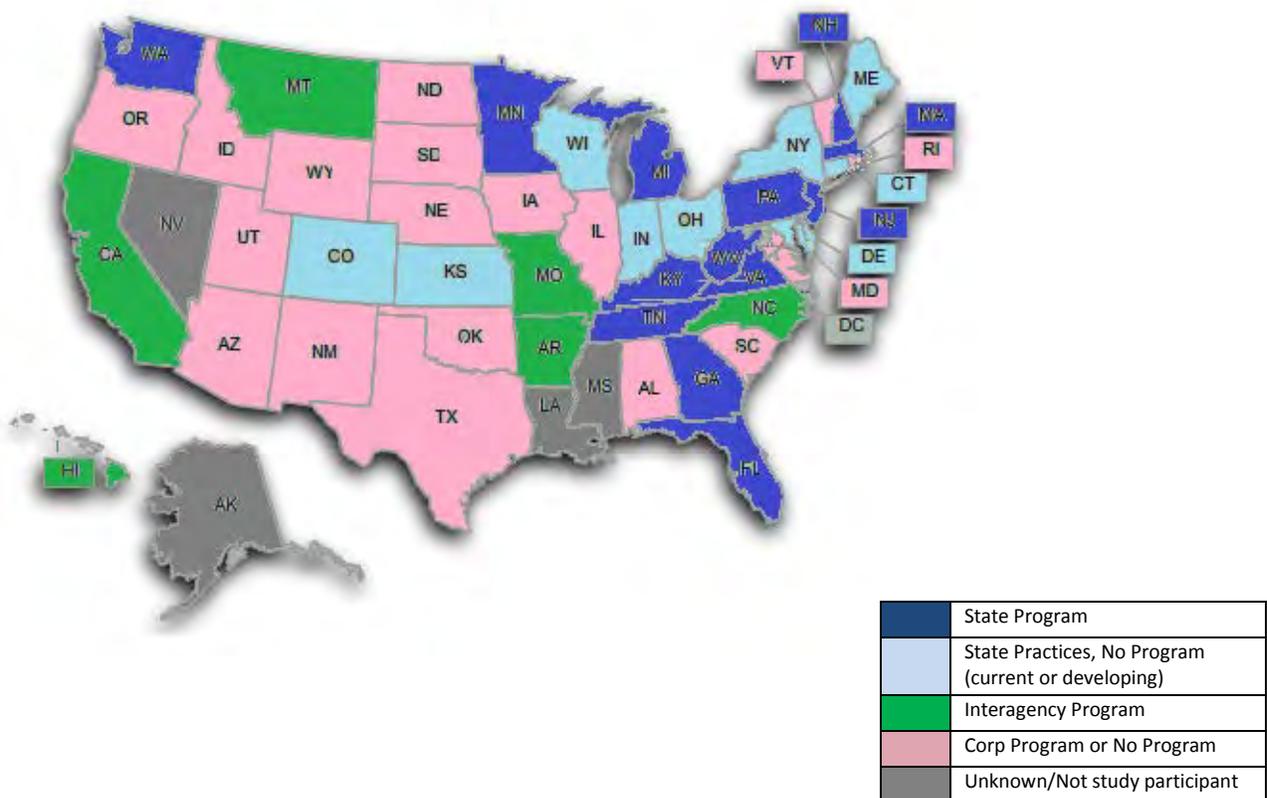


Table 13 - Stream Mitigation Programs and Practices

Status	State
Yes, state has own mitigation program	FL, GA, KY, MA, MI, MN (developing), NH*, NJ, OR, PA, TN, VA**, WA, WV
State has practices, but no formal program	CO, CT, DE, IN, KS, ME, OH
State has practices, but chooses not to use them	NY (A&M)
State only provides mitigation for one activity	WI (metallic mining)
No, have an interagency mitigation program	AR, CA, HI, MO, MT***, NC
No, the state does not coordinate mitigation, but ...may require mitigation via the Corps	AL (except in coastal zone), AZ, ID, IL, IA, MD, NE, NV, NM, ND, OK, NO, SC***, SD, TX, UT, VT, WY

**New Hampshire's program characteristics spelled out in Ch. 900*

***Virginia is developing an in lieu fee. This will not be competition for private banks/ILFs (where most of VA's compensation is being done).*

****Montana is represented on the Army Corps of Engineers IRT for state approval.*

*****South Carolina does not add to what the Corps does except in rare cases it might use a different SOP*



Photo Credit: Tahoeathen

Q. Are the same mitigation actions required for all types of streams or are there different arrangements based on different types of streams (e.g. size, class by order, flow duration, ditches). (n=47)

Most interviewees report that there are different mitigation requirements in their state for streams based on stream type and other differences. In thirteen states (28%) differences are incorporated as part of their formal mitigation activities, while in twenty-one states (45%) differences are usually included in mitigation arrangements, but these differences are informally implemented.

Specific types of differences are reported in 24 states (51%). These differences are most commonly based on stream type, location, water quality or classification, stream condition/quality, and habitat type. A state-by-state summary of stream mitigation requirements is provided in Appendix I.

Table 14 - Requirements for Different Stream Type

Type of Requirements	State
Formally Different (through state, Corps, other)	AL, GA, IA, IL (soon), KY, ME*, MO, PA, SC, SD, TN, TX, WV
Informally Different	AR, CA, CO, CT, DE, FL, IN, KS, MD, MN, MT, NH, NM, NJ, NC, ND, OH, OK, OR, RI, WA
Don't Know	AZ, HI, ID
No Difference	MA, MI, NE, UT, VA
N/A	NV, NY, VT, WI, WY

*In Maine, stream permitting is based on classifications other than stream type

*In Florida, higher value impacts have higher amounts of mitigation required.



Photo Credit: C. Michael Hogan

Interviewees were asked to identify the *factors* taken into consideration for making stream mitigation decisions in their state. Some states indicated more than one type of difference. These differences are documented in Table 15.

Table 15 - Types of Mitigation Requirement Differences

Differentiation	State
Stream Type	CA, CT, HI, KS, KY,NH, MO, MT, PA, RI
Stream Location	GA, KS, MT, NH, NJ, NC, OR, RI
Water Quality/WQ Classification	IN, KS, ME, MT, NJ, RI, TN
Stream Condition/Quality	KS, MD, MO, MT, WA
Watershed Size	MT
Special Resource Value	KS, MO(Scenic river, natural resource waters), MT (outstanding waters), VA
Species Present	GA, CT, KS
Permanence	KS
Stream Order	CT
Habitat Type	CT, NJ, PA, RI
Non-degradation related	MT
Other	MI, OR (commensurate with impacts, includes evaluation of functions and values), RI (Functions, Streambed, Width)
Specify no differences (all 1:1)	NE
Unknown	AL, ID, IL

Note: While terms such as stream type and permanence maybe considered to mean the same thing by some states, the report documented only the terms reported by interviewees, as definitions and amount of overlap in terminology was not provided.

Q. What activities count as stream mitigation in your state for dredge and fill activities (stream stabilization projects, restoring riparian area, fencing out cattle, hydraulic modification, in-stream restoration, etc.)? (n=47)



In twenty states (43%) all options for stream mitigation are considered. Of the twenty-nine states providing information about specific activities that qualify as stream mitigation in their state, the most commonly reported stream mitigation activities are in-stream restoration (29 states; 100%), stream stabilization (26 states; 90%), buffer/riparian work (24 states; 83%), stream enhancement (20 states; 69%), stream preservation (19 states; 66%), and hydraulic modification (18 states; 62%). An additional six states (22%) generally do not require stream mitigation, either because there are no stream impacts or potential impacts are addressed through the initial avoidance and minimization steps of the mitigation process). The majority of states determine the appropriateness of proposed mitigation activities on a case-by-case basis. A number of states allow for activities similar to stream creation, including the re-establishment of stream systems post-mining activities or other practices, such as increasing sinuosity, daylighting streams, or moving streams a limited distance to accommodate a project. (Photo Credit: NRCS)

What is in and out - Mitigation Preferences:

Most states tend to rely primarily on one type of stream mitigation (in-stream, buffer, etc.). However, even with this preference, they tend to require that a portion of the mitigation commitment be another kind of mitigation (e.g. in Nebraska, they prefer riparian plantings as mitigation, but often require at least some mitigation be in-stream restoration as well). States have a variety of other preferences on riparian/buffer work, cattle exclusion, and low impact development (LID), as well.



Riparian Zone/Buffer Work: In at least thirty-four states, buffer work is allowed as a primary form of stream mitigation. In Oregon, buffer work is preferred to in-stream work. In some states, the ability to include buffer protection is part of state regulations. Georgia has a state buffer variance that protects buffers through a state regulation independent of the Section 404

permitting process. New York State has jurisdiction to protect 50 feet of stream buffer if it is a “protected” stream under state law. Conversely, in some states, there is limited ability to require buffer work. In other states buffer work is accepted as mitigation, yet there is a preference for other types of mitigation (such as MD and MO). In New Mexico, areas adjacent to streams are defined and regulated as wetlands. Consequently, although they do not do stream

The study found inconsistent use of the terms “riparian zone” and “buffer” among states. The term “buffer” may include land area in addition to the riparian zone.

mitigation for impacts to stream buffers, because of how they are defined, these areas are mitigated in-kind as wetlands (Photo Credit: NRCS)

Cattle Exclusion: In states like Colorado, Montana and Utah, cattle exclusion is a common and highly acceptable practice to address stream impacts. Cattle inclusion can also be considered a passive form of restoration or enhancement when livestock exclusion also lets the riparian area grow back. In some states, cattle exclusion can be used as a stand-alone stream mitigation activity (e.g. AL, CO, FL, MD, MT, NC, OK, UT, and WA). In other states, cattle exclusion is only allowed as a best management practice (BMP) that *must* be part of a larger suite of mitigation activities (AR, CT, MA, MO, NE, NJ, OH, SC and TX). (Photo Credit: NRCS)



Low Impact Development: An emerging stream mitigation concept is the use of low impact development (LID) as a form of stream mitigation, which also addresses stormwater pollution. Some interviewees report that LID is allowed as stream mitigation in their state (AR, IN, NE, OK and TN). In this camp there are a few states where LID will only be considered if the work can be proven to be above and beyond NPDES Stormwater-related activities (e.g. SC and NE), to ensure that there is no “double-dipping” in terms of regulatory requirements. One state (West Virginia) even reported that they would be willing to consider LID that is actually included as part of NPDES work, as they want to incentivize this kind of work. West Virginia sees that there will be increased consideration of LID as the demand to address stormwater increases in the Chesapeake Bay region. Other states are not so eager to jump on the LID bandwagon. While only one state reported being prohibited from the use of LID as mitigation (MA), other interviewees shared that LID would not be considered in their state at this time, including CO, MA, MO, MT and NM.



Changing Perspectives on LID: Whether or not LID is allowed in states may be an issue of timing, with more mitigation coordinators starting to consider LID as both the state of LID practice and outcomes become better understood

and the economy improves (to make LID more financially viable).

One of the benefits of Low Impact Development (LID) is that it reduces adverse effects to watershed hydrology, and thus stream hydrology. LID practices encourage retention of infiltration in the watershed, which slows delivery of runoff and other water to the stream channel, thereby reducing erosion and other changes to stream geomorphology. It also helps facilitate removal of pollutants and sediments before the water reaches the stream channel. By reducing adverse effects to stream structure and function due to hydrology changes caused by development, LID practices can reduce the amount of stream compensatory mitigation required.

Montana, for example, thinks they will be seeing more requests for LID as mitigation as the economy strengthens. Lack of knowledge about LID is also an issue, with several states saying, “that is NPDES, not us” when thinking about LID as a form of stream mitigation. (Photo Credit: Rogersoh)

Thinking about how LID fits into the stream mitigation process: Interviewees provide a number of innovative ways to think about LID related to stream mitigation. For example, Pennsylvania staff indicates that LID work could be related to stream function in their state in the future. Utah staff shared that while they don’t view LID as a form of mitigation, it may be considered for part of the prior *minimization* step in the future (e.g. avoidance, *minimization*, and mitigation). Washington State staff say that they would consider LID if it is part of an overall, more complex strategy with controls at a mitigation bank or as part of in lieu fee projects, but not for permittee responsible mitigation work.

Interviewees were asked in a qualitative interview question about what activities count as stream mitigation in their state for dredge and fill activities. Interviewees were *not* provided a list of activities from which to select allowable stream mitigation activities in their state, nor were they provided definitions for activities. General definitions for each mitigation activity are listed in the report glossary.

Table 16 - Activities that Qualify as Stream Mitigation

Practice of Considering All Activity Options:	CT, HI, IL, IN, KS, MD, MI, MN, ND (Corps), NE, NM, OR*, PA, RI, SD, TX, UT (impact minimization), WA, WV, WY (Corps/IRT)
In-Stream Restoration	AL, AR, CA, CO, CT, FL, IA, IL, IN, KS, KY, MA, ME, MD, MO, MT, NC, NE, NH, NJ, NM, OH, OK, RI, SC, TN, UT, VA, VT
Stream Stabilization	AL, AR, CA, CO, CT, FL, IL, IN, KS, KY, MA, ME, MD, MO, NC, NE, NH, NJ, OH, OK, RI, SC, TN, UT, VA, VT
Buffer/Riparian/Upland Restoration	AR, CT, FL, IA, IL, IN, KS, KY, MA, MD, ME, MO, MT, NE, NH, NJ, NC, NM, OH, OK, RI, SC, UT, VA
Stream Enhancement	AL, AR, CA, CO, IA, IL, IN, KS, KY, MD, MT, NC, NE, NH, OH, RI, SC, TN, UT, VA
Stream Preservation (incl. conservation easements)	CA, CT (only with other mitigation), IN, KS, KY, MD, ME, MT, NC, NH, NJ, OH, PA, RI, SC, TN, UT, VA, VT
Hydraulic Modification (e.g. riffle-pool complexes)	AR, CO, CT, FL, IA, IL, IN, KS, MA, MT, NE, NH, NC, OH, OK, SC, UT
Fencing out cattle	<i>Approve as stand-alone:</i> AL, CO (strongly approve), FL, IA, KS, MD, MT, NC, OK, RI (Strongly encourage), UT, WA <i>Approve, but not as standalone:</i> AR, CT, MA, MO, NE, NJ, OH, SC, VA
Installing Low Impact Development (LID)	TN, OH (encouraged), WV (starting), CT (must be substantial to quality; DE, IN, MD, OK, PA (connected to function), RI; Not allowed as mitigation: MA, MO, CO. Would be considered for minimization, not mitigation: NJ, UT, WA
Stream Creation	No states formally allow stream creation as a form of mitigation.



Photo Credit: Matthias Kabel

Interviewees reported a number of mitigation activities that they did not fit under one or more of the mitigation activities listed in Table 16 on the previous page. Some of these activities could, arguably, fit into one or more of the categories in those tables, but given the uncertainty over what practices fit and terms such as “stream enhancement” and “stream restoration”, no attempt was made to assign them to a mitigation category. These additional mitigation practices are listed in Table 17 below.

Table 17 - Other Mitigation Practices Discussed in Interviews

Habitat (root wads, boulders, etc.)	AR, IA, IN, KS, ME, MO, UT, VA, WA
Large Woody Additions	IA, ME, OR, UT, WA
Structures for Fish/Passable for fish/Weirs	IA, IL, KS, UT, VA
Treatment of Invasive Species	CA, NH, UT, VA
Focus on Beneficial Uses	CA (New), MD (Starting)
Improving Culverts	AR, KS, ME, MI, NE, UT
Daylighting	IN, NH, NJ, UT, VA
Piling Removals	KS, OR, WA
Flow Regime	CO
Watershed Protection	UT, VA
Restoring floodplains	IL, KS, NJ, UT
Stream restoration toward Dynamic Equilibrium	VT
Use of specific guidance	IA (Dave Derrick Design Website) VT (NRCS/FWS)

*Oregon evaluates the replacement of functions and values; no exclusions to date.

**NY = replant, recontour and restore to baseline, but this is not mitigation.

No information was provided for NV; Unknown for AZ

Q. Which mitigation options are offered in your state (mitigation banks, in lieu fee programs and permittee responsible mitigation)? (n=47)

Stream mitigation is a relatively new form of mitigation across the country. Consequently, it is not surprising that there continue to be more mitigation options for wetlands than streams in a number of states. For streams, the most common stream mitigation option reported is permittee responsible mitigation, which is reported in 39 states (83%), with mitigation banks the next most common option offered in 25 states (53%), and the least common being In Lieu Fee programs offered in 22 states (47%).



Addressing stream impacts takes on a different form in seven states, where stream mitigation generally does not take place because either a) streams remain predominantly un-impacted in the state (Idaho), b) the focus of the state is exclusively on the avoidance and minimization of stream impacts, rather than allowing mitigation (New York, Rhode Island and Vermont) or c) the program is so new that only minimal, ad hoc permittee responsible mitigation was allowed at the time this study was conducted (Minnesota and Oklahoma). Wisconsin is in the process of developing mechanisms to conduct stream mitigation for metallic mining only.

Mitigation options for wetlands are slightly more prevalent, with permittee responsible wetland mitigation offered in 41 states (87%), one or more wetland mitigation banks offered in 33 states (70%), and in lieu fee programs for wetland mitigation offered in 25 states (53%). A state-by-state summary of stream and wetland mitigation options offered in each state is provided in Appendix J.

Permittee Responsible Mitigation Allowed as Stream Mitigation (n=47)

For streams, the most common option is permittee responsible (PR) mitigation. Permittee responsible stream mitigation is offered in 39 states (83%). Interviewees identify that a primary challenge with assessing the success of permittee responsible mitigation is a lack of staff time and resources.

Figure 11 - Permittee Responsible Option Available for Stream Mitigation

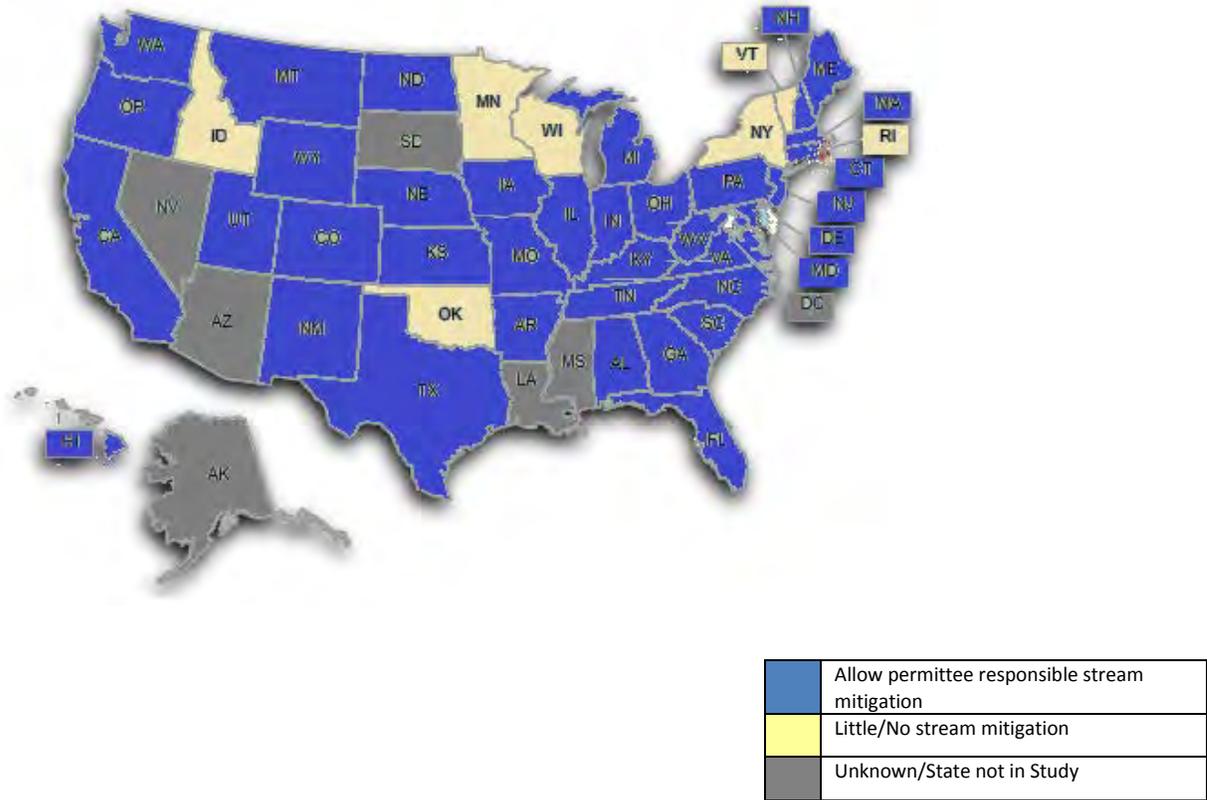


Table 18 - Permittee Responsible Mitigation Option Available for Wetlands and Streams

Mitigation Option	Wetlands	Streams
Permittee Responsible	AL, AR, CA, DE, CO, CT, FL, GA (only grandfathered), HI, IA, ID, IL, IN, KY, KS, MA, MD, ME, MI, MO, MT, NC, ND, NE, NH, NJ, NM, NY, OH, OR (little), PA, RI, SC, TN, TX, UT, VA, WA, WI, WV, WY	AL, AR, CA, CO, CT, DE, FL, GA (Only grandfathered), HI, IA, IL, IN, KS, KY, MA, MD, ME, MI, MO, MT, NC, ND, NE, NH, NJ, NM, NV, OH, OR, PA, RI, SC, TN, TX, UT, VA, WA, WV, WY

Availability of Mitigation Bank Credits for Streams (n=47)

Mitigation banks are on the rise across the country. Twenty-six states (55%) have one or more mitigation banks offering stream credits or are in the process of developing one or more banks (6 states; 13%). The formal tier of mitigation option preferences outlined by the Corps and EPA Mitigation Rule (2008) places mitigation banks as the first choice, followed by in lieu fee programs, and lastly, permittee responsible. However, mitigation banks are not available in all watersheds throughout the country, sometimes because there is not enough permitting activity for a bank to be economically feasible. In other states, mitigation banks will be established in future years if the demand for stream mitigation increases. The current status of mitigation banks is documented in the USACE RIBITS database.

Mitigation banks are often preferred by regulators, as they tend to have more control over mitigation activities than they do for permittee responsible arrangements. Those who run mitigation banks have the incentive to achieve specific measurable goals because the release of final financial benefits is tied to achievement of specific requirements (which is also true for in lieu fee programs, only on a different schedule). The issues of lack of staff time and resources to conduct field inspections and evaluation noted for permittee responsible mitigation activities are also addressed by the mechanisms and contracts that approve and control mitigation banks and the convenience of visiting one site to review many projects.

Figure 12 - Stream Credits Available through One or More Mitigation Banks

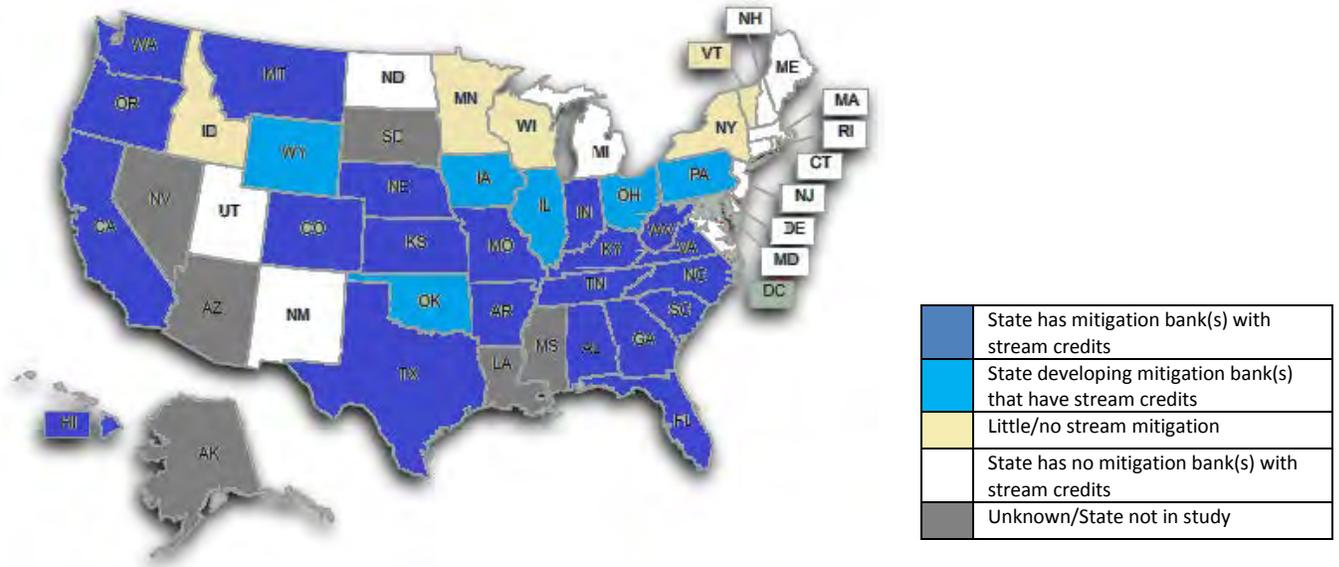


Table 19 - Mitigation Banking Credits Available for Wetlands and Streams

Mitigation Option	Wetlands	Streams
Mitigation Banks	AL, AR, CA, CO, FL, GA, IA, ID, IN, KS, KY, MD, ME, MI, MN, MO, MT, ND, NE, NC, NJ, NY, OH, OR, PA, SC, TN, TX, VA, WA, WI, WV, WY	AL, AR, CA (few), CO, FL, GA, HI, IL (forthcoming), IN (rare), KS, KY, MO, MT, NC, NE, OH, OK (developing), OR, PA, SC, TN, TX, VA, WA, WV, WY,

In Lieu Fee (ILF) Programs Available for Stream Mitigation (n=47)

In lieu fee (ILF) programs are also on the rise. In twenty-two states (47%), one or more ILF programs offering stream credits is available, with ILF programs currently being developed in two additional states (4%; IN and OH). In lieu fee programs are often seen as opportunities for regulators to have more control over mitigation activities. Like mitigation banks, those who run in lieu fee programs have the incentives to achieve specific measurable goals because the release of final financial benefits is tied to achievement of specific requirements. The issues of lack of staff time and resources to conduct field inspections and evaluation noted for permittee responsible mitigation activities are also addressed by the mechanisms and contracts that approve and control ILF programs (as they are by mitigation banks). The current status of in lieu fee programs is documented in the USACE RIBITS database.

