

Prepared in cooperation with the U.S. Department of Agriculture

Agricultural Conservation Practice Implementation in the Chesapeake Bay Watershed Supported by the U.S. Department of Agriculture

Data Series 1102

U.S. Department of the Interior
U.S. Geological Survey



Cover. Grassed waterways protect flow pathways within farm fields, reducing erosion and nutrient loss from farmland. Photograph by Jane Thomas, Integration and Application Network, University of Maryland Center for Environmental Science.

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By W. Dean Hively, Olivia H. Devereux, and Jennifer L.D. Keisman

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U.S. Department of the Interior

RYAN K. ZINKE, Secretary

U.S. Geological Survey

James F. Reilly II, Director

U.S. Geological Survey, Reston, Virginia: 2018

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Foreword

Introductory comments from collaborators at the Natural Resources Conservation Service:



United States Department of Agriculture

Since its establishment, the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has been a strong provider of farm conservation planning and implementation assistance. Under the 2014 Farm Bill's Regional Conservation Partnership Program, the Chesapeake Bay watershed was named as a Critical Conservation Area, with the goal of building on existing strong partnerships in the watershed to support regional conservation needs. The 2014 Chesapeake Bay Watershed Agreement, signed by the Federal government and all seven jurisdictions in the watershed, has also promoted continued collaboration among Federal and state agencies and non-governmental organizations working to restore water quality in the Chesapeake Bay watershed. The Chesapeake Bay Program Partnership has provided a forum in which Federal and state agencies, along with farmers and municipalities and non-governmental organizations, have developed, coordinated, and implemented strategies for managing resources and improving water quality.

In 2010, NRCS entered a partnership with the United States Geological Survey (USGS) establishing USGS as a Conservation Cooperator with privacy-protected access to USDA farmland datasets. The USGS, as an impartial scientific third party, has coordinated with NRCS and the Chesapeake Bay Program Partnership and has assisted in the compilation of an accurate, comprehensive dataset that has been well-integrated with the jurisdictional datasets used to assess, track, and report conservation practice implementation. NRCS participates in these agreements to facilitate agricultural producers receiving appropriate recognition for their conservation practices. NRCS provided the data for this report and supports continued use of data to acknowledge environmental improvement effects resulting from conservation practice implementation.

We appreciate the role and expertise provided by USGS to improve the accuracy and completeness of conservation datasets in the Chesapeake Bay watershed. Consistent and thorough reporting of NRCS-supported conservation practices will be beneficial to Chesapeake Bay Program jurisdictions in their efforts to quantify progress toward their conservation goals. In addition, with this information, the Federal and state partnership can better target future conservation activities and funding. In 2018, NRCS released its Chesapeake Bay Action Plan which summarized NRCS natural resource priorities, principles for working with partners and engaging the public, and voluntary science-based approach with customers. We want to ensure that producers' conservation activities on agricultural lands are fully acknowledged, support adaptive management of conservation programs to promote effective solutions, and address resource concerns while promoting sustainable agriculture.

A decorative graphic consisting of a horizontal row of small, light blue and white squares of varying sizes, some overlapping, creating a pixelated or mosaic-like effect.

TERRELL ANN ERICKSON
Acting Regional Conservationist, Northeast

Acknowledgments

Executive Order #13508 prioritized Federal collaboration in support of the Chesapeake Bay Program and provided the impetus for a productive collaboration between the U.S. Geological Survey (USGS) and U.S. Department of Agriculture (USDA) agencies working to improve farmland conservation. We are grateful to our collaborators at the USDA-Natural Resources Conservation Service and USDA- Farm Service Agency for their attention to detail and excellence in providing access to continually improving conservation datasets. Thank you to Barry Frantz, NRCS Chesapeake Bay Watershed Coordinator, for providing editorial review. We thank our collaborators within the Chesapeake Bay Program Partnership including points of contact within the state jurisdictional agencies, as well as the team that received a 2016 U.S. Environmental Protection Agency (EPA) national award for collaborative problem solving, recognizing their contributions to developing a verification framework for reporting the implementation of conservation practices within the Chesapeake Bay watershed. We are grateful to the reviewers who made helpful suggestions for improving this publication. This work was supported by the USGS Priority Ecosystems and Land Change Science programs, as well as the EPA Chesapeake Bay Program.

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Conversion Factors

U.S. customary units to International System of Units

Multiply	By	To obtain
Length		
mile (mi)	1.609	kilometer (km)
Area		
acre	4,047	square meter (m ²)
acre	0.4047	hectare (ha)

Conversion Factors—Continued

International System of Units to U.S. customary units

Multiply	By	To obtain
Length		
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
Area		
square meter (m ²)	0.0002471	acre
hectare (ha)	2.471	acre

Abbreviations

BMP	Best management practices
CBP	Chesapeake Bay Program
CCMS	Conservation Contract Maintenance System
CLU	Farm Service Agency common land unit
CRP	Farm Service Agency Conservation Reserve Program
CREP	Farm Service Agency Conservation Reserve Enhancement Program
CTA	Natural Resources Conservation Service conservation technical assistance
HUC	Hydrologic unit code
EPA	U.S. Environmental Protection Agency
FIPS	Federal Information Processing Standards
FSA	U.S. Department of Agriculture Farm Service Agency
MIDAS	Farm Service Agency Modernize and Innovate the Delivery of Agricultural Systems project
MOU	Memorandum of understanding
NEST	U.S. Department of Agriculture National Easement Staging Tool
NPAD	U.S. Department of Agriculture National Planning and Agreements Database
NRCS	U.S. Department of Agriculture Natural Resources Conservation Service
SCIMS	Service Center Information Management System
TMDL	Total maximum daily load
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey

Agricultural Conservation Practice Implementation in the Chesapeake Bay Watershed Supported by the U.S. Department of Agriculture

By W. Dean Hively¹, Olivia H. Devereux², and Jennifer L.D. Keisman¹

Abstract

The U.S. Department of Agriculture (USDA) provides cost-share funding and technical assistance to support the implementation of agricultural conservation practices on farms throughout the Chesapeake Bay watershed. Conservation implementation has been substantial in the time period for which digital records are available (from 2007 through 2017). Farmer participation in USDA conservation programs is voluntary and the implementation data are privacy protected. In 2010, the U.S. Geological Survey (USGS) and USDA formed a cooperative partnership to analyze the effects of agricultural conservation on sediment, nutrient, and pesticide transport to the Chesapeake Bay. The USDA provides conservation implementation records for Chesapeake Bay farms to the USGS, with strict limitations on the use of the data to maintain confidentiality of site-specific farm data. The USGS aggregates the data to maintain farmer privacy, and subsequently provides the aggregated datasets to the public to inform conservation decision making processes. As part of that process, the USGS collaborates with the USDA to increase the understanding and quality of the USDA datasets and informs the interpretation of data records by Chesapeake Bay Program partners. The USGS obtains USDA conservation datasets in October of each year, performs data handling and quality checks as described in this document, and delivers aggregated summaries to the six Chesapeake Bay state jurisdictions for use in reporting conservation implementation to the Chesapeake Bay Partnership's Annual Progress Review, which occurs in December of each year. The privacy protected, site-specific datasets are also used by USGS scientists to understand the effects of agricultural conservation on sediment, nutrient, and pesticide transport to the Chesapeake Bay at the small watershed scale. This publication describes the methods used to aggregate the datasets herein made available to the public at county and eight-digit hydrologic unit code watershed scales, reporting annual implementation from 2007 through 2017. It also documents the effect of geographic aggregation scale on the

reportability of records and provides details regarding appropriate use and interpretation of the data records.