Figure 13 - Stream Mitigation Credits Available through One or More In Lieu Fee Programs

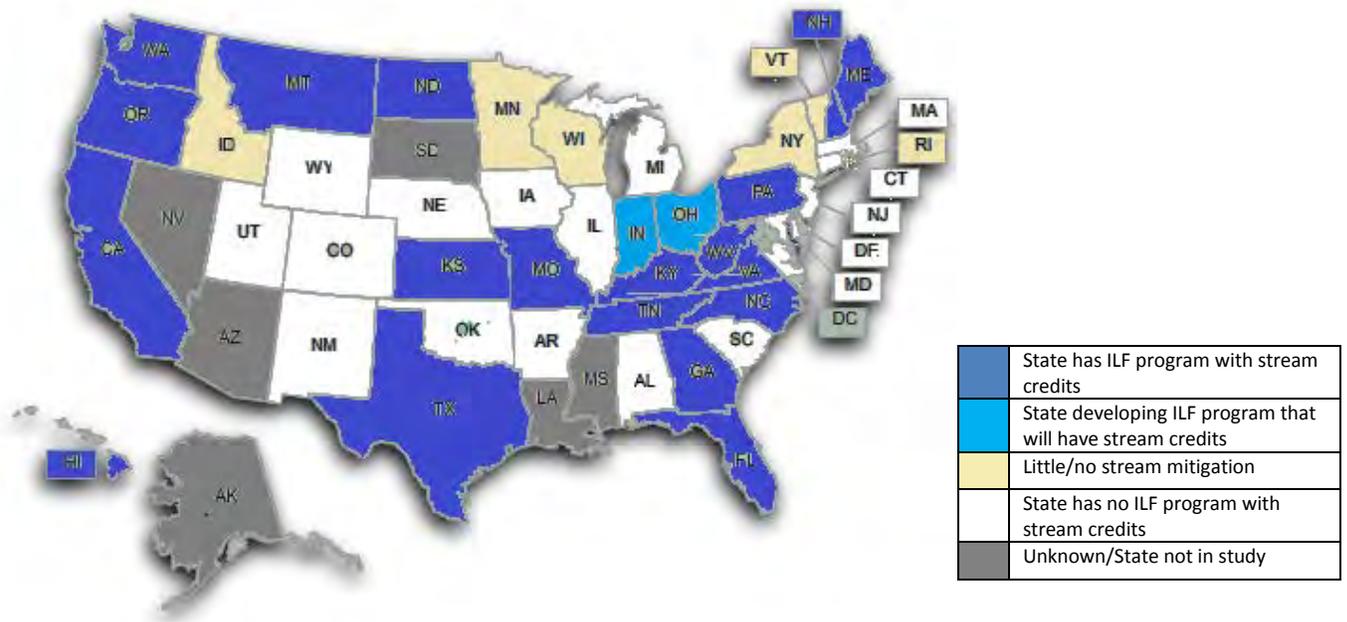


Table 20 - In Lieu Fee Program(s) Available for Wetlands and Streams

Mitigation Option	Wetlands	Streams
In Lieu Fee Programs	CA, FL, GA (Phasing out), ID, IN (late 2014), KY, KS, MD, MN, MT (new), NH, NJ, NC, ND, NY, OH (soon), OR, SC, TN, TX, VA, WA, WI (developing), WV, WY (Corps/404)	CA, FL, GA (Phasing out), HI, IN (in late 2014), KS, KY, ME, MO, MT, NC, ND, NH, OH (soon), OR, PA, TN, TX, VA, WA, WV, WY

Q. How is site selection and design evaluated for stream mitigation? (n=39)

In twenty-nine (74%) of the 39 states with mitigation practices or programs who answered this question, site selection and design evaluation is done on a case-by-case basis, using best professional judgment. A state-by-state summary of site selection and design evaluation practices is provided in Appendix K. (Photo credit: NRCS)



Q. Is the process for site selection and design the same or different for mitigation banks versus in lieu fee (ILF) versus proposed permittee responsible (PR) mitigation projects?

In most states with multiple mitigation options (mitigation banks, ILF and PR), interviewees report that the general process of site selection and design between the three stream mitigation options has become “more similar” since the EPA and the Corps issued regulations governing compensatory mitigation for authorized impacts to streams and other waters under Section 404 of the Clean Water Act. However, when asked how it is more similar, they reveal a disconnect - that formal review by an Interagency Review Team (IRT) or some other form of interagency review tends to be triggered for banks and ILF applications, while permittee responsible applications tend to be under the sole purview of either the state or the Corps, depending on which entity has control of mitigation for that state.

In several states with two or more stream mitigation options, interviewees indicate that banks and ILF tend to be reviewed more carefully and site design and evaluation is more thorough than for permittee responsible stream mitigation because banks and ILF programs will provide mitigation for multiple future actions. This may also be because a greater number of reviewers are able to provide comments to the Corps or state on proposed activities, with feedback potentially helping improve and subsequently increase the likelihood of ecological success. In addition, the agencies/staff responsible for reviewing permit applications (including the proposed mitigation activities) tend to be the same for banks and ILF, but different for permittee responsible mitigation applications.

Based on the provisions in the 2008 Mitigation Rule, both mitigation banks and in lieu fee programs have similar incentives to be successful. If a mitigation bank does not produce the intended wetland or stream mitigation credits, it will be suspended or terminated until it does. Likewise, if an in lieu fee program does not successfully produce released wetland or stream credits in a timely manner, it will also be suspended or terminated until it does so. The compliance tools for both mitigation banks and in lieu fee programs are similar, even though timing may be somewhat different.

Q. How closely does mitigation follow (align with) the kind of damage done (e.g. are wetland, in-stream, riparian, different stream type, use/value taken into consideration)? (n=36)

Interviewees from thirty-six states where there are mitigation programs or practices answered this question. Despite the lack of formal siting and design guidance, most states report that when they do mitigate for stream impacts,



siting and design criteria would work towards getting a somewhat close (17 states; 47%) or close (14 states; 39%) match of landscape position and/or other criteria. Only four interviewees (11%) reported that program/practices in their state did not match mitigation site and design closely. Stream mitigation is not taking place or no information was provided for the remaining states.

Table 21 - Closeness of Mitigation to Kind of Damage from Stream Impact

Siting and design criteria match landscape position and/or other criteria...	
Closely	AR, CA, IN, IL (With new methodology), IA, KY, ME, MD, MA, MI, MO, NC, ND, RI
Somewhat Closely	CO, CT, DE, FL, GA, MT, NH, NE, NJ, NM, OK, OR, SC, TX, UT, VA, WA
Not Closely	KS, PA, TN, WV
Stream Mitigation generally not occurring	ID, MN, NY, VT, WI
Don't Know	AL, AZ, WY
No Information Provided	NV, SD
Other -Case by Case/Federal Nexus	HI

Q. Does your state have procedures for assigning stream debits and mitigation credits? (n=36)

In twenty-one (58%) of the thirty-six states with either a state- or Corps-based stream mitigation program or procedure that answered this question, a procedure for assigning stream debits and/or mitigation credits is available. An additional six states are in the process of developing debiting/crediting procedures (17%). In addition to the six states that do minimal stream mitigation, twelve states (26%) report there is no current or forthcoming procedure in their state. Oregon, Nevada and Arizona did not answer this question. A state-by-state summary of procedures for assigning stream debits and credits is provided in Appendix L.

Figure 14 - States that Reported having Procedures for Assigning Stream Debits and Mitigation Credits

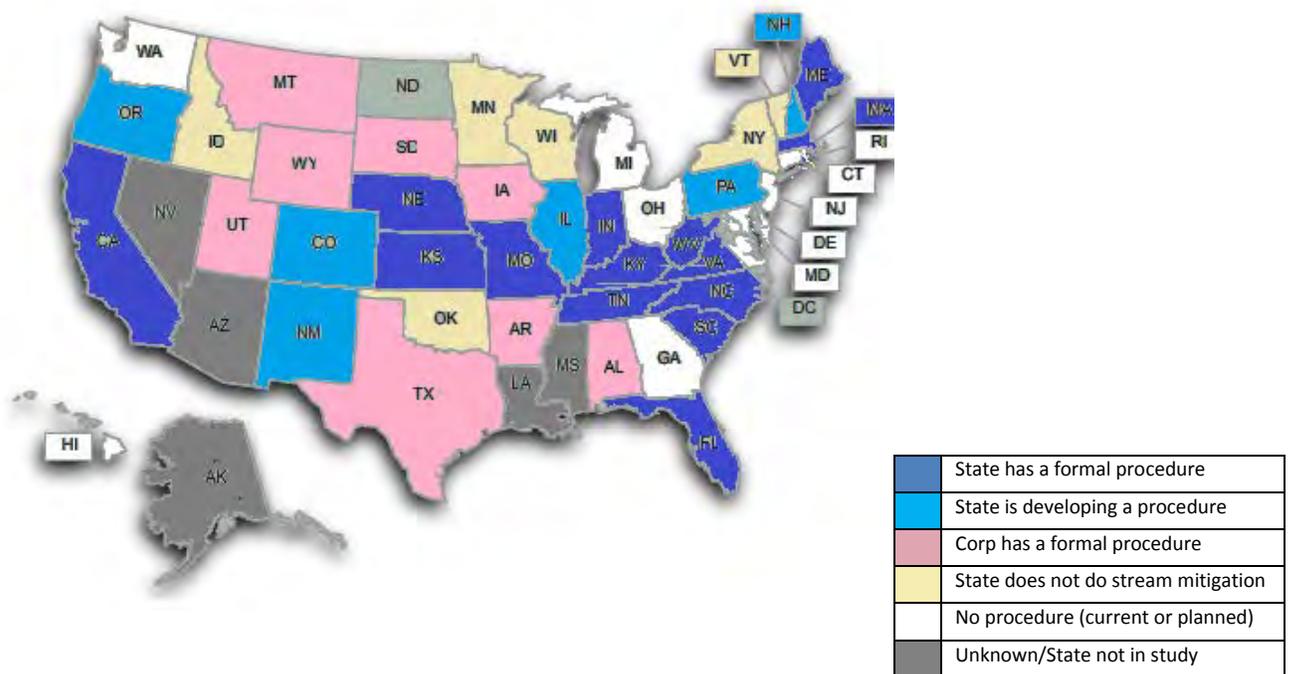


Table 22 - Status of Procedures for Assigning Debits and Credits

Yes, State has a procedure	CA, FL, IN, KS, ME, MA (only vegetation), MO, NC, SC, TN, VA, WV
Corps has a procedure	AL, AR, IA, KY, MT, NE, SD, UT, WY (IRT)
In process of developing a procedure	CO, IL, NH, NM, PA, OR
No procedure	CT, DE, GA, HI, MD, MI, NJ, OH, RI, TX, WA

Stream Mitigation Guidance Documents and Tools

Sample stream mitigation guidance documents and tools were provided by 18 states. These documents are listed in Table 23 of this report.

Figure 15 - States that Provided Stream Mitigation Guidance Documents and/or Tools



Table 23 - Sample Mitigation Guidance/Tools with Web Links

Arkansas - Little Rock District Stream Method (Revised) Borrowed from Mobile District Method) http://www.swl.usace.army.mil/Portals/50/docs/regulatory/Little%20Rock%20Stream%20Method.pdf	AR
Draft California Corps Mitigation Ratio SOP (not available yet)	CA
Illinois Stream Mitigation Method http://www.mvm.usace.army.mil/Portals/51/docs/regulatory/publicnotices/Illinois/Illinois%20Method.pdf	IL
Illinois Stream Worksheet http://www.mvm.usace.army.mil/Portals/51/docs/regulatory/publicnotices/Illinois/Illinois%20Worksheet.pdf	IL
Florida Uniform Mitigation Assessment Method (UMAM) http://www.dep.state.fl.us/water/wetlands/mitigation/umam/index.htm	FL
Kansas Corps Stream Mitigation Guidance http://www.kaws.org/files/kaws/rpt_SMG_021808_db.pdf	KS
Kentucky Stream Relocation/Mitigation Guidelines (2007) http://water.ky.gov/permitting/Lists/Working%20in%20Streams%20and%20Wetlands/Attachments/5/DraftStreamMitigationGuidelines.pdf	KY
State of Missouri Stream Mitigation Method (MO, IA) http://www.mvm.usace.army.mil/Portals/51/docs/regulatory/May_2013_Missouri_Stream_Mitigation_Method.pdf	MO
Montana – Omaha District SMT http://www.nwo.usace.army.mil/Portals/23/docs/regulatory/mitigation/200508-MitigationGuide.pdf	MT
North Carolina Stream Mitigation Guidelines (2003) http://portal.ncdenr.org/c/document_library/get_file?uuid=ab4ccad4-5cbe-45f3-979f-ab3fe35d21a1&groupId=61581	NC

Table 23 - Sample Mitigation Guidance/Tools with Web Links, Continued

Oregon Stream Mitigation Framework http://www.oregon.gov/dsl/PERMITS/docs/Interim_Guidance_Stream_Mitigation_11212012.pdf	OR
Oregon Removal-Fill Guide, Chapter 8 http://www.oregon.gov/dsl/PERMITS/Pages/wetland_mitigation.aspx	OR
Pennsylvania Draft Mitigation Guidelines http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-99527/310-2137-001.pdf	PA
RIBITS Ledger Procedure (e.g. used in Nebraska) http://www.nwk.usace.army.mil/Portals/29/docs/regulatory/mitigation/2011RibitsHandbook.pdf	SC
South Carolina Compensatory Mitigation Guidelines (2010) http://www.sac.usace.army.mil/Portals/43/docs/regulatory/Guidelines_for_Preparing_a_Compensatory_Mitigation_Planf.pdf	
South Dakota Corps Stream Mitigation Procedures (Omaha and Minnesota Districts) http://www.nwo.usace.army.mil/Portals/23/docs/regulatory/mitigation/200508-MitigationGuide.pdf	SD
2004 Tennessee Compensatory Stream Mitigation Guidelines http://www.tn.gov/environment/water/docs/wpc/stream-mitigation-guidelines.pdf	TN
Virginia Unified Stream Methodology http://www.deq.virginia.gov/Portals/0/DEQ/Water/WetlandsStreams/USMFinal_01-18-07.pdf	VA
Washington State http://www.ecy.wa.gov/programs/wr/wstf/images/pdf/mitigatn.pdf https://fortress.wa.gov/ecy/publications/publications/1206015.pdf	WA
West Virginia Stream and Wetland Mitigation Metric 2.0 http://www.lrh.usace.army.mil/Missions/Regulatory/Mitigation.aspx	WV
Wyoming Corps Stream Mitigation Procedure – Omaha District, Regulatory Office http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/Wyoming/Mitigation.aspx	WY

Q. Does your state have a policy for assigning debits and credits for impoundments (installing or removing dams)? (n=47)

In twenty states (43%), a policy or formal process exists for assigning credits and/or debits for either the installation or removal of impoundments, or both. In another eight states (17%), informal assignment of credits and debits would be considered. In eleven states (23%), no credits or debits are assigned for any installation or removal of impoundments. In Nebraska, there are formal procedures, but these are not used. It is likely that whether or not impacts from impoundments are mitigated is influenced, in part, by the frequency that impoundments are established or removed in a state. Consequently, a lack of crediting/debiting process may reflect a lack of demand rather than a failure to address these impacts. A state-by-state summary of mitigation for impoundments is provided in Appendix M.



In some states installation or removal of impoundments is considered to be “self-mitigating” (e.g. WA), with the state choosing not to require stream mitigation for the installation or removal of an impoundment because those actions provide some important functions, even though there may be net changes in certain functions. In other states, impoundments are not mitigated. Dam restoration and or removal is frequently funded by grants and undertaken through nonprofit/volunteer groups. In many of these cases integration with the mitigation program is not required.

Figure 16 - Mitigation for Impoundments

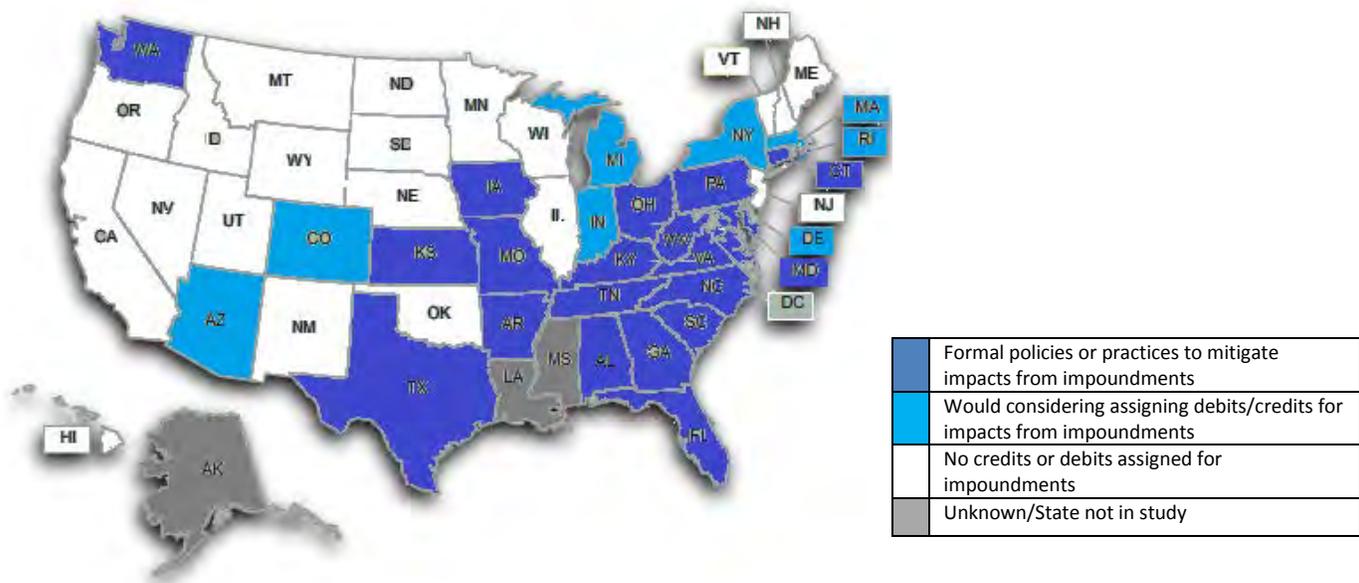




Photo Credit: U.S. Fish and Wildlife Service Northeast Region

Table 24 - Mitigation for Impoundments

Formal Mitigation Policy/Practices	AL, AR, CT, FL, GA, IA, KS, KY (installation only), MD, MO, NE (not used), NC (installation only), OH (removal only), PA, SC, TN, TX (installation), VA, WA, WV
Informal Practices/Would Consider	AZ, CO, DE, IN, MA (removal only), MI, NY (if trout habitat), RI
Not mitigated	CA, IL, ME, MN, NH, NJ, NM, OK, OR, SD, VT
Unknown/ No Information	HI, ID, MT, NV, ND, UT, WY

Q. Does your state’s mitigation policy allow for stream creation? (n=47)

For the purposes of this report, stream creation was defined as establishment of a stream where a stream has never existed before. Using this definition, no states formally use stream creation as a mitigation activity. However, several states accept activities that are similar in nature to stream creation and may or may not be categorized as such by a state, some of which may in other states be more commonly referred to as stream enhancement or even stream restoration activities. Washington State has put back extensive channels as mitigation. Other examples include: California and North Carolina allowing for daylighting of streams; Connecticut and Illinois allowing for the relocation of streams, and Indiana and Texas allowing for the re-establishment of streams after mining. *It should be noted that these findings only reflect what information was reported by interviewees, while others may disagree with these characterizations.*

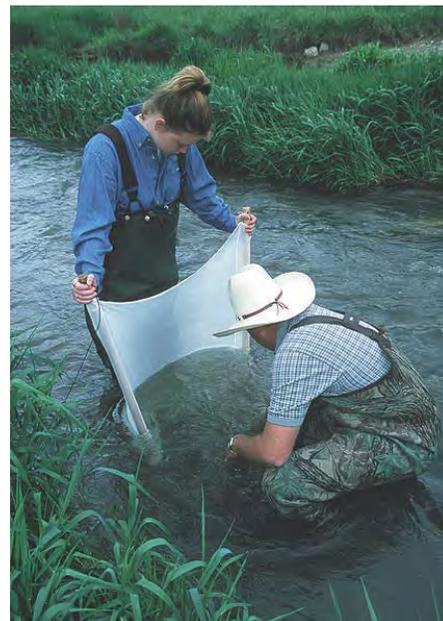
Thirteen states (28%) shared that while stream creation is not currently done in their state, theoretically it would be considered as a mitigation option (AL, CO, ID, MA, MN, MT, OR, RI, TN, UT, WV and WY). Although Kentucky does not formally count stream creation as a mitigation option, there have been isolated cases of stream work similar to stream creation. Stream creation as mitigation was not allowed in twenty-four states (51%). In many states, the practical ability to create a stream is limited by the inability to do so under their state’s environmental conditions (e.g. arid). Opposition stream creation was very strong from some interviewees. This reaction is captured by one state’s comment, “Stream creation?! That’s crazy talk!” Regardless of whether they thought it was feasible/appropriate, most interviewees expressed an interest in learning more about stream creation. A state-by-state summary of each state’s stance on stream creation as stream mitigation is provided in Appendix M.

Figure 17 - Stream Creation Allowed as Stream Mitigation Practice



Q. How is stream mitigation success measured in your state? What is measured? Are these measures performance-based? What tools are used? (n=38)

In the vast majority of states stream mitigation success is measured on a case-by-case basis, using best professional judgment. Based on the responses from 38 states, only nine states (23% of those responding to this question) indicate that the entity coordinating stream mitigation in their state has formal and/or standardized methods for evaluating the success of a stream mitigation project. The most common practice is to outline specific measures of success in the permit application, often including requirements for data collection and reporting for up to five years. Reported results may be followed-up by a site inspection, but often (due to resource limitations), they are not. (Photo Credit: Jeff Vanuga, NRCS)



A Growing Debate: Should functional uplift be measured? How? At what Cost?

Some interviewees expressed that they feel it is only appropriate to measure what is under a permittee’s control, i.e. not what can be affected by upstream influences. This perspective is based on the fact that streams are linear in nature and permittees often have little control over other activities upstream and on adjacent lands that may impact the mitigation site. As a consequence, they argue that mitigation has to focus on improving the physical attributes of a stream. For example, sedimentation is the number one cause of impairment in Arkansas, leading to turbidity. Physical stabilization addresses this; the argument is that biological improvement will follow.

Some interviewees expressed the belief that while there is value in the use of functional assessment, the tool’s best use is not in measuring uplift as a way to determine the success of the mitigation, but rather as a baseline to determine which impacts can be most effectively targeted for improvement. Others believe that for stream mitigation to have value, it must be tied to measures and demonstration of functional uplift. For example, Montana argues that requiring mitigation of physical attributes is not enough. They would like to mitigate for losses of beneficial uses, aquatic biota and function.

Using functional uplift to measure success is considered to be an ideal by most interviewees. But many argue that current limitations include expense, not enough control over upstream impacts, a lack of clarity about which functions should be measured, and difficulty determining what counts as functional uplift and how much uplift is enough. These constraints limit the application of functional assessment in many states¹.