Introduction

The Chesapeake Bay is the largest estuary in the United States, and its watershed extends across 165,000 square kilometers (64,000 square miles) of land, including parts of six states (Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia) and the District of Columbia (fig. 1). Decades of population growth, agricultural production, and urban development have led to degradation of the Chesapeake Bay's water quality and aquatic living resources. In response, a multiagency partnership, the Chesapeake Bay Program (CBP), was founded in 1983 to "fully address the extent, complexity and sources of pollutants entering the Bay," and long-term water-quality monitoring networks were established (https://www.chesapeakebay.net/who/bay_program_history). The USGS has participated in the CBP Partnership since the 1987 Chesapeake Bay Agreement, bringing its expertise in measuring and analyzing water quality to the restoration effort.

In 2010, total maximum daily load (TMDL) regulations were developed for the Chesapeake Bay watershed, setting clear goals and accountability mechanisms to guide the restoration of the Chesapeake Bay and the region's streams, creeks, and rivers (U.S. Environmental Protection Agency, 2010). The TMDL process identified specific nutrient and sediment load reduction targets for each state and Chesapeake Bay segment. The TMDL also required that each state jurisdiction develop a Watershed Implementation Plan outlining the proposed strategy for implementing the necessary best management practices (BMPs) to reach its reduction targets. To track progress in achieving these targets, the CBP Partnership requests that jurisdictions submit an annual progress review of BMPs that have been newly implemented within each fiscal year (July 1 through June 30). Implementation of agricultural BMPs is supported by a variety of cost-share and technical assistance programs sponsored by the jurisdictions, private entities, and agencies within the U.S. Department of Agriculture (USDA)

¹U.S. Geological Survey.

²Devereux Environmental Consulting.

2 Agricultural Conservation Practice Implementation in the Chesapeake Bay Watershed

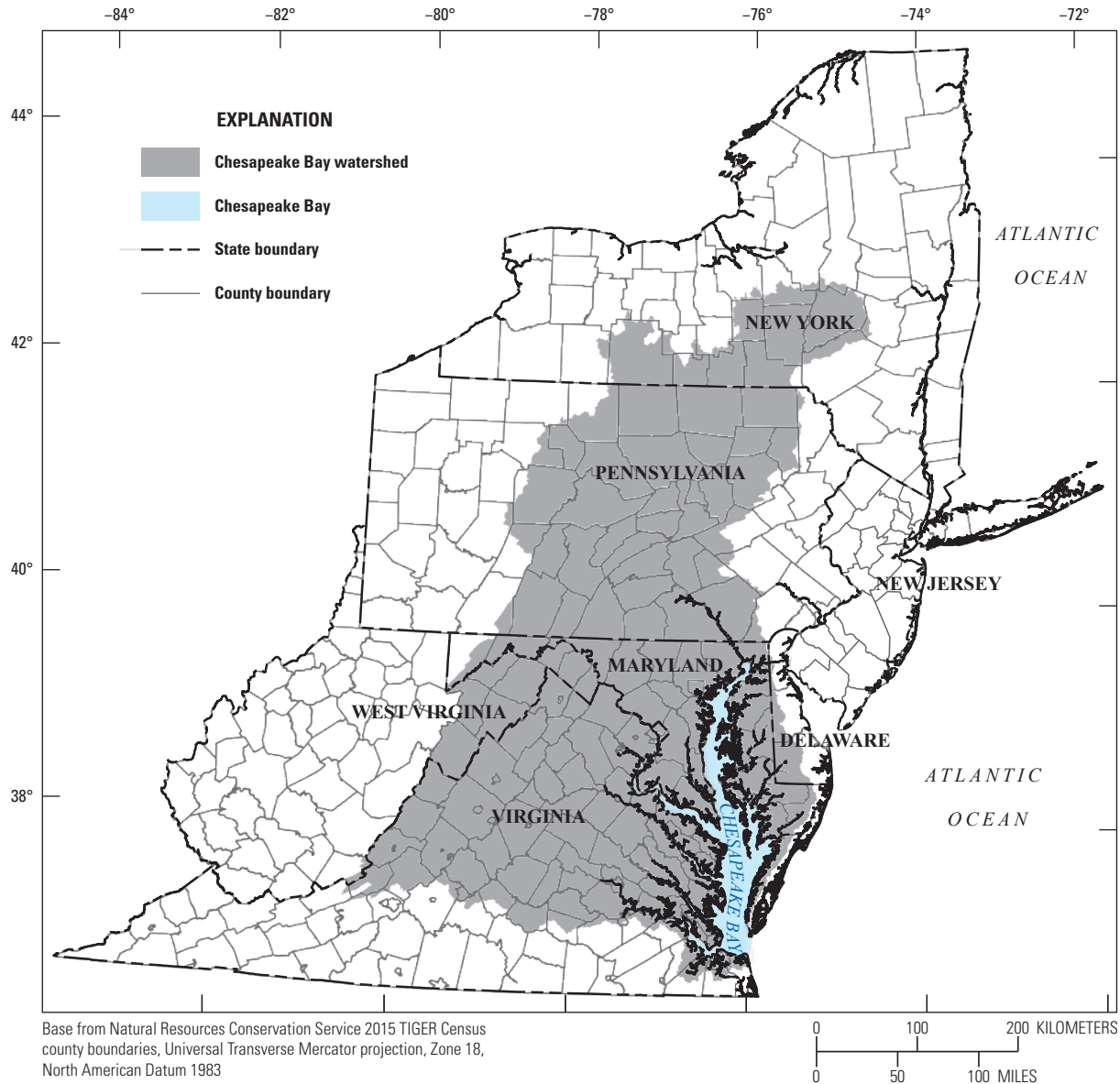


Figure 1. The Chesapeake Bay watershed with state jurisdictional borders and county boundaries. The Chesapeake Bay watershed boundary is derived from the Chesapeake Bay Program Partnership’s watershed model version 5.3.

including the Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA).

To support conservation activities with the goal of protecting and restoring water quality in the Chesapeake Bay watershed, the USGS formed a Conservation Cooperator partnership with the USDA, allowing it to obtain privacy-protected conservation implementation data for Chesapeake Bay farms. Since 2010, the U.S. Geological Survey (USGS) has taken on the responsibility for accessing and processing USDA conservation datasets, in order to make high quality implementation data accessible to the public for use in decision making processes, and to support analysis of the effects of agricultural conservation on sediment, nutrient, and pesticide transport to the Chesapeake Bay at the county and small watershed scale. Farmer participation in USDA conservation

programs is voluntary, and because implementation data are privacy protected, the data can be made public only if aggregated to protect farmer privacy.

On an annual basis, the USGS acquires datasets documenting USDA-sponsored agricultural conservation practices (Hively and others, 2013), evaluates them for quality and completeness, aggregates the data to maintain farmer privacy, and provides the resulting datasets to the public to inform conservation decision-making processes. Each year updated aggregated datasets are transferred from the USGS to the six state jurisdictions (Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia) to assist them with reporting conservation progress to the Chesapeake Bay Program Partnership’s annual progress review. Making the aggregated dataset

freely available to the public supports the Chesapeake Bay Program Partnership's goals of transparency and collaboration.

In its role as a science provider, the USGS provides critical support for advancing the USDA's and CBP's understanding of how both anthropogenic pressures and the implementation of BMPs designed to mitigate those pressures affect water quality. Under the Conservation Cooperator Agreement, the spatially explicit (nonaggregated) privacy-protected implementation data can be used by USGS scientists to investigate the effects of agricultural conservation on trends in water quality at smaller scales than would otherwise be possible with aggregated data. Determining the relations between anthropogenic activities and changes in water quality is important for informing the design and adaptive management of nutrient reduction strategies. Incorporating the role of agricultural BMPs into explanations of changes in water quality is facilitated by spatially explicit knowledge of conservation practice implementation. The partnership between USGS and USDA provides USGS scientists with access to site-specific information on agricultural USDA-sponsored conservation practices and provides USDA with critical analysis that can be used to improve conservation outcomes from USDA programs.