¹ Upon review of a draft of this report, David Olson of the ACOE suggested that control over upstream impacts should be a factor in site selection. It could also be a factor in setting objectives and performance standards, to do what is achievable in a particular watershed context, while still providing some important ecological functions to the local area.



One set of interviewees argue that if mitigation is too expensive, investors won't want to develop banks. They want to keep the costs low enough to encourage interest and success. Consequently, these states want to avoid both function-based mitigation and function-based assessment of mitigation success to keep costs manageable for applicants. States which have developed integrated tools that allow for function-based mitigation (e.g. West Virginia) claim that their function-based mitigation tools both reduce impacts and generate higher quality mitigation by streamlining permitting and creating predictability and transparency. In addition, West Virginia staff indicate that there have been no legal challenges to their metric in the two years since its formal implementation.

Photo Credit: U.S. Fish and Wildlife Service Southeast Region.

Results and Findings - Section 4: Stream Mitigation Gaps and Needs

Q. What gaps exist in your state's stream mitigation efforts? (n=40)

States were asked to share what gaps or challenges existed in their state related to stream mitigation. Those who provided responses to this question, focused on issues related to standardization and transparency, resource limitations, access and availability of quality mitigation sites, challenges/loopholes in regulatory systems that impacted their ability to effectively implement stream mitigation, and inconsistency issues. A list of state gaps and concerns, summarized into categories, follows:



Photo Credit: U.S. Fish and Wildlife Southeast Region

Standardization and Transparency Issues:

Interviewees seek:

- Greater standardization in stream mitigation tools and ratios
- More consistency for permit applicants and legal review
- Development of a stream mitigation policy/framework in their state
- A “non-debatable” functional assessment and process for assigning debits and credits
- More defined, quantifiable field documents with scoring

Resource Issues:

Interviewees shared that they were faced with resource challenges regarding:

- Securing adequate staffing to complete mitigation tasks
- Making sure that stream mitigation work (including field inspections) is completed and enforced
- Training new staff as there is turnover

Access/Availability Issues:

Interviewees expressed challenges implementing stream mitigation due to challenges around:

- Identification and availability of good mitigation sites
- Finding willing landowners who will allow perpetual stream easements
- Lack of access to mitigation banks in each watershed

State Regulatory System Issues:

Interviewees identified a number of barriers to effective stream protection through their state regulatory programs:

- Unable to regulate riparian clearing, channel maintenance, and water withdrawals for non-public streams.
- Lack of regulation of isolated streams
- Want more control over mitigating impacts to buffers
- Privately-owned, agricultural and industrial land activities that are not regulated due to broad exemptions
- Stream losses flying under the radar of the regulatory system
- Inconsistent application of regulations
- Lagging behind with policies and procedures
- Local government not understanding regulations
- Large, unmitigated indirect impacts to streams from flow redirection
- Need for MOUs between state and Corps district offices to better share workload and avoid duplication

Inconsistency Issues:

Interviewees noted problems with the following inconsistencies:

- Between the review processes for permittee responsible versus other mitigation options where there is IRT review (i.e. mitigation banks and in lieu fee programs)
- Between state and Corps
- Between Corps districts (for those states with multiple districts)

Q. Are there specific kinds of technical assistance or guidance that would be useful? (n = 30)

Interviewees were asked to share suggestions for specific kinds of technical assistance or guidance on stream mitigation-related issues that would be useful.

Suggestions/requests focused resoundingly on the need for access to case studies on stream mitigation successes and failures, various types of guidance (especially around measuring functional uplift), guidance on making stream mitigation judgment calls, requests for federal and scientific guidance on specific issues, and suggestions for regional discussions and collaboration. A few interviewees made state-specific requests for technical assistance. (Photo Credit: U.S. Army Corps of Engineers)



A list of interviewee-offered suggestions, summarized into categories, follows:

Case Studies of Stream Mitigation Successes and Failures

Interviewees seek information on:

- Mitigation successes and failures/pitfalls
- What others states are doing with stream mitigation

Guidance on Measuring Functional Uplift

Interviewees seek the following guidance:

- Examples of successful functional assessment
- Lists of appropriate ecological and functional variables and measures
- Guidance on how to decide which measures to use to measure functional uplift

Other How-To Guidance

Interviewees also requested:

- Mitigation SOPs from other states (common and innovative practices)
- SOPs for defining stream channels, top of bank, etc.
- Guidance on how to best restore degraded streams
- Adequate mitigation ratios for degraded streams
- Examples of MOUs between states and the Corps districts to share workload
- More information on how to create an in-lieu fee program
- Information about anti-degradation laws and their effectiveness

Debate about Stream Mitigation Judgment Calls

Interviewees wanted advice on how to make the following specific judgment calls:

- What are reasonable goals for stream mitigation given limited resources?
- When are mitigation results close enough to compliance to approve?
- What is acceptable for in-kind/out-of-kind stream mitigation?
- How can degraded streams be protected?

Federal-level Supports

One or more interviewees indicated that the following federal-level assistance would be helpful:

- Access to a functional stream classification that ties in with the Clean Water Act
- Clarification about what the CWA allows for mitigation
- How the Corps interacts with the CWA authority
- How to take jurisdiction for beneficial uses/impacts
- Training on the national handbook on 401 certification

Regional Collaboration

- Several interviewees indicated that they would like to see more regional collaboration, including: Regional meetings between states on stream mitigation to learn from each other and potentially develop shared or coordinated approaches if appropriate.

Scientific/Research Needs

Some information requests were specifically requesting scientific studies and evidence, including:

- Scientific information on stream mitigation advancements
- Research and case studies on ecological/functional uplift and its measures
- Research on stressors
- Resiliency models

Specific Technical Assistance Requests

Finally, some interviewees had specific technical assistance requests, including requests for:

- A list of states working on assessment methods
- Help with setting up a financial plan for development of an in lieu fee (onsite technical support and facilitation)
- Guidance and feedback on the states' best management practices (BMPs)

Requests for Potential Online Courses/Trainings

Finally, interviewees were asked if they had any specific needs for online training and, if so, which topics were most needed. The response was very positive, with interviewees describing mostly moderate to significant need for online training. Analysis of the responses to this question indicate both that the areas of need will a) require the development of guidance and research to support such trainings, and b) that while online training may be one form of training, a range of training mechanisms should be considered to meet needs.



Reasons for needing these additional trainings included high staff turnover and the need to know a lot about many things with limited staff. Limited training and travel budgets were cited as a growing issue for states, as well as that the timing and frequency of standard courses often do not meet *ongoing* needs for training staff. Several interviewees also shared that they would have an easier time getting approval to participate in online courses at this time, while it is not as easy to get approval to train offsite. The majority of interviewees that expressed an interest in online courses, indicated that it was of great importance to keep staff up-to-date because stream mitigation programs are relatively new and developing so rapidly. A complete listing of suggestions for online training is provided below.

A major *concern* is that for some trainings suggested here, a hands-on component may be essential. Consequently, a mixed-method approach is suggested and advocated by most that expressed an interest in online courses. This means that some courses would be “blended” courses, with both an online component and a shortened local or regional hands-on training component (e.g. the way red-cross offers its joint online/in-class training course option).

Primary topics of interest for online training include basic stream identification and delineation practices, evaluation of stream impacts, rule of thumb decision-making, information on stream mitigation and restoration techniques, and lots of requests for general training of stream-related concepts and methods. There was also interest in learning about new ideas, such as stream creation and amalgamated function-based stream mitigation tools. States were also interested in developing new connections related to emerging issues (e.g. climate change, stormwater, land use, flood control).

Online Training Topics of Interest:

- Stream identification; Identification where intermittent and ephemeral are differentiated; How to define channel, top of bank, etc.; Determining origins for headwater streams
- How to evaluate stream impacts; Evaluation considerations for different types of streams; How to effectively use rapid biological assessment tools
- Rules of thumb for decisions about whether to approve or deny 401 certification; Help with permit approval process; How to apply criteria
- Types of available mitigation; Stream mitigation successes and failures/pitfalls/remedies for failures; Stream mitigation BMPs; How to deal with unique violations

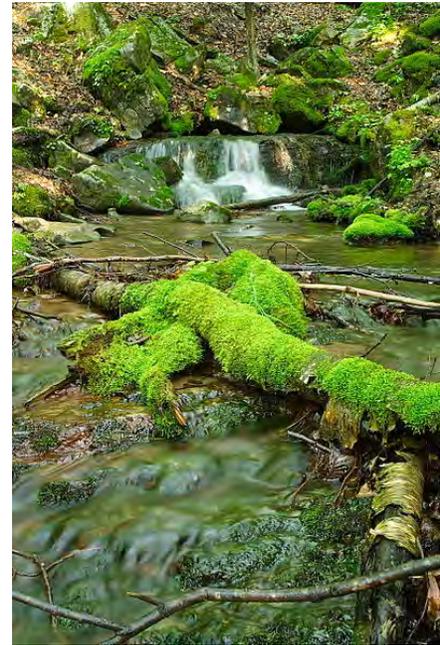
Online Training Topics of interest, Continued

- General training on concepts and methods:
 - Hydrology; Stream hydrology; Stream/riverine hydrology
 - Stream morphology
 - Habitat Assessment; Habitat Value
 - Stream functions
 - Stream characterization
 - Plant identification
 - Soils
 - In-stream structures and functions
 - The connections between stream health and riparian function; How do physical processes translate into biological outcomes
 - Understanding the biological/hydrologic connection
 - Information on stream flow and beneficial uses for intermittent and ephemeral streams
- Restoration techniques
 - Common/region-specific restoration practices; How to best restore a degraded stream
 - How to effectively implement buffer and/or upland protections; Who is doing buffer protection – what approaches have worked and failed?; How to address buffers in light of the ‘takings’ issue; How to do riparian banking
 - Monitoring – What to look for
 - Determining what can be included as in-kind vs. out-of-kind mitigation
- Measuring mitigation success; How to select measures and measure functional uplift; How others states are monitoring stream mitigation; Functional based performance standards; Stream functional assessment
- Mitigation SOPs - specifically those on comparable streams in the same region of the country
- Developing a legally-defensible stream mitigation program
- Explanation of advances in stream-related science (ex. mitigation, restoration)
- How to be prepared for climate change (resiliency models, adaptation, floodplain restoration)
- How to address stream impacts lost through exemptions/non-jurisdictional waters ;
- How to protect streams that the state knows are going to change in response to influences such as development, more frequent storm events, etc.
- Successful debit and credit programs and procedures; Ways to convert impacts and restoration efforts into debits and credits; When to withhold/release credits
- What are we mitigating to?
- Achieving consistency determining the impacts of mitigation without a state assessment method
- Understanding the value of intermittent and ephemeral channels ;
- Understanding the strengths and weaknesses of rapid assessment methods
- Better understanding of Clean Water Act regulations, incl. Stream Mitigation in 404



STUDY CONCLUSIONS

At this time of rapid growth in the development of stream mitigation programs and approaches, this report provides a baseline describing the status of practices stand today and where they appear to be trending. Stream mitigation is a growing practice in the United States. While there are well-established programs in parts of the country, states in many parts of the United States are just beginning to work on developing programs and practices. Given the diversity of state statutes and regulations among varying geographic regional conditions and resources, and socioeconomic and political variation, an important finding of this report is that there are no one-size-fits-all solutions, practices or models. Consequently, states will benefit from looking at other models and templates from around the country, but must modify appropriate practices to their local conditions, needs and regulatory systems.



Stream mitigation is rapidly emerging on the heels of more well-established wetland mitigation. However, stream mitigation does not encompass the same set of practices and the science of stream restoration and enhancement is less well-understood and is in the early stages of development. In addition, the regulatory reach and powers of each state and its partners is very different. In order to understand the stream mitigation landscape, one must first understand that there is a vast diversity in state regulatory systems that are being adapted to include stream mitigation. In many cases, these systems and constraints limit the amount and reach of stream mitigation that is required in a state. (Photo Credit: Forest Wanderer)

Not all activities are created

equal: *When a culvert is replaced using correct BMPs to improve fish passage and limit erosion, there may be no additional need for mitigation; a net improvement exists from the activity itself. The same may be true of some stream stabilization projects that are done correctly.*

There is a need for better understanding of the fundamental components of streams (as well as their watersheds, which have substantial influence on stream structure and function), stream mitigation, and mitigation systems to support the expansion of mitigation practices. Standardization of mitigation practices and protocols will be valuable. At the same time, flexibility and adaptation is needed to address regional conditions and site specific constraints. Adaptive management will also likely be needed to adjust stream projects so they can provide the desired ecosystem functions and to account for changing watersheds. This diversity of needs should be considered to effectively provide resources to the states. Research on successes and failures, best practices, and functional uplift are among the most pressing needs expressed by states.

Other pressing concerns include:

- **Functional Assessment** - Functional assessment tools are needed to support success in stream mitigation efforts. Functional assessment guidance can help states can address: “How do I measure or assess uplift?” “Which functions or groups of functions should be measured?” “How much uplift is enough?”
- **Updating Stream Maps** - Many states need access to more detailed and accurate stream maps. Many current maps significantly underrepresent the streams in a watershed. In some states, streams that would be regulated under state law do not get mitigated because they are not even on the maps used in their identification practices.
- **Riparian Zone/Buffer Protections** – Riparian zone/buffer protection is a critical component for stream mitigation. Many states perceive these areas as important components. However, other states are restricted in their regulatory reach, unable to regulate buffer zones around streams.
- **Improving permittee responsible mitigation** - Many states are turning to mitigation banks or in lieu fee programs, despite their preference for permittee responsible mitigation because of documented low success rates. Identification of ways to improve permittee responsible mitigation activities is important in states and portions of states where other options, such as mitigation banks and in lieu fee programs, are not available. Monitoring and compliance efforts are needed to help ensure that permittee-responsible mitigation is completed and successfully meets its objectives.
- **Learning by Example** - States are very interested in what works and what doesn't and avoiding mistakes already made by others. The vast majority of interviewees in this study were interested in reviewing examples of how other states have addressed these issues and sharing models and template materials, including learning from other programs, nonpoint source pollution programs in particular.
- **The importance of words** - This study identified large gaps in the consistent application of common definitions and interpretations of stream terms and approaches. Developing a common vocabulary over time will be valuable.
- **Avoidance and Minimization** - When looking to promote stream mitigation, consideration must also be given to strengthening the first two elements of the mitigation sequence --- avoidance and minimization, including application of anti-degradation water quality standards where required by state regulations and watershed protection techniques, which can supplement work on restoring or enhancing stream channels and their riparian areas. Examples of practices that can result in an ecological improvement include daylighting, culvert improvements, etc. In most cases, these projects solve an existing problem with how the activity is implemented.

Finally, a primary finding of this report is the connection between the amount and quality of stream mitigation (including evaluation of mitigation projects) and access to resources. Most states indicate that in the current economic (and in some cases political) climate, resources are very limited for work on stream mitigation. Reported resource constraints range from too few staff, small or non-existent budgets and a lack of scientific support to limited access to training and a lack of model practices and/or measures. States are in need of multiple resources, including funding, specific technical information, engaged dialog, access research, examples of successes to increase political will within the state, staff training, and especially examples of what works and what doesn't that are transferable to their situation and regulatory framework. To this end, analysis has led to the identification of ten key study recommendations.

STUDY RECOMMENDATIONS

Stream mitigation is a rapidly evolving area of public policy. This study identified twelve individual and/or collaborative activities by states and other partners that would prove beneficial:

Address National Variability

1) Encourage decision-makers and practitioners to take into consideration the highly diverse regulatory systems and terminology within which stream mitigation occurs and that there are few on-size-fits-all approaches or tools

Suggested Actions/Supports:

- Focus development of broad stream mitigation guidance and recommendations on topics that can appropriately be generalized
- Ensure that discussion on stream mitigation issues takes into consideration an appropriate range of definitions and interpretations for the stakeholders engaged in the conversation
- Terminology and concepts need to be carefully defined to support and communicate when they are used they may have more than one meaning (e.g. use of the terms “ephemeral” and “intermittent” in state laws and regulations)
- When reviewing stream mitigation programs and policies in other states, program managers should take into consideration legal, regulatory, geographic, natural condition and other differences and integrate appropriate revisions before adopting any new practices

2) Develop a list of stream mitigation options and engage in a national discussion on activities that constitute stream mitigation

Suggested Actions/Supports:

- Conduct analysis of the state-by-state summaries of the report to develop an initial stream mitigation practices by state
- Establish a national workgroup of state and government agencies, NGOs and stream restoration experts to discuss the list in the context of current practices, available science, and restoration in other programs
- Develop a white paper evaluating the different approaches and circumstances when they are most appropriate

3) Identify models and regulatory frameworks that allow for greater regulation and mitigation of stream riparian zone/buffer areas

Suggested Actions/Supports:

- Develop case studies from states actively engaged in buffer regulation and mitigation
- Identify barriers and challenges to riparian zone/buffer protection and restoration, including developing a literature review that includes buffer protection work from a variety of fields (e.g. nonpoint source pollution and fisheries).
- Provide guidance to states interested in exploring expansion of buffer protection

Provide Support to Decision-makers and Practitioners

4) Help regulators evaluate the options for and components of compensatory stream mitigation in order to support the expansion of mitigation practices

Suggested Actions/Supports:

- Train decision-makers and practitioners on the key elements of stream mitigation (mitigation goals, terms, options, activities, etc.)
- Develop and share case studies of compensatory stream mitigation successes
- Share stream mitigation guidance documents and SOPs from other states (both common and innovative practices)
- Provide analysis of and guidance on appropriate crediting and debiting systems (e.g. function-based, ratios)
- Share examples of integrated stream assessment and crediting systems
- Train staff on how to design and implement measures of stream mitigation success
- Contact experienced staff in *related* stream management programs and the state/tribal level (e.g. nonpoint source management, fisheries management, soil erosion control) to identify existing useful best management practices and evaluation tools.

5) Help regulators evaluate the challenges and opportunities related to implementing stream mitigation

Suggested Actions/Supports:

- Document and share stream mitigation lessons learned
- Develop legal review of challenges to stream mitigation requirements and, ideally, best practices to use in developing a legally-defensible program.

6) Provide guidance on application of consistent avoidance and minimization components of the mitigation sequence to stream permittees

Suggested Actions/Supports:

- Provide case studies and trainings on avoidance and minimization activities.
- Provide example of methods to minimize and avoid impacts, relating these methods to mitigation requirements
- Develop one or more white papers on legal foundations for avoidance and minimization approaches

Facilitate Learning Opportunities and Discussion

7) Provide opportunities for cooperative sharing, learning and training on stream mitigation issues, ranging from regional working groups to online training resources

Suggested Actions/Supports:

- Identify formal training needs and prioritize level of interest in specific topics from states and other parties based on the list of needs identified in this report.
- Support the development of regional stream mitigation working groups to promote cooperative sharing and learning
- Secure funding to develop trainings to meet identified needs
- Work with experts to develop and deliver high quality training options

8) Help practitioners gain access to training on stream characteristics and their response to stream restoration/preservation/ enhancement mitigation activities

Suggested Actions/Supports:

- Identify and share high quality training resources
- Develop readily-accessible online training (or combined online/on-site training) in priority subject areas
- Tailor trainings to region-specific needs
- Develop funding support for staff training

9) Provide training and guidance on functional assessment

Suggested Actions/Supports:

- Provide basic training on stream functions, and measuring functional lift, ecological uplift and functional assessment (this is likely to be an area of activity in both the near- and long-term).
- Develop guidance on how to decide what criteria to use to measure functional uplift
- Share examples of successful functional assessment efforts
- Develop conditional and functional assessment methodologies when needed

10) Facilitate engaged debate about the pros and cons of different identification, assessment and evaluation methods and measures to support stream mitigation program development

Suggested Actions/Supports:

- Plan discussions into ongoing planning meetings and conferences
- Review and/or compile comparative analysis of options used by different states
- Facilitate peer-to-peer networking to support consistent decision-making

11) Create opportunities to learn about unique practices, such as incorporating low impact development (LID) into stream mitigation options and stream creation

Suggested Actions/Supports:

- Identify case studies, potential best practices, barriers and opportunities
- Provide opportunities for regulators and other practitioners to learn from experts

Track Change/Progress Over Time

12) Use this report as a baseline for measuring changes in stream mitigation practices in the future.

Suggested Actions/Supports:

- Utilizing the study questions in Appendix A of this report, conduct future investigation to identify changes and trends in stream mitigation over time
- Document the indicators and drivers of change in stream mitigation

GLOSSARY OF TERMS

- **Best Management Practices (BMPs):** Policies, practices, procedures or structures that have consistently shown results superior to those achieved with other means, and that are used as a benchmark.
- **Biological Integrity:** A measure of the state of health in aquatic communities.
- **Buffering:** The ability of the riparian zone to filter pollutants that move to the stream from higher elevations.
- **Compensatory Stream Mitigation:** The restoration, enhancement, creation, or preservation of streams and their associated floodplains for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved. Compensatory mitigation should be designed to restore, enhance, and maintain stream uses and functions that are adversely impacted by authorized activities.
- **Compensatory Stream Mitigation Activities:** Activities may include restoration, creation, enhancement and, preservation of stream channels and their riparian areas.
- **Compensatory Stream Mitigation Options:** Stream mitigation options usually take one of three forms: a) permittee responsible mitigation, b) buying credits from a mitigation bank, or c) paying into an in lieu fee program.
- **Compensatory Stream Mitigation Credits:** In a compensatory mitigation system, stream mitigation activities are valued in “credits.” The value of these credits is determined by quantifying the stream functions or linear feet restored or created.
- **Debits:** Stream impacts are quantified in “debits.” The value of these debits is determined by quantifying the stream functions and/or linear feet disturbed, and with what impact.
- **Conservation Easement:** A legally-binding, recorded instrument approved by a regulatory agency and legal counsel to protect and preserve mitigation sites.
- **Ditch:** There is no common agreement about the definition of a ditch, what is included or excluded from the definition, or even whether the term ditch is a formal term or just a colloquial term. In general, a ditch is a channel used for drainage alongside a road or the edge of a field. For the purposes of this report, a ditch may be manmade or an altered natural stream. The term is also confused by other terms, which may or may not fit a regulatory agency’s definition of a ditch, such as a “canal” or “drainageway”.

GLOSSARY OF TERMS

- **Functional Assessment:** An approach to stream assessment that increases the emphasis on stream function (i.e., the physical, chemical and biological processes that occur in streams), in addition to form. The approach pairs whole systems thinking with a parameter specific process-based evaluation. This assessment method measures ecological uplift in combination with functional lift, a measure referred to as “functional uplift.”
- **Ephemeral Stream:** There are many definitions of ephemeral streams that are used in different locations and contexts. Many scientific definitions include elements of the following definition: A stream that has flowing water only during or for a short duration after precipitation events in a typical year. In many states, this term refers to streambeds that are located above the water table year-round and streams where groundwater is not a source of water for the stream.
- **Headwater Stream:** Generally refers to the uppermost stream in a river network, furthest from a river’s endpoint or confluence with another stream.
- **In Lieu Fee Mitigation:** In Lieu Fee (ILF) mitigation occurs when a permittee provides funds to an in lieu fee sponsor (a public agency or non-profit organization). Usually the sponsor collects funds from multiple permittees in order to build and maintain the mitigation site. The in lieu fee sponsor is responsible for the success of the mitigation. It is an off-site mitigation that usually occurs after the permitted impacts.
- **Intermittent stream:** There are many definitions of intermittent streams that are used in different locations and contexts. Many scientific definitions include elements of the following definition: A stream that has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from precipitation is a supplemental source of water for stream flow.
- **Jurisdictional Determination:** A process which identifies whether streams (and other waterbodies) within a project’s boundaries meet the definition of “waters of the United States” or “waters of the State”.
- **Mitigation Bank:** A mitigation bank is a stream, wetland or other aquatic resource area that has been restored, established, enhances, or preserved for the purpose of providing compensation for unavoidable impacts to aquatic resources permitted under Section 404 or a similar state or local regulation. The permittee, upon approval of regulatory agencies, can purchase credits from a mitigation bank to meet requirements for compensatory mitigation. The bank sponsor is ultimately responsible for the success of the project. Using a mitigation bank is an offsite mitigation option, but bank credits are usually purchased before an impact to a stream is approved.

GLOSSARY OF TERMS

- **Perennial Stream:** There are many definitions of perennial streams that are used in different locations and contexts. Many scientific definitions include elements of the following definition: A stream that has flowing water year-round during a typical year. The water table is located above the streambed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from precipitation is a supplemental source of water for stream flow.
- **Permittee:** For the purposes of this report, the word “permittee” refers to an individual, company or organization that has been approved by a regulating agency responsible for the implementation of Section 404 or a similar state or local law or regulation, who may be required to undertake compensatory mitigation for unavoidable impacts to a stream.
- **Permittee Responsible Mitigation:** Permittee Responsible (PR) mitigation occurs when a permittee undertakes restoration, establishment, enhancement, or preservation of a stream in order to compensate for stream impacts resulting from a specific project. The permittee performs mitigation after the permit is issued and is ultimately responsible for implementation and success of the mitigation. Permittee responsible mitigation may occur either onsite or offsite (if allowed by the regulatory agency).
- **Riparian Zone:** The area of vegetated land along each side of a stream or river that includes, but is not limited to, the floodplain. The quality of this terrestrial or wetland habitat varies depending on the width and vegetation growing there. Functions of the riparian zone include reducing floodwater velocity, filtering pollutants such as sediment, providing wildlife cover and food, and shading the stream.
- **Standard Operating Procedure (SOP):** An established procedure to be followed in carrying out a given operation or in a given situation.
- **Stream Assessment:** An evaluation of stream health, which may include data collection and analysis of physical, hydrologic, and ecological conditions/functions within a specific stream mitigation project area.
- **Stream Classification:** Ordering or arranging fluvial systems into groups or sets, based on their similarities and relationships. A morphological classification system categorizes a stream based on its physical and geomorphic characteristics (e.g. Rosgin).
- **Stream Delineation:** Establishment of the existence (location) and physical limits (size) of a stream for the purpose of federal, state or local regulations. Stream delineation is also an element of a “jurisdictional determination,” a process which identifies water bodies within a project’s boundaries meet the definition of “waters of the United States.”

GLOSSARY OF TERMS

- **Stream Enhancement:** Stream rehabilitation activities undertaken to improve water quality or ecological function of a fluvial system.
- **Stream Identification:** In this study, the term stream identification is used to represent a wide range of practices, generally focused on determining points on the landscape that represent stream origins and reaches that are some distance downstream. Identification practices may include determining whether a stream is ephemeral, intermittent or perennial, often using geomorphic, hydrologic and/or biological stream features.
- **Stream Mitigation Program:** For the purpose of this study, the term stream mitigation “program” is used to refer to a formalized set of practices within the Corps or a state agency that is authorized and responsible for implementing compensatory stream mitigation within a state.
- **Stream Mitigation Practice:** For the purpose of this study, the term stream mitigation “practice” is used to refer to an action by the Corps or a state agency that is authorized and responsible for implementing compensatory stream mitigation within a state related to implementing stream mitigation, which may be formalized (part of a mitigation program) or informal.
- **Stream Order:** A method for classifying, or ordering, the hierarchy of natural channels within a catchment.
- **Stream Preservation:** Protection of ecologically important streams, generally in perpetuity, through the implementation of appropriate legal and physical mechanisms.
- **Stream Relocation:** Movement of a stream to a new location to allow an authorized project to be constructed in a stream’s former location.
- **Stream Restoration:** The process of converting an unstable, altered or degraded stream corridor, potentially including the adjacent riparian zone and flood-prone areas), to its natural and stable condition, considering recent and future watershed conditions.
- **Streambank Stabilization:** The in-place stabilization of an eroding streambank.
- **Stream Type:** The U.S. EPA refers to four types of streams, based on flow characteristics: a) perennial streams, b) intermittent streams, c) ephemeral streams, and d) headwater streams. Other classification systems may be used to identify various stream types.
- **Vegetated Buffer:** An upland or wetland area vegetated with native trees and shrubs next to streams that separate aquatic habitat from developed area, including agricultural areas.

APPENDIX

Appendix A	Base Questions for ASWM Stream Study Interviews
Appendix B	Regulatory Focus and Types of Streams Regulated by State
Appendix C	Regulation of Ditches by State
Appendix D	Percentage of streams considered Waters of the State and Definitions of Waters of the State by State
Appendix E	Portion of Streams Subject to Dredge and Fill Permitting and Responsible Party for Stream Delineation by State
Appendix F	Stream Identification Procedures by State
Appendix G	Whether and How State Delineation Differs for the Federal JD by State
Appendix H	Stream Assessment Approaches by State
Appendix I	Stream Mitigation Program/Practice Characteristics by State
Appendix J	Available Mitigation Options by State
Appendix K	Stream Mitigation Site Selection and Design Evaluation Practices by State
Appendix L	Procedures for Assigning Debits and Debits for Stream Mitigation by State
Appendix M	Mitigation Practices for Impoundments/Dams by State
Appendix N	Stream Creation as an Allowable Mitigation Practice by State
Appendix O	State Interview Contact List

CUSTOMIZED QUESTIONS FOR STATE NAME

Contact Name

Contact Title

Tel.

Email

Address

SECTION A. STREAM IDENTIFICATION AND DELINEATION

1. How does your state legally define streams subject to state water quality standards and other regulations?

a. What terms are used in the state's statutes and regulations to identify streams
Just "streams?" Perennial? Intermittent? Ephemeral? Other?

b. Does your state regulate ditches? How are they defined?

c. If so, how does your state distinguish between streams and ditches?

2. How does the state definition relate to the 'scientific' definition of streams?

Perennial, intermittent and ephemeral (where perennial flows year round, intermittent is in contact with groundwater part of the year and ephemeral is never in contact with groundwater)

a. Roughly what percentage of streams in the state are considered waters of the state?

3. A. How are streams, particularly small streams and headwater streams, identified in the field?

a. How is the width/lateral extent/ of the stream determined?

b. How is the beginning of a stream identified?

For example: Are there specific criteria that are applied? Does staff search for bed and bank? Is the Ordinary High Water Mark used?

c. Is there written guidance on how to do this?

d. How do these procedures differ from those used to determine the federal limits of jurisdiction in stream systems—or are they the same?

4. Is this the current definition of Waters of the State for State Name?

Insert definition of “Waters of the State” from Report

5. Under this definition of “waters of the state,” what portion of the state’s streams are subject to dredge and fill permitting?

- a. Is the delineation left to the Corps jurisdictional determination?

SECTION B. Mitigation

6. How much stream mitigation is happening in your state? Please estimate the scope of mitigation work annually in linear feet or number of individual and general permits?

7. What are the most common types of dredge and fill stream permits in your state (*e.g. roads, culverts, channel maintenance, agriculture, silviculture, gravel and sand extraction*)?

- a. Overall, What is the level of impact that needs to be mitigated?
(For example, there is a big difference between impacts that obliterate a stream and those that redirect a portion of a stream through a culvert)

8. How does your state assess streams?

- a. What stream functions and/or conditions do you assess (e.g. habitat, water quality, stream structure, etc.)?

9. Does your state have its own stream mitigation practices and/or programs or does your state work largely through the IRT and Corps districts?

10. If you have your own mitigation practices, does your state require the same mitigation actions for all types of streams or different arrangements based on different types of streams (e.g. size, class by order; flow duration – perennial, intermittent, ephemeral, ditches)

- a. Do you have rules, guidance or standard operating procedures in place for mitigation that you can share?

11. What activities count as stream mitigation in your state for dredge and fill activities? (E.g. Stream stabilization projects, restoring riparian area, fencing out cattle, hydraulic modification, in-stream restoration, etc.)

12. Which mitigation options are available in your state?

- | | | | |
|------------------------------------|--------------|-------------|----------|
| a. Mitigation Banks | ___ Wetlands | ___ Streams | ___ Both |
| b. In Lieu Fees (Pay into account) | ___ Wetlands | ___ Streams | ___ Both |
| c. Onsite (permittee responsible) | ___ Wetlands | ___ Streams | ___ Both |

13. How is site selection and design evaluated for stream mitigation?

- a. Is it the same or different for *mitigation banks* versus *in lieu fee* versus *permittee responsible*?

14. How closely does mitigation follow the kind of damage done (e.g. wetland, in-stream, riparian, different stream type, use/value taken into consideration)?

15. Does your state have a procedure for assigning debits and credits?

- a. Are there handbooks, procedures, etc.?]
- b. Does your state have policy for assigning credits and debits for impoundments? (installing or removing dams)?
- c. Does your state's mitigation policy allow for stream creation? If yes...
- i. How is stream creation defined?
 - ii. What are some examples?
 - iii. How do you handle it?

16. How do you measure success. How are these measured? (Tools used)

- a. Are they performance-based? (Biological indicators, water quality, habitat, linear feet, etc.)

17. What is *not* covered in your state?

- a. Are there gaps or specific issues that your state is struggling to address? Please explain.

18. Are there specific kinds of technical assistance or guidance that would be helpful?

- a. What don't you have tools for?

SECTION C. Collection of Interviewee Information

19. Who should be listed as the contact for stream mitigation information in our report?

20. Please confirm the spelling of your

- a. Name
- b. Title
- c. Agency and Department
- d. Telephone number
- e. Email address

21. Are there any tribes doing stream mitigation in your state? If so, do you have a contact for them?

22. Document any recommended websites, documents or additional contacts.

- a. Website links
- b. Copies of guidance/documents used
- c. Additional contacts

APPENDIX B: Regulatory Focus and Types of Streams Regulated by State

Types of Streams Regulated in State					
State (n=47)	Regulatory Focus	Definition of Streams	P	I	E
Arizona	Surface waters. Streams and Perennial, Intermittent and Ephemeral Streams all identified in rule with formal definitions	Formally define all three types of streams.	X	X	X
Alabama	Covered under waters of the state, which references streams.	None defined. No differentiation between types of streams (except in NPDES). Some sector specific regulatory cites referencing stream type/description in NPDES Rule	X	X	X
Arkansas	Presence of water. Not regulated when dry, meaning that some streams may not be regulated at one time of the year, while it may be at another time of year.	Stream is defined in Water Pollution Control Act, but no further definitions	X	X	X
California	Presence of water, which includes all CA waters; do not have to be connected to navigable waters (CA Porter Cologne Act)	Currently working on developing science-based definitions for all three stream types	X	X	X
Colorado	Covered under waters of the state. Tied to water rights and appropriation. Focus on fish and wildlife habitat.	Unknown	X	X	X
Connecticut	Focus on “watercourses” (Watercourses Act). Include vernal and intermittent, though many ephemeral streams by the scientific term meet the requirement for regulations under the term intermittent streams in the state’s regulations.	Intermittent streams are defined, but does not match the scientific term (includes many ephemeral streams)	X	X	X (some ephemeral quality as state’s definition of intermittent)
Delaware	Submerged lands and tidelands, inclusive of streams (subaqueous lands). Depends on whether or not the water is “flowing” (hard to determine where Delaware is so flat) and navigable (state - not federal - definition of navigable). Do not regulate if non-flowing, even if there is a bed and bank. Any blueline on USGS assumed to be jurisdictional and then look beyond. Strong emphasis on historical maps.	No formal definition of streams, but do regulate perennial and intermittent. Do not regulate ephemeral.	X	X	
Florida	Independent state statutory program	These terms are	X	X	X

	<p>regulates all wetlands and other surface water, including those that are isolated. “Stream means any river, creek, slough, or natural watercourse in which water usually flows in a defined bed or channel. It is not essential that the flowing be uniform or uninterrupted. The fact that some part of the bed or channel has been dredged or improved does not prevent the watercourse from being a stream” (373.019).</p> <p>WQ standards applicable to streams and other surface waters are divided by classes – Class I: Drinking water; Class II; Class III: All other; Class IV: Agricultural waters; and Class V: Industrial waters.</p>	<p>used and defined in the state’s water quality standards (available upon request).</p> <p>A stream includes the open channel and all connected wetland to their landward extent as defined by Ch. 62-340 of the FL Administrative Code.</p>			(regulated as part of Class III – All Others – waters)
Georgia	Contact with groundwater; Fish: Trout. Recent change in laws defined ephemeral further.	All 3 types (P, I and E)	X	X	X
Hawaii	It is recognized that the waters of the State are held for the benefit of the citizens of the State. It is declared that the people of the State are beneficiaries and have a right to have the waters protected for their use. The state water code shall be liberally interpreted to obtain maximum beneficial use of the waters of the State for purposes such as domestic uses, aquaculture uses, irrigation and other agricultural uses, power development, and commercial and industrial uses. However, adequate provision shall be made for the protection of traditional and customary Hawaiian rights, the protection and procreation of fish and wildlife, the maintenance of proper ecological balance and scenic beauty, and the preservation and enhancement of waters of the State for municipal uses, public recreation, public water supply, agriculture, and navigation. Such objectives are declared to be in the public interest	Means any river, creek, slough, or natural watercourse in which water usually flows in a defined bed or channel. It is not essential that the flowing be uniform or uninterrupted. The fact that some parts of the bed or channel have been dredged or improved does not prevent the watercourse from being a stream.	X	X	X
Idaho	Regulate “Waters of the State” based on beneficial uses. Includes streams, but not defined in WQS.	No definition of streams in WQS, but intermittent and ephemeral “waters” are defined in WQS.	X	X	Regulated but do not apply criteria to ephemeral very often

		Idaho’s Water Body Assessment Guidance document defines streams, as well as providing information about what is <i>not</i> a stream.			
Illinois	Three levels of regulation in Illinois: 1) All waters of the state are regulated for pollution; 2) Office of Water resources Construction projects – 1 sq mi in urban; 10 sq mi in rural; 3) Public Waters (only 8% of streams). Can regulate any waterbody that flows into a “public water” (from 1911 act), but only flooding is regulated for “non-public” waters.	No formal definitions or distinctions	X (Only 8% of streams are regulated)	X (WQ and flooding)	X (WQ Only)
Indiana	All waters that have a defined bed and bank are regulated. Can regulate above the bed and bank (rarely not regulated). <i>Note: this statement is relative to IN Section 401 WQ Certification; the IDNR has different jurisdiction)</i>	Don’t define streams or types of streams. Includes ephemeral if have defined bed and bank.	X	X	X (If have defined bed and bank)
Iowa	Designated uses of surface waters of the state. Regulation is based on NPDES pollution prevention. All streams are presumed to meet PA fishable/swimmable until a UAA has been performed and passed via rule to apply a stream-specific designation.	Includes streams. Define ephemeral, intermittent and losing streams (which generally equate to ephemeral streams)	X	X (rebutable presumption ; general use applicable)	X (rebutable presumption; general use applicable)
Kansas	All classified streams with a defined bed and bank are subject to state regulation for pollution control purposes.	Streams and 3 types of streams: a) perennial, b) intermittent with permanent pools and c) ephemeral/intermittent are defined in Corps Mitigation guidance. Continual dialog about classification of ephemeral (currently require more debits of impacts to intermittent than ephemeral)	X	X (intermittent with permanent pools)	X (ephemeral/intermittent)
Kentucky	Surface water and evidence of flow;	2 types	X	X	X

	Banks and beds either constantly or intermittently flowing. Ephemeral covered in general certification; Length of impact determines whether regulated by individual certification.	(P and I)			
Maine	Regulation is based on five criteria (must have two or more to be regulated): 1) US topographic blue dotted line; 2) Continuous flow for more than 2 months; 3) scoured channel bed – this is primary; 4) aquatic animals, and/or 5) aquatic vegetation. Requirements spelled out in more detail in the regulations	Lengthy definitions of streams, but no definitional distinctions between perennial, intermittent and ephemeral. (Look to 480-V-Stream Rules and 38-480Z)	X	Most	None
Maryland	Must have sustained flow of more than storm event (Water Resources Protection Act) or be regulated by FEMA Floodplain regulations	No definition for stream. State regulates “waters of the state,” which includes streams that have groundwater input. Define intermittent.	X	X	
Massachusetts	Regulated if it is a body of running water moving in a definite channel due to a hydraulic gradient. In order for a stream to be regulated, it must flow within, into or out of a jurisdictional area. Intermittent streams do not have to flow throughout the year except for that portion upgradient of all bogs, swamps, wet meadows and marshes. Massachusetts has found many intermittent and ephemeral streams do not exist on the USGS maps,	Define perennial and intermittent. An ephemeral stream (scientifically) could be regulated as an intermittent stream if it meets MA definition of intermittent streams.	X	X	X (An ephemeral stream can be regulated as intermittent in MA)
Michigan	Regulate if definite banks, a bed and visible evidence of a continued flow or continued occurrence of waters. Regulate all waters that meet the definition of a stream, regardless of stream type.	Define “inland stream”: Definite banks, a bed, and visible evidence of a continued flow or cont. occurrence of water; may or may not be serving as a drain as defined by the drain code of 1956 (MI NREPA 324.30101)	X	X	X
Minnesota	Under waters of the state. Define surface	No stream	X	X	X

	waters v. groundwater. Standards apply to all streams.	definitions			
Missouri	Numeric Water Quality Criteria only applies to classified waters. Three types of waters: 1) P: permanently flowing; 2) P1: backwater; and 3) C: streams that flow seasonally (intermittent). Unclassified waters are protected by general water quality criteria (i.e. "free-firms"). Water Quality Certifications apply to jurisdictional waters, which could be both classified and unclassified waters of the state and are defined by USACE.	Streams that flow seasonally are intermittent streams; ephemeral streams flow primarily after precipitation events.	X	X	X
Montana	Regulate based on surface water and drainageways under the Montana Water Quality Act	Define streams. Also use the terms perennial, intermittent and drainageways (which are similar to ephemeral)	X	X	X
Nebraska	Regulate everything that is not associated with a stormwater conveyance feature (including all three types of streams)	Regulations include all three types of streams, but Perennial, intermittent and ephemeral are not defined.	X	X	X
Nevada	Regulate both natural and manmade waterways	Provide definition of streams, but not types of streams. Streams refer to all natural watercourses identified by use of USGS 7.5 minute series topographical maps	Not Provided	Not Provided	Not Provided
New Hampshire	Regulate waters of the state, including natural and artificial marshes, streams, lakes and ponds. New Hampshire refers to regulation of "everything that ebbs and flows" (which does not include ephemeral).	Use all 3 terms; regulate perennial and intermittent, but not ephemeral (only a few cases associated with wetlands)	X	X	Ephemeral only covered in a few cases when associated with wetlands
New Jersey	Surface water. Regulated if drain more than 50 acres or if drain less than 50 acres but has a discernible/definable bed and bank or channel. Mainly associated with	NJ does not specifically define streams; Only uses term water not	X See regulatory focus statement	X See regulatory focus state	

	Flood Hazard Rule.	streams. Definition is disconnected from the scientific stream terms.		ment	
New Mexico	Focus on surface waters, including streams. Does not grant power to take away or modify property rights in water. Some perennial have become intermittent in drought.	Define perennial, intermittent and ephemeral surface waters.	X	X	X
New York	All waters that are mapped and classified are regulated, including Perennial, Intermittent and Ephemeral. Cannot touch waters that are trout habitat. <i>?Special "Downstream Rule:" If not mapped or in regulations and perennial, regulate to downstream rule. If intermittent, regulate to lowest classification.</i>	No definitions, but lots of intermittent and ephemeral streams are regulated	X	X	X
North Carolina	NC regulations include definitions for stream, channel, ditch, canal and modified natural streams.	Defines all three types of streams; But do not regulate ephemeral	X	X	
North Dakota	Streams are classified based on use and associated water quality criteria (Class 1, Class IA, Class II and Class III. All flowing water courses, unnamed creeks or draws not listed in the state's WQ standards are classified as Class III and regulated. Class II streams includes quite a few ephemeral streams.	Do not use the scientific terms to define streams. Class III regulated streams do include quite a few ephemeral streams	X	X	X (if they are Class III streams)
Ohio	Surface water focus. Not all require permitting though. Piggyback on what the Corps considers to be jurisdictional		X	X	X (some but no isolated streams)
Oklahoma	Rely on Corps regulation; no independent regulation of streams. Do not regulate more than Corps authority, except if non-jurisdictional waters. Have different requirements for perennial and intermittent streams (which include some ephemeral).	Define all three types of streams.	X	X	X (Some)
Oregon	Surface waters, including streams, both perennial and intermittent. Intermittent stream refers to any stream which flows during a portion of the years and provides spawning, rearing or food-producing areas for food and game fish.	Only defines perennial and intermittent	X	X	X (Only if fish habitat)
Pennsylvania	Regulate watercourses (including	Define streams,	X	X	X (included as

	streams) and floodways. Regulate natural and artificial watercourses with perennial or intermittent flow (state’s definition of intermittent includes many ephemeral).	perennial and intermittent (intermittent includes ephemeral in many cases)			intermittent)
Rhode Island	All types of streams are regulated. Rivers are defined as USGS designated “perennial streams.” Streams/intermittent streams are defined by flow/channel characteristics. Ephemeral called “areas subject to storm flowage.” Riverbank wetland buffers are also regulated.	No stream definitions	X	X	(Unless connects to a wetland, then regulated)
South Carolina	In accordance with state regulation (16-101) WQ certification state authority to issue 401 WQ certifications is predicated on a federal permit and in the absence of a federal permit, the state has no authority to issue a certification. Note that other programs , such as NPDES permits, have authority to interpret WQS more broadly.	State WQ certification doesn’t define any stream; however, State WQ standards define all three types of streams	X	X	Only if Corps says yes; take some
South Dakota	Focus on water rights and fishery classifications (cold/warm, permanent/semi-permanent/marginal). Type of fishery determines limits on the waterbody. Not every waterbody is classified; only if being discharged into	Waterbody and classifications defined, not streams or stream types	X (If meet fishery or WQ criteria)	X (If meet fishery or WQ criteria)	X (If meet fishery or WQ criteria)
Tennessee	Stream means “a surface water that is not a wet weather conveyance.” The state’s wet weather conveyance definition is similar to scientific term ephemeral. Also use presence of specific organisms as criteria for regulation. To be regulated must have enough sustained flow to have at least one of the following: a) At least two obligate lotic organisms, b) a discrete channel, or c) presence/absence of water.	Define stream, but not types of streams.	X	X	
Texas	Based on surface water. Covered under “Water in the State,” which includes rivers, streams, creeks, and beds and banks of all watercourses.	Two stream definitions in state WQ standards: 1) intermittent and 2) intermittent with perennial pools. Perennial not defined but implied, as anything falling	X	X	X (some under state’s definition of intermittent)

		above the definition of intermittent. Term ephemeral is not used (but some ephemeral are regulated under state's definition of intermittent)			
Utah	Based on waterways able to sustain an ecosystem and distinct from an upland. Only regulate "natural" streams, not any manmade waterways. Note: Utah does not regulate wetlands, lakes and reservoirs (referred to Corps permit only for these).	Definition for natural stream (any waterway along with its fluvial system with enough water to sustain an ecosystem distinct from an upland.	X	X	X (Some but not all ephemeral)
Vermont	Focus is on managing toward equilibrium. Regulate only perennial streams for stream alterations and dredge and fill permitting. Intermittent streams are included in water quality regulations.	Different regulations include definitions of perennial (all) and Intermittent (WQ only) streams	X	X (WQ only)	
Virginia	Jurisdiction of all surface water. Don't regulate some activities in waters.	Do not define streams or any types of streams	X	X	X
Washington	Regulate surface waters, watercourses, natural or manmade. Focus on water typing system (fish/no fish – regulate both at different levels), habitat and water quality.	Streams are defined, but perennial, intermittent and ephemeral not used or defined.	X (regulation related to fish and WQ)	X (regulation related to fish and WQ)	X (regulation related to fish and WQ)
West Virginia	If it has a defined bed and bank it is regulated.	Define the terms perennial, intermittent, ephemeral and wet weather streams	X	X	X
Wisconsin	State has own definition of "navigable waters" (based on "saw log test"). Regulation based on navigable waters and shoreland zoning. Regulate any surface waters that are included in a subset of state's navigable waters (larger than Corps definition of navigable waters).	Do not define streams as perennial, intermittent or ephemeral. Perennial and intermittent used in guidance, but not laws and rules.	X	X	X (only if meets navigable waters definition for the state)
Wyoming	Surface waters of the state. Regulate anything with a bed and bank – can be dry.	Do not define streams specifically. Define perennial, intermittent and	X	X	X (Can be dry)

		ephemeral drainages.			
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APPENDIX C: Regulation of Ditches by State

State	Yes/No	Details	Exemptions
Alabama	YES	But only if a permit is required for conduit of a pollutant (<i>can</i> fill, move or create a ditch without regulation, except as may be required by activity/sector-specific NPDES rules)	Any ditch that is not regulated as a conduit of pollutants or the disturbance activity itself is not regulated under NPDES rules.
Arizona	YES	Provide some standards for canals (which include ditches). Specifically related to water quality.	Unknown
Arkansas	YES	All ditches are regulated	Only if can prove that designated use has changed (no changes approved to date)
California	YES	Includes regulation of both natural and manmade. There are lots of ditches in CA and the state regulates them	Don't have jurisdiction over upland ditches placed in a feature.
Colorado	YES	If they have a defined bed and bank	Those which are under regional-level administration (may or may not be regulated at that level)
Connecticut	YES	If meet the standing or flowing definition of intermittent watercourses. If persists any amount of time beyond a storm event, it is regulated.	If artificial, manmade, concrete or stormwater conveyance only
Delaware	NO	N/A	N/A (Note: Large number of agricultural grid ditches are not jurisdictional)
Florida	YES	All ditches, canals, and channels are regulated as "other surface waters." These are delineated to their landward extent using Ch. 62-340, F.A.C. as ratified by Section 373.4211, F.S.	Some exemptions apply to maintenance dredging, construction of docks, piers, seawalls, and other shoreline stabilization.
Georgia	YES	Under water quality rules	If all on one property
Hawaii	YES	Watercourse means a stream and any canal, ditch and other artificial watercourse in which water usually flows in a defined bed or channel	-
Idaho	YES	Regulated as waters of the state, but "manmade" provision applies.	Ultimately determined by EPA/Corps (permitting agencies)