The agricultural conservation datasets provided by the USDA-NRCS and the USDA-FSA, as well as the methods by which they are aggregated and integrated with jurisdictional implementation data, have been described previously in Hively and others (2013). That publication described the strengths and complexities of the datasets, as well as identified shortcomings. Several of the shortcomings have since been addressed, and the current dataset is more detailed and accurate than previous versions. These improvements are the result of lessons learned through detailed conversations between the USGS and the USDA data providers, as well as renovations in the structure of the USDA-NRCS and USDA-FSA data handling systems.

Purpose and Scope

This data series presents the aggregated datasets compiled by the USGS in October 2017, documenting annual USDA-sponsored BMP implementation from 2007 through 2017. The purpose of this publication is to document the methods that were used to obtain and aggregate USDA-sponsored conservation practices and to describe improvements in data quality that have been achieved since the first description of this dataset was published in 2013 (Hively and others, 2013). Distinctions are made between USDA-funded practices and practices for which conservation technical assistance (CTA) was provided without USDA funding. The effects of spatial aggregation on the reportability of BMP totals are documented, and the strengths and limitations of the USDA datasets are identified. Recent and planned changes in data handling at the USDA-FSA and USDA-NRCS are discussed, along with their implications for comparisons of reported implementation

at different time periods and locations. The aggregated datasets are provided in a concurrent data release (Hively and others, 2018) at county and eight-digit hydrologic unit code (HUC) watershed scales as annual implementation totals from 2007 through 2017, and general patterns in implementation over time are described.

Methods—Processing of USDA Conservation Practice Datasets

Overview

In accordance with the memoranda of understanding (MOU) recognizing the USGS as a Conservation Cooperator (appendix 1), the USGS obtains three conservation datasets from USDA agencies in October of each year: (1) a tabular dataset of NRCS farm practice implementation including geospatial coordinates (latitude, longitude) for each practice, (2) a tabular dataset of FSA farm practice implementation including geospatial field boundary codes for each practice, and (3) a geospatial dataset of common land use (CLU) field boundaries from the FSA. These datasets are privacy-protected according to USDA Farm Bill guidelines and contain spatially explicit information documenting agricultural conservation practices that have been verified as implemented by farms located within the Chesapeake Bay watershed. The datasets include only practices with verified implementation, and do not include practices that have been planned but not yet implemented.

The USDA funds agricultural conservation through a variety of cost-share programs designed to support voluntary implementation of specific conservation practices, and each conservation practice is associated with a practice code and technical definition and standards (Farm Service Agency, 2018; Natural Resources Conservation Agency, 2018). In most cases, USDA cost-share funds and technical assistance are provided through local USDA service center offices and are often integrated with non-Federal assistance provided in collaboration with state and local partners.

The NRCS farm practices dataset includes field-scale conservation practices such as cover crop, nutrient management, and integrated pest management, as well as structural conservation practices such as heavy use area protection, fence, and waste storage facilities. By way of example, table 1 lists the most frequently implemented NRCS funded practices within the Chesapeake Bay watershed, by jurisdiction ('most frequently' is here defined as number of individual practices per year, rather than implementation amount).

The NRCS dataset distinguishes practices that have been financed or cofinanced by the NRCS (funded practices) and practices for which the NRCS provided conservation technical assistance without financial support (CTA). Practice

Table 1. Top ten most frequently implemented U.S. Department of Agriculture-funded conservation practices in 2017, by state jurisdiction.

A. Delaware		B. Maryland		C. New York	
Code	Practice	Code	Practice	Code	Practice
340	Cover crop	590	Nutrient management	590	Nutrient management
561	Heavy use area protection	595	Integrated pest management	340	Cover crop
590	Nutrient management	561	Heavy use area protection	647	Early successional habitat development
345	Residue and tillage management, reduced till	382	Fence	666	Forest stand improvement
367	Roofs and covers	528	Prescribed grazing	528	Prescribed grazing
114	Integrated pest management plan—written	340	Cover crop	382	Fence
591	Treatment of agricultural waste	484	Livestock pipeline	342	Critical area planting
449	Irrigation water management	516	Mulching	484	Mulching
316	Animal mortality facility	614	Watering facility	614	Watering facility
595	Integrated pest management	315	Herbaceous weed treatment	516	Livestock pipeline
D. Pennsylvania		E. Virginia		F. West Virginia	
Code	Practice	Code	Practice	Code	Practice
590	Nutrient management	590	Nutrient management	382	Fence
340	Cover crop	328	Conservation crop rotation	561	Heavy use area protection
382	Fence	340	Cover crop	614	Watering facility
614	Watering facility	528	Prescribed grazing	516	Livestock pipeline
329	Residue and tillage management, no-till	329	Residue and tillage management, no-till	528	Prescribed grazing
620	Underground outlet	382	Fence	590	Nutrient management
561	Heavy use area protection	472	Access control	314	Brush management
484	Mulching	614	Watering facility	472	Access control
528	Prescribed grazing	512	Forage and biomass planting	612	Tree/shrub establishment
412	Grassed waterway	315	Herbaceous weed treatment	512	Forage and biomass planting

definitions are established by the NRCS (Natural Resources Conservation Agency, 2018). All of the practices meet NRCS technical guidelines and verification standards. A complete list of implemented practices is contained in the data tables found in appendix 2 (Hively and others, 2018).

The FSA farm practices dataset includes practices funded by the Conservation Reserve Program (CRP) and the Conservation Reserve Enhancement Program (CREP), along with the spatially explicit common land unit (CLU) field boundary associated with each practice. Practice definitions are established by the FSA (Farm Service Agency, 2018). The CLU is a geospatial shapefile coverage developed by the FSA that identifies “the smallest unit of land that has a permanent, contiguous boundary, a common land cover and land management, a common owner and/or a common producer in agricultural land associated with USDA farm programs” (U.S. Department of Agriculture, 2012).

An example of site-specific conservation data records pertaining to a farm that gave permission to publish this otherwise privacy-protected information is shown in figure 2.

Once the data are acquired from the USDA, a series of decision rules are applied by the USGS to account for anomalies such as data entry errors, and to remove potential duplication of records among the NRCS and FSA datasets. The records are then aggregated from the spatially explicit scale at which they are provided, to scales that meet requirements for protecting farmer privacy. A more detailed description of these procedures is provided below.

Conservation Cooperator Agreements Between the USGS and USDA

The USGS obtains datasets documenting USDA-assisted implementation of conservation practices in the Chesapeake Bay watershed under the auspices of memoranda of understanding (MOU) with USDA-NRCS and the USDA-FSA (appendix 1A–C). These agreements authorize the USGS to use the Federal conservation datasets to “provide technical assistance, in the form of monitoring, assessment, and evaluation of USDA Farm Bill Programs, by analyzing the impact of farming practices on water quality in the Chesapeake Bay watershed.” The agreements also establish guidelines for aggregating the datasets to protect farmer privacy, after which the aggregated data can be released to the public (appendix 1D).

The original five-year agreements, signed in 2010, were established following Executive Order 13508 Chesapeake Bay Protection and Restoration, Section 203 Final Coordinated Implementation Strategy (May 11, 2009), in part to support efforts to ensure that conservation practice data from USDA programs were fully represented in jurisdictional reporting of BMP implementation to the CBP (Hively and others, 2013). The USGS committed to developing a process of acquiring, processing, and evaluating the USDA data records, and providing them to state jurisdictional agencies in aggregated

format. After a successful initial five-year phase, the MOU were renewed in 2015, and are now in duration through 2020.

Aggregation Guidelines

In accordance with the MOU, which details the requirements of the Food, Conservation, and Energy Act of 2008, also known as the 2008 Farm Bill Section 1619 (7 U.S.C. 8791(b)(2)(A)), the USGS follows the requirement that “USDA, or any contractor or cooperator of USDA, shall not disclose information provided by an agricultural producer or owner of agricultural land concerning the agricultural operation, farming or conservation practices, or the land itself, in order to participate in the programs of the Department...” (appendix 1B). To protect farmer confidentiality, the USGS aggregates the implementation data in accordance with USDA guidelines before making them available to the jurisdictions and the general public.

Sufficient aggregation has been defined by the USDA as the spatial and temporal resolution at which five or more farmers are enrolled in a given conservation practice within a particular geographic area (see p. 19 in Hively and others, [2013] and appendix 1D). If four or fewer farmers are enrolled in a particular practice within a particular spatial extent, those data are not reportable. Therefore, aggregation to smaller spatial scales (for example, 12-digit HUC watersheds) will result in a smaller total reported implementation than aggregation to larger spatial scales (for example, 8-digit HUC watersheds, counties, or statewide totals). Similarly, aggregation across several years will result in more reportable data than aggregation within specific years. The effect of aggregation scale on reportability is further discussed below. The companion data release (Hively and others, 2018) that presents the datasets resulting from the methods described in this data series provides implementation data aggregated at county and HUC-8 watershed scales for each annual time period (July 1–June 30) from 2007 through 2017.

In these datasets, each county is designated by a five-digit Federal Information Processing Standard (FIPS) code which uniquely identifies counties and county equivalents in the United States. The first two digits represent the state code, and the following three digits are specific to the county. For counties that cross the Chesapeake Bay watershed boundary the reported totals reflect all practices implemented within the county, including portions of the county falling outside the Chesapeake Bay watershed. Shapefiles of county boundaries are available from the NRCS Geospatial Data Gateway (<https://gdg.sc.egov.usda.gov/>).

A standardized system of hydrologic drainage unit identification is maintained by the USGS in partnership with the USDA (U.S. Department of Agriculture, 2013), with each unit representing a watershed identified by a unique hydrologic unit code. The HUC watersheds are delineated based on hydrological features, without consideration of county or state boundaries. The number of digits in the HUC increases as the

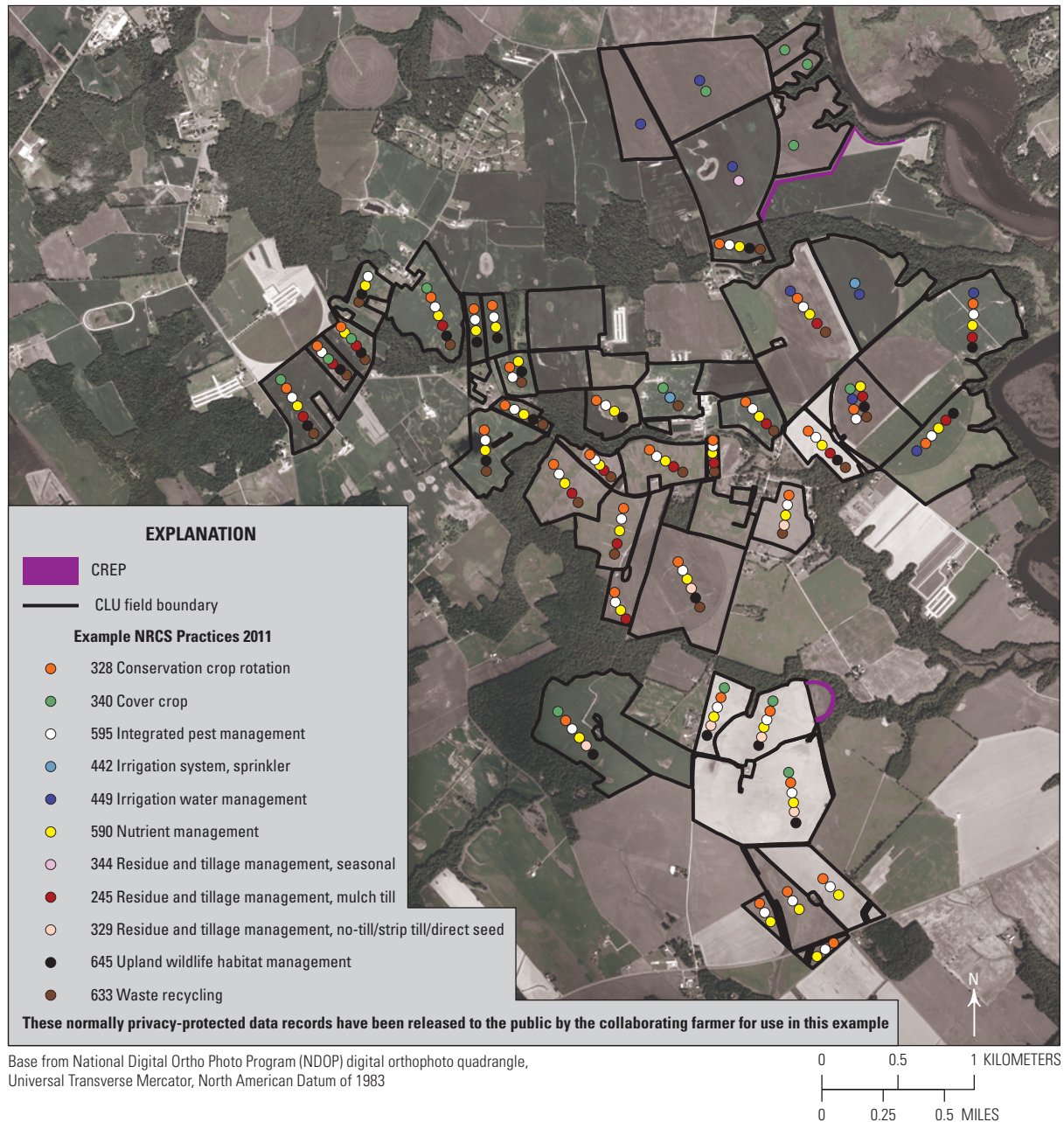


Figure 2. Conservation practices implemented on a Maryland grain farm in 2011, including practices funded by the Natural Resources Conservation Service (NRCS) and the Farm Service Administration Conservation Reserve Enhancement Program (CREP), with associated common land unit (CLU) field boundaries. These normally privacy-protected data records have been released to the public by the collaborating farmer for use in this example.

area decreases. For example, a HUC-8 watershed represents a larger area than a HUC-12 subwatershed. The Chesapeake Bay watershed consists of 4 HUC-4 subwatersheds of the mid-Atlantic region (0205, 0206, 0207, and 0208), within which 53 HUC-8 subwatersheds are nested (Chesapeake Bay Program, 2008). Standardized shapefiles of HUC-8 watershed boundaries (U.S. Department of Agriculture, 2013) are available for download from the NRCS Geospatial Data Gateway (<https://gdg.sc.egov.usda.gov/>).