Illinois	YES	But only if they are receiving a polluted discharge (WQ regulation only)	Any ditch that is not receiving a polluted discharge
Indiana	YES	If they have a defined bed and bank Note: This is applicable only to Sec. 401 WQ Certification	Some are exempt (various reasons)
Iowa	YES	UAA – All streams are presumed to meet fishable/swimmable until a UAA has been performed and, as appropriate, passed via state rule to apply a stream-specific designation. The UAA may demonstrate a General Use classification as is appropriate.	Drainageways that would not meet the definition of Waters of the State. However, most ditches would meet that definition and require a UAA. IA has found that may do support designated uses.
Kansas	NO	Only may be regulated if they are actually a modified stream (rare cases). Field call.	-
Kentucky	YES	If it has a defined bed and bank and defined channel. Flow dependent regime.	Grass swales.
Maine	NO	Only if actually a ditched stream	-
Maryland	YES	However, most are NOT regulated. Only ditches that are downcut to groundwater are regulated.	Any ditches not downcut to groundwater
Massachusetts	YES	If meet's the state's definition of a stream	Mosquito ditches
Michigan	YES	If meet the state's definition of a stream	Some maintenance exemptions
Minnesota	YES	Only if it is a jurisdictional ditch where water quality regulations apply	-
Missouri	YES	Only if meet the criteria to be "waters of the state"	Any ditches contained on one property
Montana	YES	If ditch enters state waterways	Not if waters in ditch are absorbed/used up onsite
Nebraska	YES	Canal systems are also waters of the state	-
Nevada	YES	Have placed standards on canals and drains in the past, though not recently	-
New Hampshire	YES	However, they do not formally define ditches	Clean-out of non-tidal drainage ditches where there is no fill
New Jersey	YES	Only if drain over 50 acres; meet field judgment	
New Mexico	YES	Only if have flow through. Regulated if have polluted discharge.	If internally-draining or not connected to commerce.
New York	YES	If mapped and in the regulations	-
North Carolina	YES	Regulate streams, as well as channels, ditches and modified natural streams, but only if the waterbody is really a ditched stream	Any ditches that are not a ditched stream

North Dakota	YES	Only if they are streams that have been ditched or channelized. Regulated ditches are identified using EPA RF3 files	Manmade ditches
Ohio	YES	If the ditch is jurisdictional, according to the Corps, then the state requires a permit	Non-jurisdictional ditches
Oklahoma	YES	Ditches are included in waters of the state. All that are considered “classified waters”	None
Oregon	YES	A ditch is defined as a manmade water conveyance channel and does not include manipulated streams. Ditches are jurisdictional if they are created in Waters of the State or are created from an upland and 1) contain food and game fish and 2) have free and open connection to Waters of the State.	There are non-jurisdictional irrigation ditches and roadside/railroad ditches when certain conditions are met.
Pennsylvania	YES	Case-by-case. If have a defined bed and bank, but not required as sw management facility for roadway.	Case-by-case; Can chose to regulate, but often do not.
Rhode Island	YES	If meet RI’s flow criteria for a stream or intermittent stream or an area subject to storm flowage. Do not use the colloquial term “ditch”	If “ditch” does not flow into or out of or connect other wetlands, it is not regulated.
South Carolina	YES	Only if they are designated as Corps JD ditches; SC does not have any authority beyond this	Non-Corps JD ditches
South Dakota	YES	All ditches are regulated. Anything that is a drainageway.	Only if wastewater treatment of stormwater conveyance (which are regulated in other ways)
Tennessee	YES	If meet the definition of a stream <i>or</i> have two obligate lotic species. Do distinguish between stream and ditch. Ditches are in TN statute Included in TN mitigation document	
Texas	YES	Generally, if the ditch is connected to other surface waters, it is regulated	-
Utah	NO	Not right now. State legislature has given state the power to regulate regular canals (incl. ditches) but that state has not yet opted to regulate them. Have had some recent canal failures, so may bring attention to this issue in near future.	No ditches are regulated at this time.
Vermont	YES	But only if the ditch is really a channelized stream.	-
Virginia	YES	If they are surface waters. VA has a guidance document on ditches	Not regulated if they are dug through uplands or are non-contiguous
Washington State	YES	Ditches and other manmade structures can all be regulated. Regulated based on impact to	-

		fish life and WQ.	
West Virginia	YES	But only if the ditch is really a channelized stream.	Any roadside ditch that was constructed to direct drainage from the roadway. SW conveyance.
Wisconsin	YES	Manmade ditch is regulated as a stream if adjacent land is no longer in agricultural use and if the ditch fits the state's definition of navigable waters ("saw log test", i.e. has bed and bank and can float smallest recreational watercraft on a recurring basis).	All others
Wyoming	YES	All ditches are considered waters of the state, but may not be waters of the United States; therefore 404 regulations may not apply. Regulated by classes; not all ditches have the same designations.	Some manmade ditches are exempt from 404 regulation.

APPENDIX D: Portion of Streams Subject to Dredge and Fill Permitting and Definitions of Waters of the State and by State

State	Percentage of streams Considered Waters of the State	Definition of Waters of the State
Alabama	Unknown	"Waters of the State" means "[a]ll waters of any river, stream, watercourse, pond, lake, coastal, groundwater or surface water, wholly or partially within the State, natural or artificial. This does not include waters which are entirely confined and retained completely upon the property of a single individual, partnership or corporation unless such waters are used in interstate commerce", Code of Alabama 1975, § 22-22-1(b)(2), as amended. "Waters" include all navigable waters as defined in 33 U.S.C. § 1362(7), as amended, which are within the State of Alabama.
Arizona	100%	(Section 45-141) Public Nature of Waters of the State: The waters of all sources, flowing in streams, canyons, ravines or other natural channels, or in definite underground channels, whether perennial or intermittent, flood, waste, or surplus water, and of lakes, ponds, and springs on the surface, belong to the public and are subject to appropriation and beneficial use as provided in this chapter. Any person, the State of Arizona, or a political subdivision thereof may appropriate unappropriated water for domestic, municipal, irrigation, stock watering, water power, recreation, wildlife, including fish, non-recoverable water storage pursuant to section 45-833.01 or mining uses, for his personal use or for delivery to consumers. A water source that is located on land owned by the United States and that has been or may be appropriated under state law may be beneficially used on any land whether or not owned by the United States. Source: http://www.azleg.state.az.us/ArizonaRevisedStatutes.asp?Title=45
Arkansas	100%	(Section 8-4-102) "Waters of the State" means all streams, lakes, marshes, ponds, watercourses, waterways, wells, springs, irrigation systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion of the state. Source: http://www.arkleg.state.ar.us/NXT/gateway.dll?f=templates&fn=default.htm&vid=blr:code
California	100%	(Section 13050-13051) "Waters of the State" means any surface water or groundwater including saline waters, within the boundaries of the state. Source: http://www.leginfo.ca.gov/cgi-bin/waisgate?WAIISdocID=797811557+5+0+0&WAIISaction=retrievee
Colorado	If it is "aquatic habitat," it is covered	(Section 25-8-103) "State waters" means any and all surface and subsurface waters which are contained in or flow in or through this state, but does not include waters in sewage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed. Source: http://www.michie.com/colorado/lpext.dll?f=templates&fn=mainh.htm&cp=
Connecticut	100%	(Section 22a-367) "Waters" means all tidal waters, harbors, estuaries, rivers, brooks, watercourses, waterways, wells, springs, lakes, ponds, marshes, drainage systems, and all other surface or underground streams, bodies, or accumulations of water, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion thereof. Source: http://search.cga.state.ct.us/dtsearch_pub_statutes.html
Delaware	Unknown – lots of agricultural grid ditches are not	Regulated under Title 7 - 7504 Regulations Governing the Use of Subaqueous Lands - "Subaqueous lands within the boundaries of Delaware constitute an important resource of the State and require protection against uses or changes which may impair the public interest in the use of tidal or navigable waters. The purposes of this Ch. are to empower the Secretary to deal with or to dispose of interest in public subaqueous lands, and to place reasonable limits on the use and development of private subaqueous lands, in order to protect the public interest by employing orderly procedures for granting interests in

	considered jurisdictional	public subaqueous land, and for issuing permits for uses of or changes in private subaqueous lands. To this end 7 Del.C. §7212 empowers the Secretary to adopt rules and regulations to effectuate the purposes of the chapter, to apply to the courts for aid in enforcing this statute and the rules and regulations adopted pursuant thereto, and to convey interests in subaqueous lands belonging to the State." Source: http://regulations.delaware.gov/AdminCode/title7/7000/7500/7504.shtml#TopOfPage
Florida	99.99% (All unless contained entirely on one property)	(Section 403.031 (13), F.S.) "Waters" include, but are not limited to, rivers, lakes, streams, springs, impoundments, wetlands, and all other waters or bodies of water, including fresh, brackish, saline, tidal, surface, or underground waters. Waters owned entirely by one person other than the state are included only in regard to possible discharge on other property or water. Underground waters include, but are not limited to, all underground waters passing through pores of rock or soils or flowing through in channels, whether manmade or natural. Solely for purposes of s. 403.0885, waters of the state also include navigable waters or waters of the contiguous zone as used in s. 502 of the Clean Water Act, as amended, 33 U.S.C. ss. 1251 et seq., as in existence on January 1, 1993, except for those navigable waters seaward of the boundaries of the state set forth in s. 1, Art. II of the State Constitution.
Georgia	All, unless contained on one property	(13) "Waters" or "waters of the state" means any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells, and all other bodies of surface or subsurface water, natural or artificial, lying within or forming a part of the boundaries of the state which are not entirely confined and retained completely upon the property of a single individual, partnership, or corporation.
Hawaii	100%	None provided
Idaho	~100% (but different criteria may apply)	All the accumulations of water, surface and underground, natural and artificial, public and private, or parts thereof which are wholly or partially within, which flow through or border upon the state.
Illinois	100% (Water quality) 8% (Public Waters)	(Section 35C-1-301.200) "Waters" means all accumulations of water, surface and underground, natural, and artificial, public and private, or parts thereof, which are wholly or partially within, flow through, or border upon the State of Illinois, except that sewers and treatment works are not included except as specially mentioned; provided, that nothing herein contained shall authorize the use of natural or otherwise protected waters as sewers or treatment works except that in-stream aeration under agency permit is allowable. Source: http://www.ipcb.state.il.us/documents/dsweb/Get/Document-33352/ Public waters are defined as "...all open public streams and lakes capable of being navigated by watercraft, in whole or in part, for commercial uses and purposes, and all lakes, rivers and streams which in their natural condition were capable of being improved and made navigable..."
Indiana	99.9% (except in excavated upland)	IDEM Uses: (IC 13-11-2-265) (a) "Waters", for purposes of water pollution control laws and environmental management laws, means: (1) the accumulations of water, surface and underground, natural and artificial, public and private; or (2) a part of the accumulations of water; that are wholly or partially within, flow through, or border upon Indiana. (b) The term "waters" does not include: (1) an exempt isolated wetland; (2) a private pond; or (3) an off-stream pond, reservoir, wetland, or other facility built for reduction or control of pollution or cooling of water before discharge. (c) The term includes all waters of the United States, as defined in Section 502(7) of the federal Clean Water Act (33 U.S.C. 1362(7)), that are located in Indiana. As added by P.L.1-1996, SEC.1. Amended by P.L.183-2002, SEC.1; P.L.282-2003, SEC.31; P.L.52-2004, SEC.4. - See more at: http://codes.lp.findlaw.com/incode/13/11/2/13-11-2-265#sthash.WvpW7Pee.dpuf DNR Defines WOS as: (IC 14-8-2-307) "Water of the state," means a lake, reservoir, marsh, waterway, or other water: under public ownership, jurisdiction, or lease; or that has been used by the public with the acquiescence of any or all riparian owners. Source: http://www.in.gov/legislative/ic/code/title14/ar8/ch2.html
Iowa	Vast Majority	"Water of the state" means any stream, lake, pond, marsh, watercourse, waterway, well, spring, reservoir, aquifer, irrigation system, drainage system, and any other body or accumulation of water, surface or underground, natural or artificial, public or private, which are contained within, flow through or border upon the state or any portion thereof.
Kansas	All classified waters, which is the majority of the State's streams	(Section 28-16-58) "Waters of the state" means all surface and subsurface waters occurring within the border of the state, or forming part of the border between Kansas and one of the adjoining states. Source: http://www.kdheks.gov/pdf/regs/28-16-58.pdf
Kentucky	20%	(Section 151.100) The word "stream" or "watercourse" shall mean any river, creek, or channel, having well defined banks, in which water flows for substantial periods of the year to drain a given area, or any lake or other body of water in the Commonwealth; The word "diffused surface water" shall mean that

		water which comes from falling rain or melting snow or ice, and which is diffused over the surface of the ground, or which temporarily flows vagrantly upon or over the surface of the ground as the natural elevations and depressions of the surface of the earth may guide it, until such water reaches a stream or watercourse; The word "groundwater" or "subterranean water" shall mean all water which fills the natural openings under the earth's surface including all underground watercourses, artesian basins, reservoirs, lakes, and other bodies of water below the earth's surface. http://www.lrc.ky.gov/KRS/151-00/CHAPTER.HTM
Maine	100%	(Section 3-38 §361-A) "Waters of the state" means any and all surface and subsurface waters that are contained within, flow through or under, or border upon this state or any portion of the state, including the marginal and high seas, except such waters as are confined and retained completely upon the property of one person and do not drain into or connect with any other waters of the State, but not excluding waters susceptible to use in interstate or foreign commerce, or whose use, degradation, or destruction would affect interstate or foreign commerce. Source: http://janus.state.me.us/legis/statutes/38/title38sec361-A.html
Maryland	The majority, but not ephemeral	(§5-101) "Waters of the state" includes: both surface and underground waters within the boundaries of the state subject to its jurisdiction; that portion of the Atlantic Ocean within the boundaries of the State; the Chesapeake Bay and its tributaries; all ponds, lakes, rivers, streams, public ditches, tax ditches, and public drainage systems within the state, other than those designed and used to collect, convey, or dispose of sanitary sewage; and the floodplain of free-flowing waters determined by the department on the basis of the 100-year flood frequency. Source: http://www.michie.com/maryland/lpext.dll?f=templates&fn=mainh.htm&2.0
Massachusetts	Unknown – there are a lot of intermittent streams that don't exist in the system	(Chapter 21-26A) "Waters" and "waters of the commonwealth," all waters within the jurisdiction of the commonwealth, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, coastal waters, and groundwaters. http://www.mass.gov/legis/laws/mgl/gl-21-toc.htm
Michigan	100%	(R324.3101) "Waters of the state" means groundwaters; lakes; rivers; streams and all other water courses and waters, including the Great Lakes, within the jurisdiction of this state. Source: http://legislature.mi.gov/doc.aspx?mcl-324-3101
Minnesota	100%	(Section 104G.005) "Waters of the state" means surface or underground waters, except surface waters that are not confined but are spread and diffused over the land. Waters of the state includes boundary and inland waters. Source: https://www.revisor.leg.state.mn.us/statutes/?id=103G.005
Missouri	98%	(Section 644.016) "Waters of the state" refers to all rivers, streams, lakes, and other bodies of surface and subsurface water lying within or forming a part of the boundaries of the state which are not entirely confined and located completely upon lands owned, leased, or otherwise controlled by a single person or by two or more persons jointly or as tenants in common and includes waters of the United States lying within the state. http://www.moga.missouri.gov/statutes/C600-699/6440000016.HTM
Montana	All, except those on Indian reservations	75-5-103 (34) (a) MCA "State Waters" means a body of water, irrigation system, or drainage system, either surface or underground (b) the term does not apply to: (i) ponds or lagoons used solely for treating, transporting, or impounding pollutants; or (ii) irrigation waters or land application disposal waters when the waters are used up within the irrigation or land application disposal system and the waters are not returned to state waters.
Nebraska	100%	(Section 46-202) The water of every natural stream not heretofore appropriated within the State of Nebraska, including the Missouri River, is hereby declared to be the property of the public and is dedicated to the use of the people of the state, subject to appropriation. (Section 37-1206) Waters of this state shall mean any waters within the territorial limits of Nebraska. Source: http://uniweb.legislature.ne.gov/LegalDocs/view.php?page=s3712006000
Nevada	100%	"Waters of the State" means all waters situated wholly or partly within or bordering upon this State, including but not limited to: 1) All streams, lakes, ponds, impounding reservoirs, marshes, water courses, waterways, wells, springs, irrigation systems and drainage systems; and 2) All bodies or accumulations of water, surface and underground, natural or artificial. (Added to NRS by 1973, 1709)
New Hampshire	Majority (all perennial and intermittent; small % of	

	ephemeral are not regulated)	
New Jersey	100%	(Section 53:1-11.10) "Waters of the state" means, but shall not be limited to, the waters of the Atlantic Ocean for three nautical miles eastward from the shores of this state; all navigable and non-navigable tidal and non-tidal, rivers, bays, streams, and inlets; and any other water within the jurisdiction of the state. http://www.njleg.state.nj.us/ Also (N.J.A. 7:7A-1.4): "Waters of the state" means the ocean, its estuaries, all springs, streams, wetlands and other bodies of surface or groundwater, whether natural or artificial, within the boundaries of the State of New Jersey or subject to its jurisdiction.
New Mexico	100%	(Section 72-1-1) All natural waters flowing in streams and watercourses, whether perennial or torrential, within the limits of the state of New Mexico, belong to the public and are subject to appropriation for beneficial use. A watercourse is hereby defined to be any river, creek, arroyo, canyon, draw, or wash, or any other channel having definite banks and bed with visible evidence of the occasional flow of water. Source: http://www.conwaygreene.com/nmsu/lpext.dll?f=templates&fn=main-h.htm&2.0
New York	100% (if mapped)	(ENV Section 15-0107) "Waters" shall be construed to include lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic Ocean within the territorial limits of the State of New York, and all other bodies of surface or underground water, natural or artificial, inland or coastal, fresh or salt, public or private, which are wholly or partially within or bordering the state or within its jurisdiction. Source: http://public.leginfo.state.ny.us/menugetf.cgi?COMMONQUERY=LAWS
North Carolina	All perennial and intermittent streams	"Waters" means any stream, river, brook, swamp, lake, sound, tidal estuary, bay, creek, reservoir, waterway, or other body or accumulation of water, whether surface or underground, public or private, or natural or artificial, that is contained in, flows through, or borders upon any portion of this State, including any portion of the Atlantic Ocean over which the State has jurisdiction. (GS 143-212(6))
North Dakota	100%	"Waters of the state" means all waters within the jurisdiction of this state, including all streams, lakes, ponds, impounding reservoirs, marshes, watercourses, waterways, and all other bodies or accumulations of water on or under the surface of the earth, natural or artificial, public or private, situated wholly or partly within or bordering upon the state, except those private waters that do not combine or effect a junction with natural surface or underground waters just defined.
Ohio	100%	(Section 1501.30) "Waters of the State" includes all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and other bodies or accumulations of water, surface and underground, natural or artificial, regardless of the depth of the strata in which underground water is located, that are situated wholly or partly within or border upon this state or are within its jurisdiction. Source: http://codes.ohio.gov/orc/1501.30
Oklahoma	100%	"Waters of the state" from Oklahoma Environmental Quality Code. The citation for this definition is Title 27A, Oklahoma Statutes, Section 1-1-201 (20). "Waters of the state" means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, storm sewers, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion thereof, and shall include under all circumstances the waters of the United States which are contained within the boundaries of, flow through or border upon this state or any portion thereof. Provided, waste treatment systems, including treatment ponds or lagoons designed to meet federal and state requirements other than cooling ponds as defined in the Clean Water Act or rules promulgated thereto and prior converted cropland are not waters of the state.
Oregon	All perennial and some intermittent streams (% unknown)	Definition for water pollution control: (Section 468B.005) "Water" or "the waters of the state" include lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon, and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction. Source: http://www.leg.state.or.us/ors/468b.html Definition for Removal-Fill: (196-800(14): Waters of this state means all natural waterways, tidal and nontidal bays, intermittent streams, constantly flowing streams, lakes, wetlands, that portion of the Pacific Ocean that is in the boundaries of this state, all other navigable and non-navigable bodies of water in this state and those portions of the ocean shore, as defined in ORS 390.605 where removal or fill activities are regulated under a state-assumed permit program as provided in 33 U.S.C. 1344(g) of the Federal Water Pollution Control Act, as amended. Source: http://www.oregonlaws.org/ors/196.800

Pennsylvania	100%	Waters of the Commonwealth are regulated under Chapter 105, which define regulated waters as “any watercourse, stream or bodies of waters and their floodways. A watercourse is defined as channel or conveyance of surface water with defined bed and bank, whether natural or artificial, with perennial or intermittent flow. This means that any ditch or drainage way that has a definable bottom and sides has the potential to be regulated. A body of water is any artificial or natural lake, pond, reservoir, swamp, marsh, or wetland.” Source: http://www.columbiaccd.org/html/body_faq1.html
Rhode Island	100%	(Section 13050-13051) “Waters of the State” means any surface water or groundwater including saline waters, within the boundaries of the state. http://www.leginfo.ca.gov/cgi-bin/waisgate?WAISdocID=797811557+5+0+0&WAIAction=retrievee
South Carolina	100%	South Carolina Code of Laws 48—1-10 defines waters as follows” “Waters” means lakes, bays, sounds, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic Ocean within the territorial limits of the State, and all other bodies of surface or underground water, natural or artificial, inland or coastal, fresh or salt, which are wholly or partially within or bordering the state or within its jurisdiction.
South Dakota	100%	“Waters of the state,” all waters within the jurisdiction of this state, including streams, lakes, ponds, impounding reservoirs, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, situated wholly or partly within or bordering on the state, but not waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA.
Tennessee	100%	No definition provided (all except those contained within one property).
Texas	100% (Some ditches and canals are not regulated)	In the context of water rights: (Water Code § 11.021) STATE WATER. (a) The water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state is the property of the state. (b) Water imported from any source outside the boundaries of the state for use in the state and which is transported through the beds and banks of any navigable stream within the state or by utilizing any facilities owned or operated by the state is the property of the state. Source: http://tlo2.tlc.state.tx.us/statutes/statutes.html In the context of water quality control: (Water Code § 26.001) (5) "Water" or "water in the state" means groundwater, percolating or otherwise, lakes, bays, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, wetlands, marshes, inlets, canals, the Gulf of Mexico, inside the territorial limits of the state, and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, navigable or nonnavigable, and including the beds and banks of all watercourses and bodies of surface water, that are wholly or partially inside or bordering the state or inside the jurisdiction of the state.
Utah	All “natural streams,” not some ditches and canals	The term “Waters of the State” is not used in the regulation of streams, but the term “Natural Stream” is used. However, the term “Waters of the State” is used by the Division of Water Quality in their regulation of water sources: “‘Waters of the state’ means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion thereof, except that bodies of water confined to and retained within the limits of private property, and which do not develop into or constitute a nuisance, or a public health hazard, or a menace to fish and wildlife, shall not be considered to be “waters of the state” under this definition (Section 19-5-102).” In addition, for purposes of issuing Water Rights, all ground and surface water is owned by the State.
Vermont	100% of waters (as defined in Sec 10-37-902)	(Section 10-37-902) "Waters" means any and all rivers, streams, brooks, creeks, lakes, ponds or stored water, and groundwaters, excluding municipal and farm water supplies. Source: http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=10&Chapter=037&Section=00902
Virginia	100%	(§ 62.1-44.3) "State waters" means all water, on the surface and under the ground, wholly or partially within or bordering the Commonwealth or within its jurisdiction, including wetlands. Such waters are a natural resource which should be regulated by the Commonwealth. "Wetlands" means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. http://leg1.state.va.us/000/cod/TOC6201000.HTM
Washington State	100%	RCW 90.48.020. “Waters of the State shall be construed to include all lakes, rivers, ponds, streams, inland waters, salt waters and all other surface waters and watercourses within the jurisdiction of the State of Washington”
West Virginia	100%	West Virginia State Code Chapter 22: (23) “water resources,” “water,” or “waters” mean any and all water on or beneath the surface of the ground, whether percolating, standing, diffused or flowing, wholly or partially within this state and within its jurisdiction, and includes, without limiting the

		generality of the foregoing, natural or artificial lakes, rivers, streams, creeks, branches, brooks, ponds (except farm ponds, industrial settling basins and ponds and water treatment facilities), impounding reservoirs, springs, wells, watercourses and wetlands.”
Wisconsin	100%	Wisconsin Statutes (Sec. 281.01-18) : “Waters of the State” includes those portions of Lake Michigan and Lake Superior within the boundaries of this state, and all lakes, rivers, streams, springs, ponds, wells, impounding reservoirs, marshes, watercourses, drainage systems and other surface water or groundwater, natural or artificial, public or private within this state or its jurisdiction. http://docs.legis.wisconsin.gov/statutes/statutes/281/1/01/18
Wyoming	100%	“Waters of the state” means all surface and groundwater, including waters associated with wetlands, within Wyoming. http://deq.state.wy.us/wqd/WQDRules/Chapter_01.pdf and Section 35-11-103(c)(iv) http://legisweb.state.wy.us/statutes/statutes.aspx?file=titles/Title35/T35CH11.htm

*Illinois: IDWR/OWR requires permits for construction in any waterway exceeding one sq mi in drainage (urban areas) or 10 sq mi (rural) which may impact flooding (upstream or downstream of a project). However, this review is limited to flooding impacts on property and safety *only* and does not consider environmental impacts (termed “natural conditions”) on the non-public streams (i.e. 92% of the statewide stream total).