Data Acquisition Process and Timeline

The data acquisition process (fig. 3) begins in August of each year, when the USGS submits data requests to the NRCS and the FSA asking for updated records of BMP implementation achieved in the past year. Data are generally received in mid- to late-October, at which point the USGS begins the process of merging NRCS and FSA data and removing duplicated practices. The records are also screened for erroneous data, which are removed or repaired. Finally, the data are aggregated to protect farmer privacy and the processed datasets are

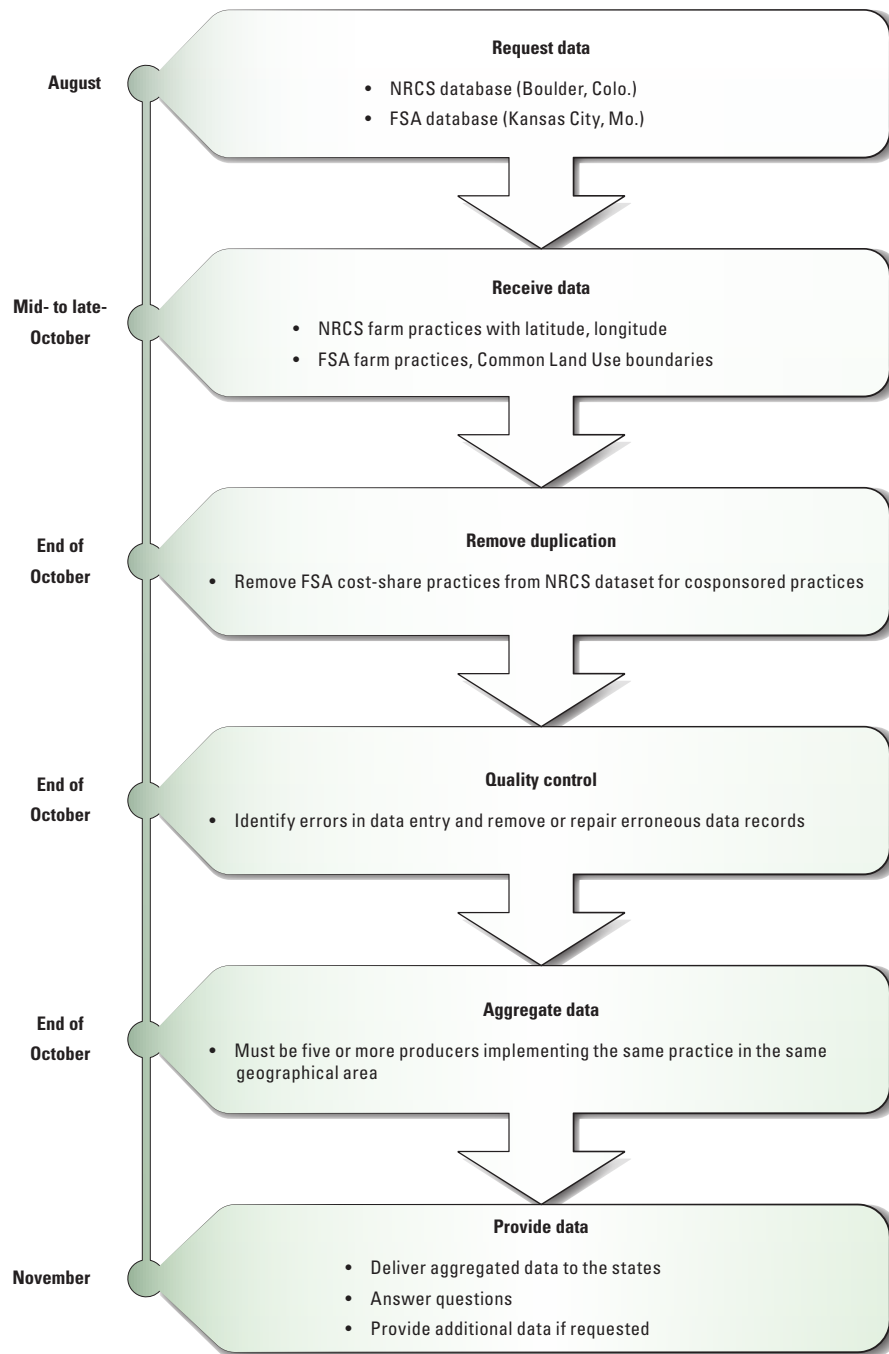


Figure 3. Data acquisition process and timeline. NRCS, Natural Resources Conservation Service; FSA, Farm Service Administration.

made available in early November, after which they are used by the jurisdictions in the annual progress review, with reporting complete by December 1.

Each data record contains an implementation date that is used to establish the year of implementation for use in the calculation of aggregated data summaries. Each reported aggregation year is defined as running from July 1 through June 30, to match the time period for which the CBP Partnership’s annual progress review reports new implementation (for example, the 2017 reporting year contains records implemented between July 1, 2016, and June 30, 2017). The

FSA and NRCS data are available for 2007 through present. Although some digital datasets exist prior to 2007, those records are inconsistent and substantial changes to USDA data systems make comparability to earlier years difficult.

In October 2017, three datasets were provided by USDA agencies. Tabular NRCS farm practice data were provided from the NRCS National Planning and Agreements Database (NPAD) by Mr. David Butler of the Colorado central data office. Tabular FSA farm practice data were provided from the Conservation Contract Maintenance System (CCMS) by Ms. Barbara Clark and Ms. Rachel Bankhead of the FSA central

data office located in Kansas City, Missouri. Additional FSA geospatial data including CLU boundaries were provided by Mr. David Parry of the Aerial Photography Field Office located in Salt Lake City, Utah.

The NRCS data are provided from NPAD, which pulls data from many USDA databases, including Toolkit, Pro-Tracts, National Easement Staging Tool, Service Center Information Management System, and Business Partner Database. The NRCS has made significant changes to its databases over the past few years, resulting in improved accuracy, thoroughness, and accessibility, and will continue to make changes in the coming years.

Removing Duplication between NRCS and FSA Data Sources

For many CRP and CREP practices, funding is provided by the FSA and the NRCS provides technical assistance, so implementation of the practices is recorded in both FSA and NRCS databases. In those cases, to avoid duplication, the CRP and CREP records were removed from the NRCS practices dataset and were reported from the FSA practices dataset. These cosponsored practices were identified by NRCS using the FSA Handbook “Agricultural Resource Conservation Program for State and County Offices” (Farm Service Agency, 2013), and are listed in table 4 of Hively and others (2013).

Adjustments to Data to Correct for Illogical or Incorrect Data Entry

Illogical or obviously incorrect data were occasionally identifiable and were corrected whenever possible. These few corrections were intended to address the most obvious errors while making the fewest assumptions about what was intended. The corrections included the following

- Removing conservation practices on land uses where it is not possible for a practice to exist, or where a practice returned land to its immediately preceding condition. For example, forest buffers on forest were not included. Discussions with states indicated that there are circumstances where forest areas are cleared to provide access to other lands, after which forest buffers are planted. For example, this can occur where a right-of-way to a train track is cleared for work on the train track, and then trees are subsequently replanted. Such cases were removed from this dataset. Land practices applied to water were also removed. Land use designations are provided by NRCS with the implementation data and include: forest, range, developed land, crop, water, farmstead, associated agricultural land, protected, other rural land, and pasture.
- When implementation for practices typically reported in acres, such as practice 391 (riparian forest buffer), was exceedingly large it was assumed that these practices had erroneously been reported in feet rather than acres, and the records were recorded as 1 acre.
- Where practice number 313 (waste storage facility) was greater than three for the same customer, contract, and year, the number was set to one. In some cases, the original number was 313 (in other words the practice code). In others, it appeared to be the number of square feet, such as 160,602, rather than the correct count of waste storage facilities. There were no such anomalies in the 2015–17 data; errors were limited to the prior years, indicating that the data entry issue has been rectified by NRCS.
- Practice 558 (roof runoff structures) had the quantity reset to two where the amount was greater than four. There appear to be instances where the quantity reported was the linear feet or animal numbers rather than the number of structures.

These corrections were applied to the entire dataset (2007 through 2017), and it was observed that although some persistent errors remain for early years, the occurrence of errors is less frequent in more recent years, attesting to the continuous improvement of the NRCS database with time. Overall, the occurrence of errors was quite low, perhaps less than 100 records in total, but the effect of the errors was sometimes large, for instance when feet were reported in place of acres, or when number of animal units were recorded in place of number of waste control structures.

There may be other sources of errors in the data that were not corrected because information to support the corrections was not available. For example

- Use of the land use category appears to differ among conservation planners. Although the official NRCS protocol is to use this category to denote the planned post-conservation land use, some planners appear to use this category to indicate the original or pre-conservation land use. These errors are difficult to identify and correct because generalizations cannot be made across counties, and correction is best made in future iterations of NRCS record-keeping protocols.
- In the FSA data, the practice acres are the total acres of conservation practice implemented, which can include both first-time enrollment and re-enrolled acres that are being renewed for another contract period. Including the re-enrollment without removing previous enrollment of the same land would result in double-counting, unless lifespan is used to retire enrollment acres as they expire. Separating re-enrollment from new enrollment in the FSA database is currently problematic.