APPENDIX E: Portion of Streams Subject to Dredge and Full Permitting under Water of the State and Responsible Party for Stream Delineation by State

State	Portion of streams subject to Dredge and Fill Permitting under 'Waters of the State'	Delineation left up to the Corps	Description
Alabama	Up to 100% as determined by Corps regulations	Yes	State has additional role in the coastal zone; Otherwise, Corps responsible for all formal determination. Strong collaborative relationship with the Corps.
Arizona	Unknown	NO	State does own delineation
Arkansas	100%	NO	State looks at Corps JD. However, this is not really pertinent, as all are regulated.
California	100%	NO	If Corps has jurisdiction, yes. If non-federal jurisdiction, then determination is made by water boards using CA delineation (isolated waters)
Colorado	Don't Know	YES	Mostly left up to the Corps; <i>however, state (flows) or county (1041 re habitat and wildlife) can regulate more.</i>
Connecticut	100%	NO	State responsibility. Up to applicant to hire a wetland scientist; state has final say on the delineation.
Delaware	100%	NO	Applicant hires consultant; delineation verified and approved by state
Florida	100%	NO	Responsibility of state water management districts and delegated local governments. Up to applicant to hire a wetland scientist. State has final say on delineation.
Georgia	All perennial and intermittent; some ephemeral	NO	Have authority to go beyond, especially for buffers
Hawaii	100%	NO	State does own delineation
Idaho	100%	NO	Corps does not have a method for stream delineation
Illinois	OWR permits in any waterway 1 sq mi (urban) or 10 sq mi (rural) which may impact flooding upstream or downstream or a project; however, only regulated for flooding, not environmental impacts	PARTIALLY	State Office of Water resources delineated for their program (see left). Results in state only being able to regulate environmental impacts ("natural conditions") in 8% of the state's streams. Corps delineates for 404 program.
Indiana	100%	PARTIALLY	Mostly left to the Corps JD, but will do some related to isolated wetlands etc.
Iowa	100%	YES	Left to the Corps
Kansas	Same % as Waters of the State	NO	Can be done by Corps, KS Wildlife and

			Parks staff, or consultant, using the KS Corps Methodology.
Kentucky	Not provided	PARTIALLY	But can condition the 401 permit
Maine	100%	NO	State does own delineation
Maryland	Vast majority (95-98%)	PARTIALLY	If Corps has done delineation, state relies on it. If not, state does own delineation
Massachusetts	Case-by case basis Some portion that is not regulated Not intermittent streams that are upgradient to wetlands	PARTIALLY	Mostly rely on the Corps, but MA can go beyond
Michigan	100%	NO	Assumed program; Michigan does its own delineation
Minnesota	100%	MOSTLY (at this time)	State delineation recognized by the Corps
Missouri	100%	YES	Left to the Corps
Montana	Unknown (Follow-up: Ask Cops)	YES	Left to the Corps
Nebraska	100%	YES	Left to the Corps
Nevada	Not provided	Not provided	Not provided
New Hampshire	All perennial and intermittent	NO	Rely on NH Program
New Jersey	100%	NO	NJ does its own delineation
New Mexico	20% (Note: 80% of streams in New Mexico are non-regulated, isolated streams)	YES	Corps Permit contains the JD
New York	All that are navigable and/or protected	NO	NY does its own delineation
North Carolina	95-95% - All perennial and intermittent (including isolated streams; ephemeral are not regulated)	NO	DWR may permit above Corps determination
North Dakota	Almost all (Up to 100%)	YES	Collaboration with the Corps, but the Corps makes the decision
Oklahoma	Don't know (Under Corps Jurisdiction)	PARTIALLY	Work from Corps JD and wetland plans, but OK can be more encompassing
Ohio	Up to 100% (dispute over authority to regulate isolated streams)	YES	Left to the Corps
Oregon	All perennial and intermittent; Delineations are only required for wetlands, but maps must include OHW line of other waters, if present. May be field verified by the state.	NO	May go beyond Corps regarding areas that are fish habitat
Pennsylvania	100%	NO	State does delineation

Rhode Island	100%	NO	RI captures more activities in uplands and large paved projects
South Carolina	100%	YES	Left to the Corps
South Dakota	100%	YES	Left to the Corps
Tennessee	Almost all (Except wetland conveyance)	PARTIALLY	Conducted by Corps or a certified professional
Texas	Not sure	YES	Left to the Corps
Utah	100%	NO	State does delineation. PGP40- has exceptions, most notably: tribal lands, impacts to endangered species and cultural impacts. Separate Corps permitting in those instances.
Vermont	100%	NO	State does its own delineation
Virginia	100%	NO	May regulate beyond the Corps; don't require significant nexus. However, some mining exemptions
Washington	100%	NO	State does delineation. Usually consensus, sometimes disagree
West Virginia	100%	PARTIALLY	State usually accepts delineation of the Corps, but state can do delineation of isolated streams with defined bed and bank where an impact is suspected
Wisconsin	100% (except tribal waters)	NO	State makes own determination, but works collaboratively with the Corps; usually make the same call
Wyoming	Don't know	PARTIALLY	Left to the Corps, unless not Waters of the U.S., then state does own delineation

APPENDIX F: Stream Identification Practices by State

State	Identification Practices	Width Measure
Alabama	Get identification information from the Corps or professionals. State uses observations/descriptives only (no formal measurement process)	Use Corps measures
Arizona	Use statewide maps for identifying perennial streams; NDHD maps for identifying intermittent and ephemeral streams (esp. upper reaches). Verify in the field with best professional judgment. Use Surface Water Procedures Manual to identify perennial versus intermittent; use metadata in maps as well.	Average of three measures within a reach
Arkansas	Don't do stream identification. All Waters of the State are regulated; not documented. OHWM used in mining regulations	Top of bank to top of bank if needed
California	Evidence of bed and bank (Hard with aroyos, which fan out)	Ordinary high water mark (standard from Corps)
Colorado	Formal bed and bank; ordinary high water mark	OHW (Corps); bankfull conditions; active channel and buffer
Connecticut	No formal identification protocol. Best professional judgment. If flowing it is a stream. If persists any amount of time beyond a stormwater event, then regulated.	Bank to bank
Delaware	Use Delaware Tech Sheets (created checklist from NC and others) Defined bed and bank Presence of flowing water Hydrophitic vegetation Sinuosity Defined water mark Historic USGS topo maps Current USGS topo maps SWAMP maps (non-title wetlands)	Ordinary High Water Mark (for non-tidal)
Florida	Most landward extent of wetland or edge of surface water. Florida uses its statewide methodology in Chapter 62-340, F.A.C. (ratified by Sec. 373.4211, F.S.) to delineate wetlands and other surface waters, to their landward extent. This does not require identifying that an "other surface water" is a stream, a river, a ditch, or any other particular category of water—but rather whether it exhibits the characteristics of being a wetland or other waterbody. However, certain distinctions are made between streams (perennial and non-	As delineated using 62-340, F.A.C.

	perennial) and “ditches, canals, and other conveyances,” as defined in Rule 62-302.200, F.A.C., solely for purposes of determining which waters will be subject to application of numeric nutrient criteria.	
Georgia	Beginning of headcut Hydric indicators Indicators of groundwater Wrested vegetation Listed in state waters guidance	Horizontally back from edge where vegetation starts (instead of top of bank to top of bank)
Hawaii	All waters of the state are regulated	-
Idaho	The Waterbody Identification System (WBID) used from ID DEQ’s Waster Body Assessment Guidance to determine if it is a river or stream (incl. stream order, average width and average depth at base flow. Rated and given overall score to make determination.	-
Illinois	Corps makes determinations Currently have interagency team working to establish an Illinois Stream Mitigation Methodology (will be consistent across all Illinois, except Chicago USACE District – which has developed its own methodology)	TBD
Indiana	Defined bed and bank (Corps)	Ordinary high water mark (Corps)
Iowa	Defined bed and bank, evidence of flow and uses. Summarized in Use Assessment/Use Attainment Analysis Document . NHD Data. Warm Water, Cold Water, and Recreational Use Sampling Protocol Guidance document .	Cross-section measurements at each location
Kansas	Above groundwater Flow during runoff events Bed and bank Best professional judgment Use Corps Guidance and NHD maps	Bank to bank Bankfull flow
Kentucky	Where bed becomes well-defined (not just holding surface waters) Use Corps JD procedures	Top of bank to top of bank
Maine	5 state criteria: 1) US topographic blue dotted line; 2) Continuous flow for more than 2 months; 3) scoured channel bed – this is primary; 4) aquatic animals, and/or 5) aquatic vegetation. Requirements spelled out in more detail in the regulations	<i>Normal</i> high water mark
Maryland	Best professional judgment (BPJ) Aerial photography	Top of bank to top of bank

	Field indicators <ul style="list-style-type: none"> - Bed and bank - Sinuosity - Channel - Hydric soils - Macroinvertebrates 	
Massachusetts	Presence of channel Incising/cutting Streambed	
Michigan	Definite bank, a bed and visible evidence of a continued flow or continued occurrence of water	OHWM or bankfull width
Minnesota	Overlays of HUC as guide	N/A (don't need)
Missouri	Only use maps - Mostly 1930s NHD maps based on confluences	NHD maps
Montana	Have identification criteria with a specific field-based protocol tied to the TMDL process	Tied to the TMDL process
Nebraska	Identification is left up to the Corps (includes using NWI, field checks, etc.)	Left up to Corps
Nevada	Best Professional Judgment	Best Professional Judgment
New Hampshire	Scour Sediment transport Stream channel Watershed sides No manual	Data sheet in the NH Stream Assessment Protocol
New Jersey	Look first at drainage area to see if it is at least 50 acres. If does not meet this criteria, then look for: <ol style="list-style-type: none"> 1) Presence of bed and bank (aka discernible channel) 2) Naturally occurring feature If these two things are absent, the feature is not regulated NJ Draft Technical Manual	Top of bank to top of bank
New Mexico	Look at minimum flow requirement (>5cfs during storm event). Others may include: Visual, OHWM, bed and bank, slope/gradient, watershed divide, upgradient of spring	Determined with tape measure/visually or pacing distance
New York	Generally use high water marks and bankfull dimension.	Not relevant, as NY does not regulate this way-track until no longer perennial flow (don't flow anymore).
North Carolina	Points in methodology that includes geomorphology, biology, hydrology NC Stream Identification Methodology (4.11)	
North Dakota	Use EPA RF3 files	???

	Use building indexes Best professional judgment - Whether or not a streambed No written guidance	
Ohio	Use Primary Headquarter Habitat Assessment Protocol (required criteria and sampling protocol). Requires every applicant to conduct a Use Attainability Analysis (but it is tailored for larger streams and has some sampling requirements that don't work for smaller streams). Regulated by policy, not law.	Included in Protocol?
Oklahoma	Best professional judgment Do not have any definitions, protocols or guidance <i>Note from Mapping perspective (Marla project): Many streams have moved since last mapped</i>	No specific measures
Oregon	Ordinary high water mark, determined by direct observation of the annual high water event, by using local gauge data to estimate bankfull stage and/or by using readily identifiable field indicators. Determination documented; effort made to verify this documentation	??
Pennsylvania	Bed and bank with a bottom and vertical surfaces Required to include map information in permit applications May or may not verify with field visit FEMA Floodplain maps	Channel width (Top of bank to top of bank) Ordinary low water mark for submerged lands.
Rhode Island	Evidence of frequent flow (moss covered rocks, aquatic habitat) Banks Scoured channel Aerial maps USGS topographical maps NRCS Soil Classification maps Longitudinal flow data	Measure scoured edge (scour marks and water marks on rocks and trees). Width averaged over minimum five measurements through project/property area.
South Carolina	Corps does identification.	Charleston District Corps does width measurements, which are based on the OHWM
South Dakota	Best Professional Judgment NHD Maps –look at names streams only (historically named) Bed and bank Presence of water Employ Use Attainability Analysis	Best Professional Judgment
Tennessee	Use Best Professional Judgment Using official standardized forms (a formal, definitive process)	Top of bank to top of bank

	<ul style="list-style-type: none"> - Eruption of a spring - Well-defined channel - Also look at aerial context 	
Texas	<p>For water quality certification, Corps does identification.</p> <p>For wastewater permitting, typically involves desktop evaluation - all maps (USGS, aerial, etc.) unless requirement for a use characterization, in which case, a biological and physical habitat assessment is done.</p>	<p>Wetted width</p> <p>Top of bank to top of bank</p>
Utah	<p>Best Professional Judgment</p> <p>Erosional bed and bank</p> <p>Any kind of associated bed load</p> <p>If it has a ecosystem</p> <p>Vegetation, erosion</p>	<p>Bankfull elevation/width (not the Corps OHWM – which is not as encompassing and “meaningful” as bankfull elevation.</p> <p>More than just wetted width → Riparian corridor or flood-prone area or 2 x bankfull (max 30 feet)</p>
Vermont	<p>Use Vermont Technical Guidance on Perennial Stream Identification (2011) which includes:</p> <ul style="list-style-type: none"> - Fluvial geomorphic processes - Defined channel - Indicators of topography - Bed and bank - Evidence of flow 	<p>Geomorphic cross-section of the stream (design oriented)</p> <p>Breaks in slope associated with bankfull high flow on an annual basis</p>
Virginia	<p>Use Best Professional Judgment</p> <p>Look at:</p> <ul style="list-style-type: none"> - Bed and bank - Ordinary high water mark - Signs of flow <p>Rely on Corps determination using ‘87 Manual</p>	<p>OHWM-OHWM</p>
Washington State	<p>All physicals</p> <p>Defined channel</p> <p>Maps</p> <ul style="list-style-type: none"> -Water typing maps - Predevelopment maps to determine if it really was a stream - Stream catalogs from the 1940s and 1950s <p>http://www.ecy.wa.gov/biblio/0806001.html</p>	<p>Not relevant</p> <p>Standards are tied to bankfull width</p> <p>Area below high water line (practice, not a rule)</p>
West Virginia	<p>Defined bed and bank</p> <p>Best Professional Judgment</p>	<p>Defined bed and bank</p> <p>Best Professional Judgment</p>
Wisconsin	<p>Identify navigable waters with a standardized administrative procedure</p> <p>Bed and bank</p>	<p>Not provided</p>

	Size, flow Topographic maps Current USGS maps 24k hydro GIS layer (seeking to develop standardized procedure to add information to GIS maps as identifications are completed) If disputed, try in a canoe	
Wyoming	Best Professional Judgment Bed and bank NHD dataset Field identification	Bankfull to bankfull

APPENDIX G: Whether and How State Delineation Differs from the Federal JD by State

State	Yes/No	Same or Different from Corps JD	How Differ
Alabama	NO	SAME	Authorized state, but don't tend to regulate more than the Corps. Very collaborative relationship with the Corps. Alabama coastal zone exceptions.
Arizona	YES	ADDITIONS	Some more ephemeral streams
Arkansas	YES	ADDITIONS	Mostly the same as Corps, but the state can regulate more than bed and bank/OHWM with surface runoff
California	NO	ADDITIONS	Except that CA has 2 supplementals for arid areas (southern CA) and inner mountain areas
Colorado	YES	ADDITIONS	More regulated due to impacts to fish and wildlife; depletion of flows and 1041 county controls
Connecticut	YES	ADDITIONS	Much broader reach than Corps; Ephemeral often quality under state's intermittent definition and are regulated
Delaware	YES	SUBTRACTIONS	Mostly pretty close, but sometimes a little less than the Corps JD
Florida	YES	ADDITIONS	Regulate adjacent areas, isolated wetlands, and waters, and, in general, all other surface waters, using the state methodology in Ch. 62-430, F.A.C.
Georgia	YES	ADDITIONS	State jurisdiction further upstream
Hawaii	YES	ADDITIONS	State can regulate more than bed and bank and HWM
Idaho	N/A	N/A	Corps does not have a stream identification and delineation method
Illinois	NO*	SAME*	*Chicago USACE District has more stringent JD than the Corps districts across the state
Indiana	NO	SAME	N/A
Iowa	NO	SAME	State has own designation procedures to designate streams to protect their uses. However, state's designated use rules are consistent with Clean Water Act requirements.

Kansas	NO	SAME	N/A
Kentucky	NO	SAME	N/A
Maine	YES	ADDITIONS	Might go beyond Corps but potentially Corps would do more than state as well. Maine's Natural Resources Act gives at least 75 foot adjacent area.
Maryland	YES	SAME/ SUBTRACTIONS	Federal sometimes takes more than the state of MD would (some ephemeral that state would not)
Massachusetts	YES	ADDITIONS	Regulate streambank and waterfront areas, some buffers
Michigan	NO	CONSISTENT	Consistent with federal JD
Minnesota	YES	ADDITIONS	Can be more inclusive than Waters of the U.S. with 401 certification
Missouri	YES	SAME (Mostly)	More consistent than the Corps, because have one set of requirements, while the multiple Corps districts are not always consistent
Montana	YES	ADDITIONS	More inclusive than the Corps. Corps = bed and bank; Montana adds anything else that is a drainageway (if runs from point A to point B, it is under state jurisdiction.
Nebraska	YES	ADDITIONS	Generally same (stick with Corps JD if delineation has been done, but can go further up if the state does the delineation). Some more ephemeral on a case-by-case basis. Recommendations though letters of opinion.
Nevada	Did not provide	Did not provide	Did not provide
New Hampshire	NO	SAME	<i>Check interview recording; have own permitting program</i>
New Jersey	YES	ADDITIONS	Broader than Corps jurisdiction
New Mexico	NO	SAME	N/A
New York	YES	ADDITIONS	Some smaller, first order/headwater streams are regulated by the State that are not regulated by the Corps
North Carolina	YES	ADDITIONS	USACE only looks at OHWM. State may take jurisdiction a little further up than Corps
North Dakota	YES	SAME?	N/A (check: Regulate quite a few ephemeral under Class III waters)
Ohio	NO	SAME	N/A
Oklahoma	YES	ADDITIONS	More encompassing than the Corps, though they do work from the Corps' JD and wetland plans

Oregon	YES	ADDITIONS/ SUBTRACTIONS	Both use OHW Mark. The Corps may regulate ephemeral streams and manmade areas
Pennsylvania	YES	ADDITIONS	Do not require significant nexus
Rhode Island	YES	ADDITIONS	Includes buffers; Corps doesn't include any buffer
South Carolina	NO	SAME	No authority beyond the Corps
South Dakota	YES	ADDITIONS	Only require bed and bank, not OHWM (more covered)
Tennessee	NO	SAME (Not more than Corps JD)	TN concerned with presence/absence of water. What happens in ephemeral streams is seen as important to water quality.
Texas	YES	ADDITIONS	Corps stream assessment procedure is less rigorous
Utah	YES	ADDITIONS	Much more inclusive. Work closely with the Corps, but can regulate riparian corridor or flood prone area or 2 x bankfull (max 30 feet). Can regulate trail along stream while Corps cannot.
Vermont	YES	ADDITIONS	Vermont regulates berming above the OHWM
Virginia	DON'T KNOW	DON'T KNOW	Exert own jurisdiction, may be more depending on Corps jurisdiction
Washington State	YES	ADDITIONS OR SUBTRACTIONS	Different (resulting in either more or less). State bases on bed and bank+ vegetation + soils, not just where the waters act upon the bank
West Virginia	YES	ADDITIONS	State is able to regulate isolated stream. Defined bed and bank. Don't require significant nexus.
Wisconsin	YES	ADDITIONS	Looking at more than federal definition of navigable waterways (saw log test)
Wyoming	YES	ADDITIONS	State's definition of Waters of the State is more inclusive

APPENDIX H: Stream Assessment Practices by State

State	Assessment Practices
Alabama	Corps or other professional does assessment Coastal zone has additional state involvement
Arkansas	State uses water quality and biology – Macroinvertebrates and fish. Corps uses Little Rock District Stream Mitigation Method.
Arizona	Habitat Chemical Macroinvertebrates Physical integrity
California	Starting to use Wetland Rapid Assessment to assess streams Pollutant impairments Looking into biological criteria Biocriteria (e.g. stream flies)
Colorado	Ad hoc basis to date Working on functional assessment Volunteer adoption in 2014; Beta release planned for 2015
Connecticut	No formal process Rely heavily on aquatic surveys – stream biological information Water quality Habitat functions Erosion resistance
Delaware	More biological focus than structural Aquatic habitat Water quality Fish shocking Macroinvertebrate netting
Florida	If water quality is impaired, must have specific methodology improve water quality. Otherwise use ERP rules to determine the functions provided by the system and what impacts needs to be reduced Use: Stream Bio Index Unified Stream Assessment Methodology
Georgia	Physical channel Chemical Macroinvertebrates Biotic Fish habitat Use Field Guide for Determining the Presence of State Waters that Require a Buffer for the their assessment guidance
Hawaii	The state water code shall be liberally interpreted to obtain maximum beneficial use of the waters of the State for purposes such as domestic uses, aquaculture uses, irrigation and other agricultural uses, power development, and commercial and industrial uses. However, adequate provision shall be made for the protection of traditional and customary Hawaiian rights, the

	protection and procreation of fish and wildlife, the maintenance of proper ecological balance and scenic beauty, and the preservation and enhancement of waters of the State for municipal uses, public recreation, public water supply, agriculture, and navigation. Such objectives are declared to be in the public interest
Idaho	Identify using Idaho River Ecological Assessment Framework , Idaho Small Stream Ecological Assessment Framework and Beneficial Uses Reconnaissance Program in conjunction with DEQ's Water Body Assessment Guidance , which looks at 3 indices: 1) macroinvertebrates, 2) fish, and 3) habitat. Diatoms, bacteria, physical habitat characteristics and chemistry are also used to determine stream condition.
Illinois	Strong suit for Illinois (since 1980's) IEPA and IDNR cooperatively sample streams (sampling rotation by watershed – in 5 year cycle); looking at ecological integrity Assessment is based on: Biota (fish, mussels and macroinvertebrates) Physical habitat Water Quality Sediment quality IEPA then uses " Use Attainment Methodology " to rate stream segments relative to designated uses in IL EPA Field Methods Manual IDNR assigns a Biological Stream Rating , (biotic integrity) based on fish, mussel and macroinvertebrate data. Also use stream Index of Biological Integrity (IBI) – a tool to interpret a fish sample to determine the degree of naturalness and impacts. Also use LTRM and LTEF monitoring protocols in IL "Great Rivers"
Iowa	Corps currently site-by-site, using best professional judgment. Working towards the development of an Iowa Assessment Method. Will include habitat, water quality, and stream structure. Was using a Stream Visual Assessment Procedure (SVAP) but found it too intensive. UAA following sampling protocols ; generate a UAA that goes through state rulemaking and EPA approval
Indiana	Use several different assessment methods (none formally adopted), including - QHEI - Ohio Assessment method Mostly Best Professional Judgment (BPJ) Specifically interested in: - Canopy - Meanders - Pool-ripple complexes - Grassed areas
Kansas	Use Attainability Assessment is conducts

	Rotating biological community assessment, endangered species Chemical (Functional assessment is mostly only used in wetlands)
Kentucky	Habitat Water quality Flow regime Stream Structure Conductivity (in E. Kentucky) Rapid Bio Assessment RBP Sheet
Maine	Water quality classification assessment Habitat Do not use physical characteristics Less assessment is conducted in Class C streams than in Class A streams
Maryland	Water quality (use classes – differentiate by high and low quality) Trout as key species (Interested in adopting a rapid assessment method)
Massachusetts	Wildlife habitat – Primary Bank Land under water Physical stability Groundwater and surface water quality Water carrying capacity (less often)
Michigan	Habitat Biological Water quality Stream Structure Hydrological Formal practices currently under development
Minnesota	Intense monitoring of fish and bugs Effluent limits Habitat Chemistry Adopting nitrate standards
Missouri	Based on the Missouri Stream Mitigation Method (2013) Determine type of stream, level of functionality – but conduct conditional, not functional assessment Based on observations
Montana	Look at sediment, macroinvertebrates and functions in general Formal assessment through TMDL process Have strong wetland functional assessment; want the same for streams (thinking about basing it on the SMP from NC)
Nebraska	Use Nebraska Stream Assessment and Mitigation Procedure, which includes a calculations spreadsheet (NeSCAP CalcBook). Includes hydraulic conveyance and sediment dynamics, in-stream habitat, available cover, flood plan zone.