Practice Lifespan

Many field-based BMPs, such as cover crop, nutrient management, residue and tillage management, and integrated pest management have a one-year lifespan, applying only to the year in which they were implemented. In contrast, structural conservation management practices such as heavy use area protection, fence, terrace, and riparian forest buffer have a multiple year lifespan, such that implementation totals must be accumulated over time to establish the amount of active implementation on the ground. The NRCS has established an estimated lifespan for each practice code. For example, the NRCS lifespan for riparian forest buffers, stream crossings, and contour farming practices are 15, 10, and 5 years, respectively. Although the actual effective lifespan of each individual instance of a structural practice will vary from place to place, and may extend well beyond the expected lifespan, these established lifespans reflect the contractual expectation for each practice.

For structural practices, the cumulative amount of implementation at any given time can be calculated by summing the amount implemented in each year until a practice exceeds its lifespan (for example, for contour farming, with a lifespan of 5 years, the sum of implementation from 2013 through 2017 would best represent the amount of functional practices on the ground in 2017). In contrast, annual field management practices such as cover crops and nutrient management apply only to the year of implementation; summing these practices over time to determine the amount present in the terminal year would be incorrect.

The lifespan of each practice is provided in appendix D1 of Hively and others (2013), as well as in appendix 3 (Hively and others, 2018). The aggregated datasets report newly implemented practices in each year and leave it to the user to apply lifespan information as desired.

Results—The Aggregated Datasets

The aggregated datasets described in this data series and provided in the accompanying data release (Hively and others, 2018) summarize the annual implementation of USDA-sponsored conservation practices on farms within the Chesapeake Bay watershed from 2007 through 2017. The datasets provide a consistent source of information that is comparable over time, reporting only new BMP implementation in each year. The year is defined as July 1 through June 30, and annual implementation data are available for 2007 through present.

The two provided aggregation levels, county level and HUC-8 watershed, are independent of each other and are redundant, representing different aggregations of the same original datasets. As such, they should be used independently and not be combined in an additive fashion, because to do so would result in double-counting of practices. The county-level aggregation (appendixes 3A and B in Hively and others

[2018]) reports practices by county for all counties falling within, or intersecting with, the Chesapeake Bay watershed. Thus, for counties that span the watershed boundary, the dataset reports the aggregation of all practices implemented within the county, including practices in the portion of the county that falls outside the Chesapeake Bay watershed. In contrast, the HUC-8 aggregation (appendixes 3C and D in Hively and others [2018]) reports only those practices that fall within the Chesapeake Bay watershed and its component HUC-8 subwatersheds.

The FSA practice data (BMP practices sponsored by the Conservation Reserve and Conservation Reserve Enhancement Programs) are provided in appendix 3E (Hively and others, 2018) only at county-level aggregation, because no link between practice code and customer code was available in the structure of the spatially explicit datasets provided by the FSA. Therefore, it was not possible to count number of customers enrolled in each practice to meet the HUC-8 aggregation criteria. It was, however, possible to aggregate by county based on county FIPS codes. Future upgrades to the FSA record-keeping system will hopefully address this issue.

All reported practices supported by the FSA or the NRCS are included in the aggregated datasets, although not all FSA and NRCS practices provide a water-quality benefit. The dataset does not include practices funded solely by the state jurisdictions or non-USDA entities, or adopted by producers without cost-share support, except in the cases where the NRCS provided conservation technical assistance. As such, these data do not represent all conservation implementation, but only the portion for which the USDA has provided support through either funding or technical assistance.

The NRCS conservation technical assistance data are provided separately from the NRCS-funded practices. The CTA data include any practice that was implemented by NRCS and met NRCS technical and verification standards at time of implementation but was not funded by NRCS or FSA. Because the CTA practices are not under contract, it is not known if each practice was maintained throughout its projected lifespan, or whether a non-Federal entity provided funding. However, CTA practices were certified to meet NRCS standards at the time of implementation.

Effect of Geographic Scale on Data Aggregation to Protect Farmer Privacy

The rules specified by USDA and agreed to by USGS are that data may be shared with the public only for practices implemented by five or more producers within the same time span and geographical area (aggregation unit). For practices with fewer than five participating producers, reporting would violate confidentiality because individual producers could potentially be identified.

Wherever there were five or more producers participating in a practice within an aggregation unit (county or HUC-8 watershed), the data were reported at that scale. Where there

were less than five producers reporting a practice in an aggregation unit, the nonreportable practice data were considered for aggregation at the next largest scale: state scale for the county aggregation, or HUC-4 watershed scale for the HUC-8 aggregation. The data reported at these larger scales include only those practices not reportable for a smaller aggregation unit and for which five or more farmers were participating.

There were some practices for which there were less than five participating producers in the state. Those data cannot be shared in unaggregated form and therefore were not reported in the aggregated dataset. Where there are only a few large farms within the Chesapeake Bay portion of a state, such as on Virginia's Eastern Shore, this was more likely to occur. It would be incorrect to assume that there is no implementation in such locations. There could be many acres of implementation among four or fewer producers.

Nonreportable situations occur more frequently with smaller aggregation scales such as HUC-12 watersheds and providing the data at a small watershed scale therefore underrepresents the amount of USDA implementation. The total number of reportable practices at each aggregation scale are shown in table 2, and the number of reportable practices by practice code, per year, at various aggregation scales (unaggregated, county, HUC-8, and HUC-12) are listed in appendix 2 (Hively and others, 2018). These numbers were calculated from the annual aggregation totals and were subsequently summed for the period of record (2007–17), such that they represent the effect of aggregation at the annual scale.

Overall, the HUC-8 aggregation reported 94.6 percent of implemented NRCS practices (92.0 percent of funded practices and 96.4 percent of CTA). The 94.6 percent included 797,351 practices implemented within the Chesapeake Bay watershed from 2007 through 2017, out of 842,987 total records that were transmitted in the NRCS privacy protected (unaggregated) farm practices dataset (table 2). The county aggregation reported 92.6 percent of implemented NRCS practices (89.0 percent of funded practices and 95.1 percent of CTA), and the HUC-12 aggregation reported 79.2 percent of implemented NRCS practices (73.1 percent of funded practices and 83.6 percent of CTA).

Reportability of conservation practices depends on the level of censorship required by aggregation protocols and tends to be greater for more frequently occurring practices (fig. 4). Although the HUC-12 aggregation captured 79.2 percent of practices overall, it should be noted that reportability at the HUC-12 scale was quite variable according to HUC-12

location, due to the increased variation in frequency of practice occurrence at the smaller watershed scale. Owing to the greater proportion and variability of unreportable records at the HUC-12 scale, HUC-8 watersheds and counties were chosen as the aggregation scales to be published in this data series.

Implementation Trends

The number of funded agricultural conservation practices supported by the USDA within the Chesapeake Bay watershed increased from 2007 to 2017, with implementation peaking in 2012–13 coincident with funding increases associated with the NRCS Chesapeake Bay Watershed Initiative (table 3, fig. 5A). The number of conservation technical assistance records decreased from 2007 to 2017 (table 3, fig. 5B), partly as a result of time constraints on field staff under increasing work load, and partly because with increased financial assistance becoming available to implement practices under the Chesapeake Bay Watershed Initiative, CTA shifted to focus on identifying conservation needs and planning practices which could be implemented through financial assistance programs (Barry Frantz, written commun., August 2018).

If lifespan is considered, such that practices are counted each year from their first implementation until they exceed their lifespan, the total number of active implemented practices is greater, as depicted in table 4 and figures 6A and B.