Nevada	Information not provided
New Hampshire	No specific criteria –Look to see what the restoration is targeting and look for those improvements Examples include: Flow, conductivity, aquatic organisms, and erosivity (for applications and restorations)
New Jersey	Habitat (especially endangered species habitat) Water quality category
New Mexico	Water quality (both grab and long-term indicators) Biological indicators when water quality indicators suggest impairment (benthic macroinvertebrates, fish, nutrients, physical habitat, riparian health and fish tissue)
New York	Case-by-case using best professional judgment Site visit Habitat Water quality Overhead cover Complex structures Temperature Settleable solids
North Carolina	Hydrology Habitat Water Quality Use NCSAM Functional Assessment (currently working on NCSAM implementation procedures) Corps Stream Quality Assessment Worksheet
North Dakota	Habitat Water quality Stream structure Invertebrates and fish (using longline shocker)
Ohio	Ohio Use Attainability Assessment Manual 1) Physical habitat features – As an assessment of what the stream is capable of meeting biologically 2) Biological – macroinvertebrates and salamanders. Look at fish in large streams. Place stream in use category. Low mitigation when poor habitat quality and nothing living in it
Oklahoma	Use two different methodologies from other states: - Eastern OK: Missouri Stream Assessment Method - Western OK: Kansas Stream Assessment Method (Would like to develop their own state assessment method)
Oregon	At this time, using Best Professional Judgment (BPJ) Require stream information AND a functional assessment Currently working on Oregon Stream Assessment Methodology , eleven functions grouped into four categories: hydrologic, geomorphologic, biological, and chemical/nutrient assessment

<p>Pennsylvania</p>	<p>Moving to functional assessment</p> <ol style="list-style-type: none"> 1) Hydrologic impacts 2) Biological/ecological impacts 3) Impacts to floodplain/floodway <p>Four documents as part of the assessment process: 3 levels of rapid assessment for riverine, wetland and lacustrine 1 Compensation mitigation guidance document: “Aquatic Resource Function-based Compensation Creates a flexible system that allows for intensification of analysis as needed (can add macro, IBI or HGM). Builds on VA USM method, but architecture is different.</p>
<p>Rhode Island</p>	<p>Habitat Water quality Stream Structure Four primary areas: 1) wildlife, 2) recreational environment, 3) flood management/control, and 4) surface and groundwater quality and protection</p>
<p>South Carolina</p>	<p>Currently use NC assessment tools Habitat Water quality Stream structure Measure linear feet x sum of facts EPA Rapid Bio Assessment feeds into the “existing condition” factor Do macro assessments for other regulatory purposes, such as NPDES and 303d. However, for 41 certifications, the Corps does the assessment. South Carolina is developing assessment tools which are not currently planned to be regulatory tools</p>
<p>South Dakota</p>	<p>Stream surveys Fish, flow All streams provided with a value Functional assessment-based procedure for wetlands, but not really happening with streams</p>
<p>Tennessee</p>	<p>Use Tennessee Use Support Assessment (a tool by WQ that provides stream segment identification and use support information) Don’t currently have good functional assessment, but received an EPA grant to create a functional assessment protocol for the state. May develop MOU with the Corps to use this assessment.</p>
<p>Texas</p>	<p>Functional assessment by the Corps in 404 permitting. For WQ control, have biological (fish and invertebrates) and habitat assessment procedures that result in an aquatic life use rating.</p>

Utah	<p>Have used two types of assessment in the past, but neither have been formally adopted.</p> <p>Follow Utah Code/Administrative Rule to access the following: 1) impair vested water rights, 2) unreasonably or unnecessarily affect any recreational use or the natural stream environment, 3) unreasonably or unnecessarily endanger aquatic wildlife, or 4) unreasonably or unnecessarily diminish the natural channel's ability to conduct high flows.</p>
Vermont	<p>An amalgamation of methodologies</p> <p>Biological monitoring and assessment – fish and macroinvertebrates</p> <p>Stream Geomorphic Assessment</p> <ul style="list-style-type: none"> - How sensitive to changes - Historic degree of alteration - Geomorphic zone <p>Floodplain calculations: look at annual floodplain (1-2 year flood event) – a) active and b) inactive -terraces</p>
Virginia	<p>Physical condition (e.g. channel and stability) serves as a proxy for functions of the stream</p> <p>Do not do additional functional assessment</p>
Washington	<p>Best Professional Judgment</p> <p>Water quality (esp. TMDL parameters)</p> <p>Geomorphology</p> <p>Habitat</p> <p>Riparian tool for uplands</p>
West Virginia	<p>West Virginia Stream and Wetland Valuation Metric</p> <p>Utilizes the Corp's High Gradient Ephemeral HGM Model (when appropriate), EPA's rapid bio assessment, water quality measures, and WV Stream Condition Index (benthos)</p> <p>Version 2.1 is just released but not formally adopted (added extended buffer preservation; next step is wetlands)</p>
Wisconsin	<p>Habitat</p> <p>Fisheries</p> <p>Water Quality</p> <p>Ambient monitoring</p> <p>Additional targeted monitoring and assessment for project-based/TMDL or specific resources</p>
Wyoming	<p>Wyoming Stream Biological Assessment Models (Multimetric and RIVPACS); Use varied assessment methods, depending on objectives.</p>

APPENDIX I: Stream Mitigation Program/Practice Characteristics by State

State	State Program	Detail	Relationship with Corps/IRT	Same or Different by Type of Stream	Requirements for In-kind Mitigation
Alabama	NO – Corps	Corps runs the mitigation program, though the state is very involved in the coastal zone	Work through the Corps and IRT	Formally Different (through Corps)	Corps combines BPJ with documentation to match impacts with stream characteristics; specific state coastal zone requirements
Arizona	NO - Corps	Corps runs mitigation	In rare cases, state adds to the corps	Unknown	Unknown
Arkansas	INTERAGENCY	Interagency approach. Work through IRT and Corps. Issue joint public notice. Case-by-case basis. State conditions approximately 25% of permits (mostly BMP or SW-related)	Work with Corps and District in interagency program. Don't add much to what the Corps requires	Informally Different	Type of stream Level of impact
California	INTERAGENCY	State and Corps both use Corps Mitigation Ratio tools (in beta testing phase) to independently arrive at ratios and compare	Work largely through the IRT	Informally Different	No formal requirements. Try to do in-kind (stream for stream) and ideally within the same watershed.
Colorado	NO But State Practices	In process of adopting. Have state guidelines and protocols, but no formal stream mitigation program	Work largely through the Corps	Informally Different	Same for in-kind, but sometimes out-of-kind has a better result
Connecticut	NO But State Practices	State has informal practices	State does any mitigation, but there is not a formal program	Informally different	Case-by-case. More protective of small streams, native brook trout streams and warm water fisheries

Delaware	NO But State Practices	State has informal practices	Work closely with the Corps on a case-by-case basis	Informally different	Case-by-case
Florida	YES	Work independently. Use USAM (Florida's Unified Stream Assessment Methodology)		Informally Different	Nothing required by type; but higher value = higher mitigation cost
Georgia	YES	Add to 401 certification Use: Mitigation Guidance Field Guide for Determining the Presence of State Waters that Require a Buffer	Work through IRT; Conversation with Corps re SOPs	Formally Different	Differentiate by presence of trout/no trout. Also closeness by 8 HUC code
Hawaii	INTERAG ENCY	Only if federal nexus	N/A	N/A	N/A
Indiana	NO But State Practices	Indiana usually takes the lead and works with the applicant on mitigation, but it is not formalized into a stream mitigation program	Indiana does the mitigation coordination, the Corps provides little additional	Informally different	Same type of stream, like for like as rule of thumb, occasionally forced into out of kind due to extent of degradation
Idaho	NO – Corps	Done by the Corps	Work through the Corps	Unknown	Mitigation of streams is not required by the Corps, though very rare cases see losses of linear feet.
Illinois	NO - Corps	Corps responsible for mitigation (forthcoming Illinois Stream Mitigation Methodology). ISMM matrix will allow doc that can stand up in court – uniform and widely accepted.	Corps responsible; 5 districts; will be using ISMM	Soon to be formally different	ISMM will include different restoration levels (floodplain, riparian, in-stream) depending on impacts.
Iowa	NO - Corps	Work through Corps and IRT	Corps/IRT runs stream mitigation	Formally different	Use Missouri Method, in process of developing own
Kansas	Mostly Corps, but state practices for ES	Largely through the IRT and Corps; if the project impacts threatened and endangered species critical habitat, then	Corps/IRT primarily, but disagree all the time	Informally different	WQ/WQ Classification, Species present

	habitat	applicant must meet state mitigation requirements outside of Corps requirements. Coordination is attempted, but Corps mitigation does not always satisfy state requirements. State comments on other Corps mitigation work via public comment.			
Kentucky	YES	Working on new SOPs	Heavily involved with IRT and Corps Districts	Formally Different	Different by perennial (1.5:1+); intermittent (1:1) and Ephemeral (0.5:1)
Maryland	NO - Corps	Corps does this	Corps is primary. Work closely with the Corps, In some cases, state has required more.	Informally Different	Mostly stream for streams but not always. No requirement for matching types
Massachusetts	YES	Coprs relies on the state a lot. Corps is working towards an in lieu fee program.		No Difference	Same requirements regardless of type.
Michigan	YES	<i>Assumed State</i> Equivalent process to IRT; Lots under development	Work closely with the Corps, but not IRT; equivalent process	No Difference	Requirement for in-kind mitigation
Minnesota	YES (limited, but developing more encompassing program)	State is developing a more complete stream mitigation program	State working collaboratively with the Corps on select activities and consider additional	Informally Different	In-kind type and amount; No formal ratios. Cannot remove the use of a stream.
Missouri	INTERAGENCY	Missouri has an interagency mitigation arrangement; with the Corps in charge of the method. Both calculate and compare	Interagency process; at times do disagree and recalculate	Formally Different	Different for “losing streams”

Montana	INTERAGENCY	Interagency program. Work largely through Corps and IRT. No single agency in MT has the resources, so they all have to cooperate to have mitigation at all.	Largely through Corps and IRT, but state can add	Informally Different	Classified Streams Outstanding Water resource Degradation-related policy differences
Nebraska	NO - Corps	Work through the Corps. Corp-driven, but the state is a partner.	State weighs in on the IRT	No Difference	1:1
Nevada	NO - Corps	Mitigation done by Corps	U/K	No info provided	No information Provided
New Hampshire	YES	Use Chapter 900 as guidance plus some others	Work closely with the Corps, EPA and IRT	Informally different	No specific guidance, but do informally look at size, special resource value, tier
New Mexico	NO – But state currently developing practices	State is in the process of developing practices. Currently work through Corps District and combined 404/401 process. State adds to the Corps, mainly focusing on WQ-related mitigation additions	Work closely with the Corps	Informally Different	Aspire to achieve in-kind; stream for stream; in-stream match if possible. <i>NOTE: Stream buffers=wetlands and are mitigated as wetlands, not streams</i>
New Jersey	YES	<i>Assumed State</i> Stream work done on their own. Have a draft SOP for Riparian Work (informal).	Since Assumed, does not work with Corps/IRT except in non-assumed waters	Informally different	Habitat type
New York	NO – Authority, but not doing	No formal program or method. Hands-off; not prohibited, but not doing it. Focus on avoidance and minimization.	Corps has a draft plan, but no stream mitigation is formally done by state or Corps	N/A	N/A
North Carolina	YES	Use NC Stream Mitigation Guidelines (which includes a methodology, crediting guidance, etc.)	Work closely with Corps and IRT	Informally different	Generally within 2 stream orders, but not strict where work is done; Ditches are often mitigated through wetlands, while altered/modified streams are mitigated through stream work.

North Dakota	NO – Corps	Defer to Corps	Defer to Corps	Informally Different	Corps is flexible – if an applicant has a good idea, likely to consider it
Ohio	NO But State Practices	Informal practices by the state. Tried to put out a comprehensive Ohio Mitigation Rule, but was not successful. Currently mitigate on a case-by-case basis	State does any mitigation work	Informally Different	All mitigation is done on a case-by-case basis
Oklahoma	NO – Work with the Corps	Don't have state program; Work with the Corps. Corps may do less than the state wants	May have disagreements with the Corps on what should be mitigated	Informally Different	No requirement for matching. Generally stream for stream; sometimes not balanced.
Oregon	YES	Case by case basis by the state. Mitigation is to be commensurate with impacts Guidance on function and value evaluation	Work closely with the Corps and IRT	Informally different	Rely on Wetland Rules and Removal and Fill Guide . Mitigation must occur within the same watershed.
Pennsylvania	YES	State runs a formal mitigation program	State has MOUs with three Corps districts. State takes a more comprehensive approach	Formally Different	Differentiate between stream type, in-stream habitat etc. Coming out with function-based process in 2014-2015.
Rhode Island	NO	So few projects, RI has no formal mitigation program. Strong focus on avoidance and minimization. Don't want formal program (concerned about unintended consequence of encouraging impacts)	Work with the IRT	Informally Different	Everything taken into consideration, but no specific guidance
South Carolina	NO	Rely on the Corps. Corps uses Charleston District guidelines	Defer to the corps. In rare instances state will recommend different SOP mitigation based on the State's interpretation of the mitigation	Formally Different	The Corps' Charleston District has a mitigation SOP that requires in-kind mitigation based on permanence (RPW, etc.) and stream order.

South Dakota	NO	Rely on the Corps (Omaha and Minnesota Districts)	Rely on the Corps	Formally Different	Corps has function-based procedures
Tennessee	YES	Use 2004 Stream Mitigation Guidelines; revising document (expected 2015). Will include new functional assessment.	Work with the IRT	Formally Different	Mitigation must be in-system. Do not differentiate by stream shape, size, etc. but do for WQ (tiers, impaired)
Texas	NO	Work largely through the Corps/IRT	Run through Corps/IRT, but state can comment (not a separate state process)	Formally Different	Focus on replacing functions and values. Moving away from mitigation ratios to function-based.
Utah	NO	Corps provides mitigation	Corps provides mitigation	No Difference	Corps does not require different actions. Don't have a good mechanism and no requirements for mitigation of riparian, other than onsite BMPs and permit-specific impact minimization conditions
Virginia	YES	Use Unified Stream Methodology (USM).	Serve on IRT with the Corps	No Difference	Same for perennial and intermittent, but ephemeral is assessed differently. The mitigation process is the same for all streams.
Vermont	NO	Vermont does not have a mitigation program. Instead they focus on moving permittees towards equilibrium	N/A	N/A	N/A
Washington	YES	State runs mitigation program	State does any mitigation work; work closely with the Corps.	Informally Different	Case-by-case Water quality functions Temporal impacts
West Virginia	YES	DEP has a mitigation program	State does any mitigation work	Formally Different	Function-based, focused on the quality of the impacted resource

Wisconsin	NO	No stream mitigation happening in state, except new program for metallic mining	State just starting to do metallic mining stream mitigation	N/A	N/A
Wyoming	No	Work through the Corps/IRT for WUS. For non-WUS, state has its own general permit for discharges to isolated waters- which requires mitigation when losses exceed 1-acre.	Work through Corp/IRT	Unknown	Unknown

APPENDIX J: Available Mitigation Options by State

Alabama

Mitigation Option	Wetlands	Streams
Mitigation Banks*	YES	YES
In Lieu Fee Programs	NO	NO
Permittee Responsible**	YES	YES

Comments:

* There are several mitigation banks across the state.

**Permittee responsible unless through mitigation bank.

Arizona

No information provided

Arkansas

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	YES
In Lieu Fee Programs	-	-
Permittee Responsible*	YES	YES

Comments:

* Arkansas allows both onsite and offsite permittee responsible mitigation

California

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	YES (few)
In Lieu Fee Programs	YES	YES
Permittee Responsible**	YES	YES

Colorado

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	YES*
In Lieu Fee Programs	-	-
Permittee Responsible**	YES	YES

Comments:

* There is one mitigation bank with stream credits in Colorado; others are being proposed

**Both on-site and off-site permittee responsible mitigation is allowed.

Connecticut

Mitigation Option	Wetlands	Streams
Mitigation Banks	-	-
In Lieu Fee Programs*	-	-
Permittee Responsible**	YES	YES

Comments:

* Corps is exploring developing and in lieu fee program. State is barred from developing an ILF.

**Allow both onsite and offsite permittee responsible mitigation.

Delaware

Mitigation Option	Wetlands	Streams
Mitigation Banks*	-	-
In Lieu Fee Programs	-	-
Permittee Responsible**	YES	YES

Comments:

* Considering establishing mitigation banks

**Try to do onsite, but allow offsite if project better outcomes

Florida

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	YES
In Lieu Fee Programs	YES	Few
Permittee Responsible	YES*	YES*

Comments:

*Florida allows both onsite and offsite permittee responsible mitigation.

Georgia

Mitigation Option	Wetlands	Streams
Mitigation Banks (~100 banks)	YES	YES
In Lieu Fee Programs	Phasing Out	Phasing Out
Permittee Responsible	Only Grandfathered Projects	Only Grandfathered Projects

Hawaii*

Mitigation Option	Wetlands	Streams
Mitigation Banks	-	YES
In Lieu Fee Programs	-	YES
Permittee Responsible	YES	YES

Comment:

*Only if Federal Nexus

Idaho

Mitigation Option	Wetlands	Streams*
Mitigation Bank	YES	-
In Lieu Fee Program	YES	-
Permittee Responsible	Limited	-

Comment:

* There are no stream mitigation options available for streams. Most stream impacts are to wetlands in Idaho. Most streams are currently left untouched.

Illinois

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	Forthcoming
In Lieu Fee Programs*	-	-
Permittee Responsible	YES	YES

Comments:

* Do not advocate for in lieu fee program, as there is the perception that this does not achieve “no net loss.”

Indiana

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	YES (rare)
In Lieu Fee Programs*	(Late 2014)	(Late 2014)
Permittee Responsible	YES	YES

Comments:

* Indiana is developing an in lieu fee program now, but it will be the last resort for stream mitigation, as it will be offsite and out-of-kind.

Iowa

Mitigation Option	Wetlands	Streams
Mitigation Bank	YES	_*
In Lieu Fee Programs**	-	-
Permittee Responsible**	YES	YES

Comments:

* Iowa would like to create stream mitigation banks, but waiting for finalization of the new assessment method to determine need.

**Both on-site and off-site permittee responsible mitigation is allowed.

Kansas

Mitigation Option	Wetlands	Streams
Mitigation Banks*	YES	YES
In Lieu Fee Programs**	AWAITING RENEWAL	YES
Permittee Responsible***	YES	YES

Comments:

* Corps prefers the use of the mitigation banks

** The wetland program is awaiting renewal, but the stream ILF has been approved with a land trust. Have a hard time getting permittees to participate; state regulators prefer the in lieu fee program, because can focus restoration where it is needed and offers more flexibility than banking option

*** Lots of transportation projects; moving more to the other two options

Kentucky

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	YES
In Lieu Fee Programs	YES	YES
Permittee Responsible	YES	YES

Comments: There is an intensive new process conducted by the IRT prior to application submittal. Topics such as financial assurances, site selection and service area play a large role in IRT approval of approved banks. Kentucky’s Transportation Cabinet has its own mitigation bank.

Maine

Mitigation Option	Wetlands	Streams
Mitigation Banks*	-	-
In Lieu Fee Programs	YES	YES
Permittee Responsible	YES	YES

Comments

* There are no real mitigation banks in Maine, although Maine DOT does have something similar to a mitigation bank for its use exclusively.

Maryland

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES*	-**
In Lieu Fee Programs	YES	-
Permittee Responsible	YES**	YES**

Comments:

* Only few mitigation banks for wetlands; Stream mitigation banks have been proposed, but have issues

*Most is permittee responsible mitigation; considered most expeditious and easiest

Massachusetts

Mitigation Option	Wetlands	Streams
Mitigation Banks	-	-
In Lieu Fee Programs	-	-
Permittee Responsible	YES	YES

Michigan

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	-
In Lieu Fee Programs	-	-
Permittee Responsible	YES	YES*

Comments:

*Onsite permittee responsible is the only option for stream mitigation in Michigan.

Minnesota

Mitigation Option	Wetlands	Streams**
Mitigation Banks	YES	-
In Lieu Fee Programs	YES*	-
Permittee Responsible	YES	-

Comments:

*Minnesota does not have a stream mitigation program yet and, consequently, does not offer any formal mitigation options. However, there are ad hoc practices.

**Wetland in lieu fee payments generally are paid into dam removal projects in Minnesota at this time.

Missouri

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES*	YES*
In Lieu Fee Programs	-	YES**
Permittee Responsible	YES	YES

Comments:

* Wetland banks are mostly in and around cities; utilize EDU (ecological designated unit)

** Not available for 2/3 of the state

***Primary option for outer areas

Montana

Mitigation Option	Wetlands	Streams
Mitigation Banks*	YES	YES
In Lieu Fee Programs**	YES	YES
Permittee Responsible	YES	YES

Comments:

*Montana currently has 2-3 mitigation banks, but has 2-4 in the process of approval; most are through one entrepreneur (EcoAsset management, David Patrick). They have been in place about 2 years. They are being monitored, but timeline makes it so they cannot yet be evaluated for success (5 years+).

**Montana has a new ILF program (new in the last few months). The ILF is called "Montana Aquatic Services" (MARS Contact is Pat Byorth).

Nebraska

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES*	YES*
In Lieu Fee Programs	-	-
Permittee Responsible	YES**	YES**

Comments:

* DOT likes wetland banks; IRT weighs in on wetland bank sites, etc. Relatively extensive program.

**Most of the work is done as onsite permittee responsible mitigation

Nevada

No information provided

New Hampshire

Mitigation Option	Wetlands	Streams
Mitigation Banks	-	-
In Lieu Fee Programs*	YES	YES
Permittee Responsible	YES	YES

Comments: New Hampshire’s program that requests communities identify their top 10 culvert issues. Then fees are used to address those issues based on community priorities (popular).

New Jersey

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	-
In Lieu Fee Programs	YES	-
Permittee Responsible	YES	YES

Comments: New Jersey is very interested in doing riparian banking. This is currently being put into bank information on an informal basis.

New Mexico

Mitigation Option	Wetlands	Streams
Mitigation Banks*	-	-
In Lieu Fee Programs*	-	-
Permittee Responsible**	YES	YES

Comments:

* New Mexico is very big and rural. Consequently, they have not been able to find sponsors for either mitigation banks or in lieu fee programs, as there is not enough demand for mitigation efforts in one watershed.

**They prefer onsite mitigation, but entertain some offsite permittee responsible work within the same watershed.

New York

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	-
In Lieu Fee Programs	YES	-
Permittee Responsible	YES	-

Comments: New York does not allow stream mitigation. Allow wetland mitigation, but concerned that this is simply a shifting of resource value between locations. Wetland mitigation promoted in-kind, in-place mitigation. If it is a protected stream, NY has jurisdiction over 50ft of stream buffer for the protected stream.

North Carolina

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	YES
In Lieu Fee Programs	YES*	YES*
Permittee Responsible	YES**	YES**

Comments:

*In lieu fee only allowed if there is not a bank in the area.

**Corps gives the option of doing their own, but most don't want to do it themselves.

North Dakota

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	-
In Lieu Fee Programs	?	?
Permittee Responsible	YES	YES

Ohio

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES (many)	Yes (starting)
In Lieu Fee Programs*	SOON	SOON
Permittee Responsible	YES	YES

Comments:

* There are currently three ILF proposals being reviewed.

Oklahoma

Mitigation Option	Wetlands	Streams
Mitigation Banks	_*	_*
Hybrid Mitigation Center	_**	_**
In Lieu Fee Programs*	_***	_***
Permittee Responsible	_****	_****

Comments:

- * There are current proposals for mitigation banks in Oklahoma
- **There is one hybrid mitigation center; includes options for both wetlands and streams
- *** They are working on developing an in lieu fee program (not yet released)
- ****Offer both onsite and offsite permittee responsible options

Oregon

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	YES
In Lieu Fee Programs	YES	-
Permittee Responsible	YES	YES*

Comments:

- * Most of the work for streams is done as permittee responsible mitigation

Pennsylvania

Mitigation Option*	Wetlands	Streams
Mitigation Banks	YES	YES (developing)
In Lieu Fee Programs**	YES	YES
Permittee Responsible	YES	YES

Comments:

- *State has a preference for mitigation banks and in lieu fee mitigation
- * The ILF Program is currently out of compliance (newly includes streams).

Rhode Island

Mitigation Option	Wetlands	Streams
Mitigation Banks	-	-
In Lieu Fee Programs	-	-
Permittee Responsible*	YES	YES

Comments:

*Rhode Island allows permittee responsible options on a case-by-case basis for both wetland and stream impacts, but avoidance and minimization is emphasized.

South Carolina

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	YES
In Lieu Fee Programs	YES	-
Permittee Responsible	YES	YES

Comments:

* South Carolina has a preference hierarchy: 1) mitigation banks, 2) in lieu fee, 3) permittee responsible (within watershed), 4A) onsite in-kind, and 5) off-site.

South Dakota

No information provided.

Tennessee

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES*	-
In Lieu Fee Programs**	YES	YES
Permittee Responsible***	YES	YES

Comments:

* Tennessee only has mitigation banks for wetlands

**They have the TSMP (an in-lieu fee program) for streams only; the Wildlife Federation has an in-lieu fee program for wetlands only.

***The state prefers permittee responsible, but the Corps prefers the other two options (claiming permittee responsible work has a low success rate). State believes that it is harder to track, but easier to keep within the watershed. This is a disconnect between the state and the Corps.

Texas

Mitigation Option	Wetlands	Streams
Mitigation Banks*	YES	YES
In Lieu Fee Programs**	YES	YES
Permittee Responsible***	YES	YES

Comments:

*Most mitigation work done through mitigation banks

** ILF program is not common.

***Allow both onsite and offsite permittee responsible mitigation. Predict that there will continue to be a good amount of permittee responsible mitigation in Texas.

Utah

Mitigation Option	Wetlands	Streams
Mitigation Banks	-	-
In Lieu Fee Programs	-	-
Permittee Responsible*	YES	YES

Comments:

*Prefer onsite permittee responsible work. Corps has used mitigation banks and in lieu fee program on a limited basis.

Vermont

Mitigation Option*	Wetlands	Streams
Mitigation Banks	-	-
In Lieu Fee Programs	-	-
Permittee Responsible	-	-

Comments:

* Vermont offers no mitigation program or options; no debits and credits are approved for any kind of mitigation. Vermont's entire focus is on avoidance and minimization.

Virginia

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES*	YES*
In Lieu Fee Programs	YES**	YES**
Permittee Responsible	YES	YES

Comments:

*Virginia has mitigation banks in almost every watershed.

** There is one statewide in lieu fee program and an additional program in one watershed.

Washington

Mitigation Option	Wetlands	Streams
Mitigation Banks*	YES	YES
In Lieu Fee Programs*	YES	YES
Permittee Responsible	YES	YES

Comments:

* Washington State’s banks and In Lieu Fee programs provide “universal credits” for wetland, stream and endangered species mitigation.

West Virginia

Mitigation Option	Wetlands	Streams
Mitigation Banks	YES	YES
In Lieu Fee Programs	YES	YES
Permittee Responsible*	YES	YES

Comments:

* Poor permittee responsible success rate. Allow both onsite and off-site permittee responsible mitigation. Off-site sometimes viewed as preferable.

Wisconsin

Mitigation Option	Wetlands	Streams*
Mitigation Banks	YES	-
In Lieu Fee Programs	Developing	-
Permittee Responsible	YES	-

Comments:

* There is no stream mitigation in Wisconsin. The Corps discouraged idea of stream mitigation, as proposed ideas were not well-defined.

Wyoming

Mitigation Option	Wetlands	Streams*
Mitigation Banks	YES**	Developing***
In Lieu Fee Programs	YES	-
Permittee Responsible	YES	-

Comments:

Considering Corps/404, all options are offered in Wyoming

* Currently, neither the state nor the Corps require stream mitigation.

** Two mitigation banks with wetland credits are being created. State also has its own dormant banking program that has never contained a credit.

***Two mitigation banks with stream credits are currently being created

APPENDIX K: Stream Mitigation Site Selection and Design Evaluation Practices by State

State	Site Selection & Design Evaluation Practices	Same for all mitigation options?	How closely does mitigation follow kind of damage?	Requirements
Alabama	Corps uses best professional judgment	Individual determination by the Corps (IRT looks at options)	DON'T KNOW (Ask Corps)	DON'T KNOW (Ask Corps)
Arizona	Information not provided	Information not provided	Information not provided	Information not provided
Arkansas	Case-by-Case	Case-by-Case	CLOSELY	Stream for stream; replace function and values; Eight digit HUC; but do allow offsite
California	Case-by-Case Using USAM	No information provided	CLOSELY	Look at what functions have been lost
Colorado	Case-by-Case; More credits rare given for better design; encourage "ecologically-preferable option"	SAME	SOMEWHAT	Stream for stream; Can do riparian work for in-stream impacts
Connecticut	Case-by-case	No information provided	SOMEWHAT	Immediate vicinity, consider offsite, stream for stream, what can be done to enhance stream habitat
Delaware	Case-by-case	No information provided	SOMEWHAT	Case-by-case
Florida	Case-by-case using applicant handbook and UMAM	SAME	SOMEWHAT	What functions are lost; Special considerations If impacting a high quality upland forest
Georgia	Case-by-case; applicant proposes (where find land, etc). No specific criteria	No information provided	SOMEWHAT	Case-by-case; Try to do onsite whenever possible for buffers
Hawaii	Case-by-vase and Federal Nexus	Case-by-vase and Federal Nexus	Case-by-vase and Federal Nexus	Case-by-vase and Federal Nexus
Idaho	N/A – No mitigation	N/A – No mitigation	N/A – No mitigation	N/A – No mitigation
Illinois	Case-by-case; Will be	PENDING ISMM	PENDING ISMM	PENDING ISMM

	formalized when Illinois Stream Mitigation Methodology (ISMM) is approved			
Indiana	Case-by -case	State decides if permittee proposal acceptable	CLOSELY	High/low water quality and aquatic habitat, as well as other resource considerations
Iowa	Case-by-case	SAME	CLOSELY	Replace stream type and function
Kansas	Proposed by permittee; evaluated by project permitting team; unless hitting T&E critical habitat. The directed by KS DWP&T Ecological services unit	YES	NOT CLOSELY	Not necessarily stream for stream; must meet/exceed credit requirement
Kentucky	Held to service area (6-8 digit HUC for banking; larger HUC for in lieu fee). Problem selecting suitable sites in vicinity with enough activity	NO Inconsistencies on credits and service area; Larger HUC for ILF due to abundant financial assurances	CLOSELY	Stream for stream 8 HUC service area Larger HUC for ILF
Maine	Linear feet + buffer square footage	YES	CLOSELY	Stream for stream, Higher debits/credits for higher use classes; goal to mitigate for the type of damage done and replacement of functions and values as much as possible
Maryland	Onsite is prioritized	YES	CLOSELY	Stream for stream, Onsite is first preference, within watershed, riparian as sole criteria (not written down)
Massachusetts	Case-by-case	Permittee responsible only option	CLOSELY	Stream Type Stream Order Preference for on-site
Michigan	All mitigation is permittee responsible;	N/A (Only have PR)	CLOSELY	In-kind for all and functional

	site should be as close as possible to the impact			replacement
Minnesota	Mitigation for streams not offered. Suggest sites if appropriate.	N/A (None offered for streams)	N/A	Whatever results in restoration
Missouri	Case-by-case	State decides if permittee proposal acceptable	CLOSELY	Stream for stream; MO Method calculates. Can use riparian work as mitigation for in-stream impacts.
Montana	Use Omaha District SMT (On Corps Website – borrowed from NC). Some mitigation has to be in-stream. Debits and credits are based on linear feet.	IRT looks at ILF and banks. Corps looks at PR (approval of appropriate mitigation)	SOMEWHAT	Stream for stream; require some in-stream; SMP rewritten 3-4 months ago. Values strong riparian corridor; want buffer work included.
New Hampshire	Do not have good guidance to score stream mitigation	Unknown	SOMEWHAT	Functions lost Linear feet/acres Proximity (closeby)
Nebraska	Unknown (Follow-up with the Corps)	Unknown (Follow-up with the Corps)	SOMEWHAT	Listed in Corps matrices
Nevada	No information provided	No information provided	No information provided	No information provided
New Jersey	Case-by-case	Informally the same for permittee responsible	SOMEWHAT	Stay within HUC 14; as close to site as possible (concentric circles outward); ask for tree plantings or pavement removal (result in improvements to WQ from good tree planting project)
New Mexico	Case-by-case	Only permittee responsible mitigation is offered	SOMEWHAT	Stream for stream and in-stream for in-stream; Try to follow in-kind as closely as possible. Limited options because state so big and rural.
New York	No stream mitigation allowed	N/A	N/A	N/A
North	Tech review up front	SAME – IRT Process	CLOSELY	In-kind matching by

Carolina	before submit (may include site visit)	(did not used to be)		warm/cool/cold water streams and kind of damage, HUC
North Dakota	Use federal process	Only permittee responsible option available for streams	CLOSELY	Stream for stream and in-kind
Oklahoma	Follow corps rules and guidelines	SAME Mostly permittee responsible; Also hybrid mitigation center	SOMEWHAT	Try to balance out impacts
Oregon	Case-by-case review	DIFFERENT Mitigation banks and in lieu fee reviewed by IRT; Permittee responsible reviewed by state	SOMEWHAT	Commensurate with impacts
Pennsylvania	Applicant proposes site and design	DIFFERENT – ILF most comprehensive review; permittee responsible substantially different review process	NOT CLOSELY	Whatever is available for streams
Rhode Island	Applicant proposes site and design	Case-by-case	CLOSELY	Impacted functions and values must be replaced to the extent possible
South Carolina	Case-by-case, depending on the objective of the plan. Part of state guidance document; emphasizes a watershed approach.	Case-by-case	SOMEWHAT	Stream for a stream. Ideally follows the kind of damage; sometimes differs. Rarely out of watershed. As consistent as possible.
South Dakota	Information not provided	Information not provided	Information not provided	Information not provided
Tennessee	Outlined in Tennessee Stream Mitigation Protocol?	SAME - for the two available stream options (ILF and PR)	NOT CLOSELY	Stream for stream only restriction; restoration for all
Texas	Case-by-case	DIFFERENT – However, some of the same people involved in review process for each	SOMEWHAT CLOSELY	Stream for stream (mostly); prefer within watershed; Ideally in-kind; Functional assessment allows focus on replacing functions

Utah	Case-by-case (for more information, contact Jason Gibson, ACOE)	SAME	SOMEWHAT CLOSELY	In-kind, prefer onsite, may not be in-kind if at mitigation bank
Vermont	N/A – No stream mitigation allowed	N/A – No stream mitigation allowed	N/A – No stream mitigation allowed	N/A – No stream mitigation allowed
Virginia	50% of all mitigation has to be from restoration/enhancement. Use VA Mitigation Do's and Don'ts document (2008)	DIFFERENT	SOMEWHAT CLOSELY	Stream for stream. Strive to have banks with all kinds; often focus on mitigation work in headwater streams as it is seen that this investment gets the most bang for the buck.
Washington	Case-by-case; site selection guidance; factors into credits and debits	DIFFERENT-Separate agencies looking at different things; more review for banks and ILF	SOMEWHAT CLOSELY	Stream for stream; preference for within watershed; some functions can be taken off-site, but this is project specific
West Virginia	Case-by-case review of plans	DIFFERENT – Larger projects at banks and ILF are more complex and receive more review	NOT CLOSELY	Problem: most impacts are in ephemeral and intermittent streams, same type streams are generally either undisturbed or hard to restore; results in out-of-kind mitigation on medium/large streams
Wisconsin	N/A – No stream mitigation options	N/A – No stream mitigation options	N/A – No stream mitigation options	N/A – No stream mitigation options
Wyoming	Contact the Wyoming Regulatory Office at (307)772-2300	Contact the Wyoming Regulatory Office at (307)772-2300	Contact the Wyoming Regulatory Office at (307)772-2300	Contact the Wyoming Regulatory Office at (307)772-2300

APPENDIX L: Procedures for Assigning Debits and Credits for Streams by State

State	YES/NO	Debit/Credit Process	Guidance Documents
Alabama	CORPS	Corps has guidance; IRT	Call CHP
Arkansas	YES	Use the Little Rock District Stream Mitigation Method	Little Rock District Stream Mitigation Method
Arizona	U/K	Unknown	Unknown
California	YES	USAM	USAM
Colorado	YES	Only on credit side, however. Not yet debit side.	In process of creating CO guidance
Connecticut	NO	No procedure or accounting approach; case-by-case	-
Delaware	NO	Case-by-case determination	-
Florida	YES	Utilize Florida's Uniform Mitigation Assessment Method (UMAM)	Uniform Mitigation Assessment Method (UMAM)
Georgia	NO	None	N/A
Hawaii	NO	None	N/A
Idaho	NO	No stream mitigation program	N/A
Illinois	SOON	Pending approval of Illinois Stream Mitigation Methodology (ISMM)	When available: Illinois Stream Mitigation Methodology (ISMM)
Indiana	YES	For banks only on a case-by-case basis. 1 acre = 1 credit. Each bank keeps a ledger. All regulatory agencies must approve purchase of credits.	Best professional judgment by regulatory personnel, based on experience, training and past regulatory decisions
Iowa	CORPS	Corps may have guidance	Unknown
Kansas	YES	What type of stream (3 classifications); quantify how much impact; length of channel as driving factor	KS Mitigation Document?
Kentucky	YES	Adjusted Mitigation Units (AMUs); Ecological Intensity Units (EIUs) are used in the Eastern part of the state. Use RIBITS	Guidance on Corps Website
Maine	YES	Based on acres; Not 1:1 in all cases	Chapter 310 guidance; In Lieu Fee Sheet
Maryland	NO	Working towards a pyramid process in the future	None
Massachusetts	YES	Only for bordering vegetation	Only for bordering vegetation
Michigan	NO	None	None
Minnesota	NO	None	N/A
Missouri	YES	Based on linear feet	Missouri Mitigation Method
Montana	YES	Omaha District SMP is used to assign	Omaha District SMT (ON

		debits and credits (based partially on NC guidance)	Corps Website)
New Hampshire	NO	Working on this with Corps and EPA	None yet
Nebraska	YES	Use RIBITS Leger Procedure	RIBITS Leger Procedure
Nevada	-	No information provided	No information provided
New Hampshire			
New Jersey	NO	Allow flood storage displacement (net-fill) credits in certain cases	Flood Hazard Control Act Rules
New Mexico	NO	N/A	-
New York	NO	N/A	-
North Carolina	YES	Enhancement = 1.5:1 to 2.5:1 Restoration: 1:1 Preservation: Generally 5:1	2003 NC Stream Mitigation Guidance
North Dakota	U/K	U/K – Ask Corps – Daniel Simuratski	U/K
Oklahoma	?	?	?
Ohio	NO	Had formal stream mitigation procedure, but it was not approved; case-by-case currently	-
Oregon	NO	Case-by-case currently; generally 1:1 by area/linear feet; developing function-based crediting/debiting	-
Pennsylvania	NO	Case-by-case currently, but moving toward functional assessment with formal mitigation guidance	New guidance documents expected in 2014-2015
Rhode Island	NO	Only restore or improve functions and values	-
South Carolina	YES	State guidelines provide a schedule for evaluating debits and credits. Try to be as consistent as possible.	Guidelines for Preparing a Compensatory Mitigation Plan (2010)
South Dakota	YES	Function-based procedure; 1:1.5-3 mitigation rations	Omaha and Minnesota Corp District Procedures?
Tennessee	YES	Prescribed in TN Mitigation guidelines - based on linear feet; stream mitigation assessment; priority designation; Impact activities; and Cumulative impacts	TN Mitigation Guidelines
Texas	NO	Functional assessment to determine credits, but no formal process	Use banking instrument and 2008 Corps Rules
Utah	YES	Corps has a formal procedure	Ask Corps for document(s)
Vermont	NO	Stream mitigation is not allowed	N/A
Virginia	YES	Unified Stream Methodology used to determine credits and debits. Work with Corps on IRT to review their reports.	Unified Stream Methodology (USM)
Washington	NO	Case-by-case, best professional judgment; try to identify critical processes for restoration/protection	-

West Virginia	YES	Formal, function-based mitigation metric	West Virginia Wetland and Stream Valuation Metric
Wisconsin	NO	No stream mitigation allowed	N/A
Wyoming	YES	Corps/IRT has a procedure	Contact Corps for procedure

APPENDIX M: Mitigation for Impoundments/Dams by State

State	YES/NO	Detail
Alabama	YES	May be some offset by creating new fringe areas as appropriate and after interagency review
Arkansas	YES	Mitigation debits are calculated for putting in an impoundment. Not many removals happening, but would be hard to quantify credits. Arkansas' methodology is not set-up for debiting impoundment removal.
Arizona	YES	Mitigation credits and debits are not required, but would be considered
California	NO	Dealt with through water rights law
Colorado	YES	Nothing formalized, but would definitely mitigate
Connecticut	YES	Require mitigation for new impoundments (not often); removal is done through restoration grants (not part of mitigation process)
Delaware	YES	Not required, but would be considered
Florida	YES	Don't permit a lot. But mitigated just like any other projects –focus on restoring and creating appropriate habitat
Georgia	YES	If lost stream, require offset (maximum offset on a scale of 1-7 for offset credits)
Hawaii	-	No information provided
Idaho	?	Don't know
Illinois	YES	Have implemented program to remove low head dams for public safety/ecological benefits, but not as mitigation projects per se.
Indiana	YES	Have not dealt with mitigation for dams yet, but would mitigate (don't have these projects right now)
Iowa	YES	Iowa is removing many dams. Stream mitigation is required for impoundments on jurisdictional streams.
Kansas	YES	Debits for construction; credits for removal
Kentucky	YES	Length of altered stream loss for installation due to footprint of dam and inundation length. Same as for putting in a culvert. Not for dam removal.
Maine	NO	Lots of dams removed, but no mitigation credit provided. No dam creation allowed.
Maryland	YES	Mitigation for both dam removal and creation; Dam Safety Group at MDE
Massachusetts	YES	May allow credits for dam removal, but depends on how much vegetated area is flooded out
Michigan	YES	Case-by-case credits for taking out dams; debits for putting a dam in

Minnesota	NO	Work to minimize impact downstream, but not mitigated. Huge controversy over any new impoundments.
Missouri	YES	Same as for any other project; based on linear feet. Issue of amount of debits; after a certain value, doesn't matter anymore because the amount of debits exceeds cost.
Montana	U/K	Ask Corps. There was a recent removal, but no credits were given/. No new impoundments have been approved and if on a streamway, approval is highly unlikely.
Nebraska	YES	Not many impoundments going in or being removed, as there is an abundance of groundwater. Contact Corps for more information.
Nevada	-	No information provided
New Hampshire	NO	-
New Jersey	NO	Don't have a lot of new impoundments. Small grants for dam removals. Not set up to issue debits and credits for impoundments.
New Mexico	NO	This is a non-issue, as there are no new impoundments or dam removals approved.
New York	YES	Not much dam creation, but would consider it if loss of habitat. Not allowed at all if trout habitat
North Carolina	YES	Corps requires 1:1 for impoundments; 1:1 for impounded reach and 2:1 for fill related to the dam. Did previously issue credits for dam removal, but Corps rescinded guidance 2 years ago. Case-by-case currently.
North Dakota	U/K	Ask the Corps
Oklahoma	NO	However, do require mitigation for inundated streams (not very often). Removing dams is not a big deal (no salmon runs etc.)
Ohio	YES	Dam removal is huge. Give mitigation credits in the dam pool itself and a certain distance below. No new impoundments approved.
Oregon	NO	Impoundments and water diversion structures are permitted through the Water Resources Department. If they have a permit, do not require mitigation for loss of miles.
Pennsylvania	YES	Apply mitigation analysis and assignment of debits and credits for both installation and removal. Removal can be used as a form of mitigation (do not require compensation for the losses from removal).
Rhode Island	YES	Mitigation requirements would be based on impacted functions and values and determined on a case-by-case basis.
South Carolina	YES	Debits are given for fill and flooding and credits awarded for removal. Cumulative impact calculated using a multiplier effect to address the overall magnitude of the whole project.

South Dakota	NO	No credits or debits for either installation or removal.
Tennessee	YES	Assign debits and credits based on linear feet. Prescribed in mitigation guidelines. Give credits for dam removal, but nothing standardized.
Texas	YES	Corps does the same process for impoundments as other impacts. Not much removal happening. Debits and credits assigned based on impact, not linear feet.
Utah	YES	Unknown
Vermont	NO	No stream mitigation allowed.
Virginia	YES	Impoundments are considered to be a full impact. Have to compensate for the loss. If remove dams, get incidental wetlands. Must compensate for any losses.
Washington		Removal is sometimes viewed as self-mitigating. Require mitigation for impacts associated with impound placement; promote adaptive management when assessing debits and credits
West Virginia	YES	Require mitigation for the footprint of the flood pool when a dam is put in. Case-by-case for removal.
Wisconsin	NO	Although viewed as an effort and opportunity to get a better stream, it is not considered mitigation and no credits or debits are assigned.
Wyoming	U/K	Unknown

APPENDIX N: Stream Creation Allowable as Mitigation by State

State	YES/NO	Detail
Alabama	THEORETICALLY	Not forbidden; not proposed; generally not possible as a practical matter
Arizona	U/K	No information provided
Arkansas	NO	Although wetland creation is allowed, stream creation is not. No viable scenario.
California	NO	But do allow for daylighting, turning hardscape to softscape, etc.
Colorado	THEORETICALLY	Have to objectively review all proposals; unlikely due to logistics
Connecticut	NO	Only if relocation
Delaware	YES?	???
Florida	YES	If mined and whole landscape destroyed; could create mitigation bank that would allow
Georgia	NO	Doesn't happen. Mostly rerouting
Hawaii	-	No information provided
Idaho	THEORETICALLY	If own property and have property rights, would allow if approved by ID Dept. of Land or Water Resources
Indiana	YES	If look at re-establishment of streams after mining
Illinois	NO	Never happens; do allow for stream relocation though
Iowa	NO	Do allow rerouting around development, etc.
Kansas	NO	Only within stream footprint
Kentucky	NO	It has come up in very isolated situations, but doesn't quite meet the definition of "stream creation"
Maine	NO	But allow movement of streams
Maryland	NO	Stream creation occurs in MD, but would not be allowed as mitigation
Massachusetts	THEORETICALLY	Theoretically would be allowed, but not as mitigation unless associated with a wetland replacement area
Michigan	NO	Not typically allowed. But do allow relocation.
Minnesota	THEORETICALLY	Theoretically would be allowed, but not hydrologically practical. Stream creation is used more for aesthetic benefit and would not qualify as mitigation.
Missouri	NO	Have to show that stream was once there; can get credit for reestablishing former sinuosity
Montana	THEORETICALLY	Not possible in an arid environment (who has water?)
Nebraska	NO	Ask Corps for more information.
Nevada	-	No information provided
New Hampshire	NO	-
New Jersey	NO	May allow return to more natural stream as mitigation

		(e.g. during hazardous waste clean-up)
New Mexico	NO	Not feasible. Trying to hold on to the streams they have.
New York	NO	Never
North Carolina	NO	Has been proposed, but not approved. "A stream should be where a stream should be." Allow daylighting as mitigation.
North Dakota	U/K	Ask the Corps
Ohio	NO	No, even though have coal mining and lost streams
Oklahoma	NO	Have allowed moving of a stream
Oregon	THEORETICALLY	Guidance doesn't specifically address the issue. Department could consider.
Pennsylvania	NO	Focus on restore, rehabilitate and enhance
Rhode Island	THEORETICALLY	Has not yet happened and unlikely to in the future, but remains within the realm of possibility
South Carolina	NO	Not prohibited, but IRT would be skeptical
South Dakota	-	Information not provided
Tennessee	THEORETICALLY	Would be allowed to consider, but nobody can do it. Do provide mitigation credits for meander improvements (fall under restoration in the mitigation guidelines)
Texas	YES	Not common, but can happen with stream realignment or mining projects
Utah	THEORETICALLY	Would consider. It has not been done as mitigation
Vermont	NO	No stream mitigation allowed
Virginia	NO	Not acceptable
Washington	YES	Have put extensive back channels as mitigation. A lot of streams have been ditched, so allow ditches to be restored as streams and relocated/situated as close to the original historic landscape position as possible. Creating processes critical for the watershed is driving this approval.
West Virginia	THEORETICALLY	Have never had this come up. Do have "new channel" option in the WV SWVM
Wisconsin	NO (Except may consider with metallic mining)	Have not encountered intentional creation; have seen inadvertent stream creation through bad stormwater management. Might start to consider related to metallic mining if it is feasible.
Wyoming	THEORETICALLY	No rules or policies that prohibit stream creation. Not really happening; unlikely that you can place a stream where it does not already exist, unless a new water source is created.

APPENDIX O: Contact List for Project Interviewees by State

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**Six people were on the phone for the Florida interview; Doug Fry is the primary contact*

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