Trends in BMP implementation over time can be described at a smaller scale using the county and HUC-8 aggregated datasets (appendix 3 in Hively and others [2018]), and those trends may be linked to observed trends in water quality at USGS monitoring stations. For example, an analysis of trends in water-quality parameters and conservation implementation for three showcase watersheds can be found in Hyer and others (2016). Future work will make available aggregated BMP implementation totals for the watersheds draining to each of the CBP Partnership's nontidal network of stream water-quality monitoring stations.

Combining with Other Conservation Practice Datasets

It is valid to use the sum of USDA-funded and CTA practices as an estimate of total implementation intensity, although

Table 2. Number of reported practices and percent of total recorded practices associated with each aggregation scale (HUC-8, county, HUC-12), according to source of support (U.S. Department of Agriculture-funded practices versus conservation technical assistance [CTA]).

[HUC, hydrologic unit code]

Source	All records	HUC-8 aggregation		County aggregation		HUC-12 aggregation	
	Number	Number	Percent	Number	Percent	Number	Percent
Funded	348,855	321,116	92.0	310,411	89.0	255,066	73.1
CTA	494,132	476,235	96.4	469,788	95.1	412,920	83.6
Total	842,987	797,351	94.6	780,199	92.6	667,986	79.2

this combined dataset will miss important practices that are not supported by the USDA (the state-supported implementation of winter cover crops in Maryland being a clear example). The CTA records do not duplicate the NRCS-funded practice records, so these datasets can be combined without risk of double counting. However, caution should be used when combining the USDA records with additional datasets of state or privately funded practices, in order to avoid duplication.

Because many practices are co-cost-shared by state and Federal funding sources, and because the NRCS often provides conservation technical assistance on practices funded by the jurisdictions, caution must be used when combining the USDA dataset with additional databases of conservation implementation to avoid counting the same practice multiple times. When combining datasets, data users may choose to identify practices by funding source to avoid double counting the same instance of a practice, or to limit the integration of datasets to practices which are never co-cost shared. For a thorough description of how the jurisdictions avoid double

counting when combining state and Federal datasets, see Hively and others (2013).

Data Access for the Chesapeake Bay Program Partnership's Annual Progress Review

The 2017 aggregated dataset compiled by the USGS and presented in this data series was transmitted to the six state jurisdictions within the Chesapeake Bay watershed (Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia) for possible use in compiling their data submissions to the 2017 CBP partnership's annual progress review. The annual updates provided by USGS have been, and will likely continue to be, used in a similar fashion for each year's annual progress review.

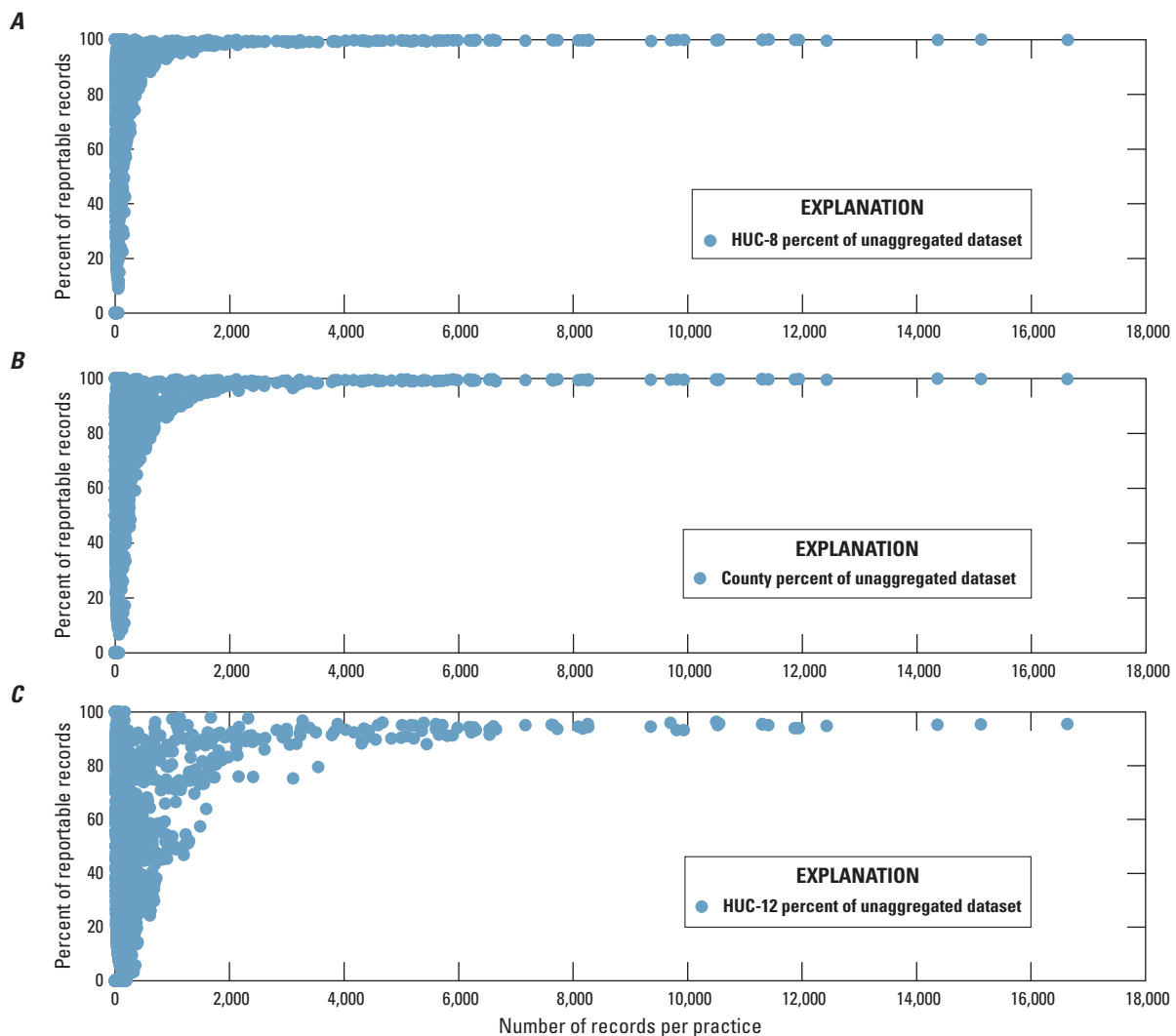


Figure 4. Effect of scale on reportability of practices due to increased censorship by aggregation protocols at smaller scales, for *A*, aggregation by HUC-8 watershed, *B*, aggregation by county, and *C*, aggregation by HUC-12 watershed.

Table 3. Annual number of U.S. Department of Agriculture (USDA)-supported conservation practices implemented within the Chesapeake Bay watershed, from 2007 through 2017, by state. These numbers were calculated using the county aggregation dataset and therefore represent 92.6 percent of all USDA-supported practices (89.0 percent of funded practices and 95.1 percent of conservation technical assistance [CTA]).

[DE, Delaware; MD, Maryland; NY, New York; PA, Pennsylvania; VA, Virginia; WV, West Virginia]

State	Type	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2007–17
DE	Funded	5,727	6,981	8,175	10,533	10,800	8,064	8,093	4,076	2,004	1,778	2,307	68,538
	CTA	8,774	10,927	3,686	4,335	2,138	878	1,044	2,778	3,357	299	3,432	41,648
MD	Funded	3,419	4,365	5,734	4,048	5,601	10,618	7,320	6,395	4,561	3,515	3,345	58,921
	CTA	17,272	17,859	16,495	20,841	15,824	16,245	15,549	10,652	9,264	6,369	7,106	153,476
NY	Funded	1,922	1,961	2,177	2,648	2,134	3,110	3,913	3,090	2,810	2,912	2,712	29,389
	CTA	10,039	8,606	7,097	4,364	4,454	4,795	4,757	2,179	1,313	695	761	49,060
PA	Funded	2,699	5,020	5,641	7,138	7,201	6,608	7,415	6,479	6,373	6,507	5,821	66,902
	CTA	15,963	15,142	10,163	10,566	8,394	7,444	9,971	6,472	7,530	5,880	5,469	102,994
VA	Funded	4,478	5,185	6,581	10,225	9,318	11,196	11,156	12,327	11,192	9,589	8,581	99,828
	CTA	19,339	18,557	19,105	19,882	13,210	16,521	15,926	2,699	925	1,331	1,993	129,488
WV	Funded	401	850	1,031	1,607	2,135	2,075	2,336	2,132	2,438	2,865	2,255	20,125
	CTA	1,568	1,718	1,037	1,633	1,465	1,234	946	892	1,079	1,088	1,189	13,849
Chesapeake watershed	Funded	18,646	24,362	29,339	36,199	37,189	41,671	40,233	34,499	29,378	27,166	25,021	343,703
	CTA	72,955	72,809	57,583	61,621	45,485	47,117	48,193	25,672	23,468	15,662	19,950	490,515
Total		91,601	97,171	86,922	97,820	82,674	88,788	88,426	60,171	52,846	42,828	44,971	834,218

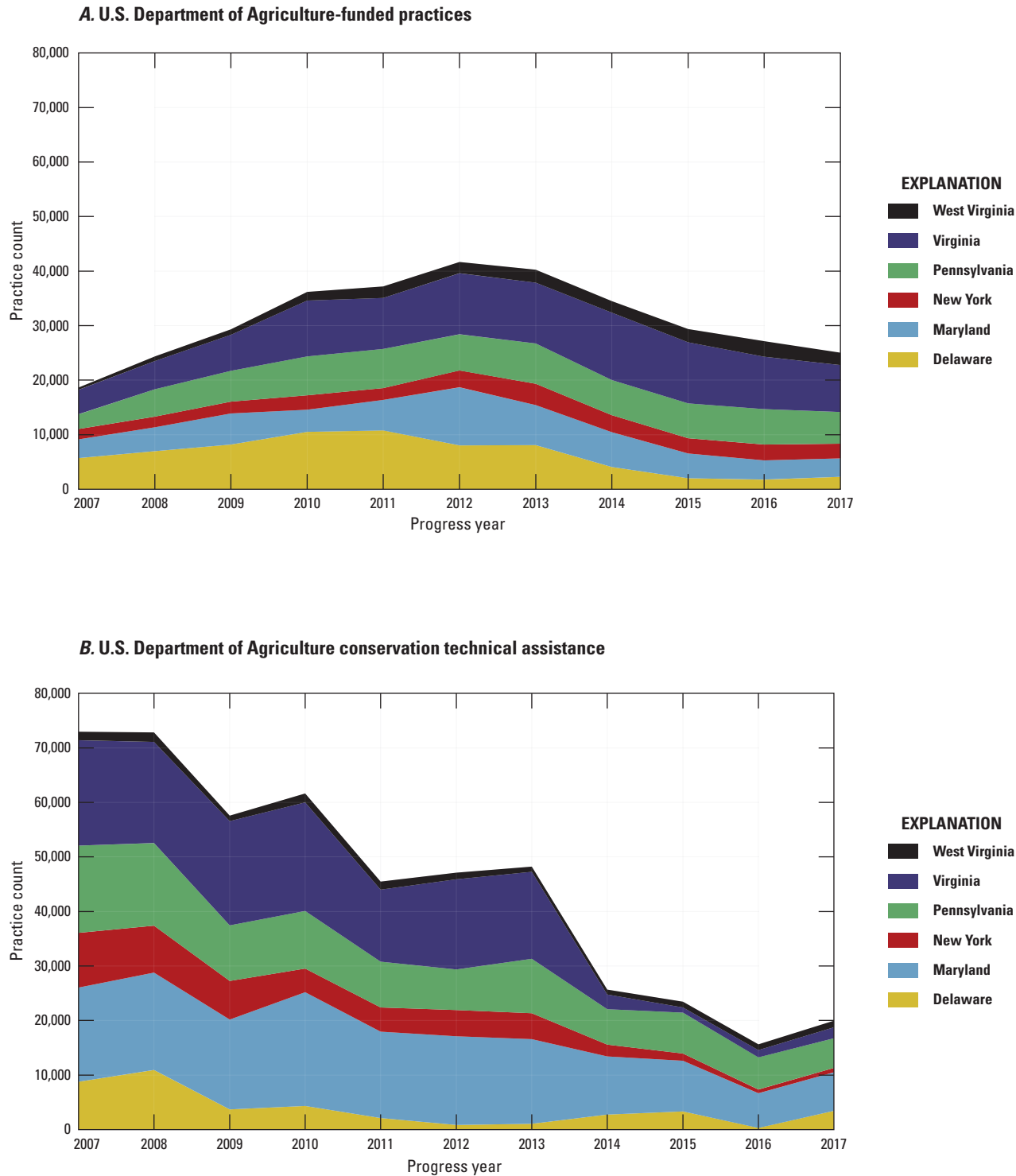


Figure 5. Annual number of A, U.S. Department of Agriculture (USDA)-funded practices and B, USDA conservation technical assistance practices implemented within the Chesapeake Bay watershed, from 2007 through 2017, by state (calculated from county aggregation).

Table 4. Cumulative number of U.S. Department of Agriculture (USDA)-supported conservation practices that have not exceeded their planned lifespan, implemented within the Chesapeake Bay watershed, from 2007 through 2017, by state. These numbers were calculated using the county aggregation dataset and therefore represent 92.6 percent of all USDA-supported practices (89.0 percent of funded practices and 95.1 percent of conservation technical assistance [CTA]).

[DE, Delaware; MD, Maryland; NY, New York; PA, Pennsylvania; VA, Virginia; WV, West Virginia]

State	Type	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2007–17
DE	Funded	5,727	7,072	8,420	10,890	11,336	8,711	8,906	5,083	3,255	3,327	4,073	76,800
	CTA	8,774	11,030	3,866	4,577	2,393	1,084	1,257	2,972	3,556	509	3,607	43,625
MD	Funded	3,419	4,632	6,428	5,142	7,132	12,523	9,602	9,079	7,717	7,143	7,472	80,289
	CTA	17,272	18,963	18,618	23,994	20,076	21,202	21,384	16,941	15,873	13,215	13,727	201,265
NY	Funded	1,922	2,168	2,719	3,442	3,236	4,470	5,576	5,076	5,021	5,293	5,371	44,294
	CTA	10,039	9,006	7,870	5,414	5,659	5,869	5,900	3,500	2,672	2,109	2,134	60,172
PA	Funded	2,699	5,794	7,385	9,810	10,937	11,456	13,460	13,820	14,867	16,085	16,347	122,660
	CTA	15,963	19,068	17,820	20,424	20,159	18,895	21,089	18,130	19,294	17,928	15,796	204,566
VA	Funded	4,478	5,813	8,065	12,667	12,660	15,470	17,062	19,828	20,110	20,237	19,860	156,250
	CTA	19,339	20,869	23,689	26,660	21,647	26,016	26,314	13,735	12,029	12,533	12,579	215,410
WV	Funded	401	986	1,434	2,329	3,281	3,748	4,511	4,829	5,707	6,807	6,846	40,879
	CTA	1,568	2,040	1,692	2,534	2,708	2,651	2,522	2,666	3,057	3,217	3,349	28,004
Chesapeake watershed	Funded	18,646	26,465	34,451	44,280	48,582	56,378	59,117	57,715	56,677	58,892	59,969	521,172
	CTA	72,955	80,976	73,555	83,603	72,642	75,717	78,466	57,944	56,481	49,511	51,192	753,042
Total		91,601	107,441	108,006	127,883	121,224	132,095	137,583	115,659	113,158	108,403	111,161	1,274,214

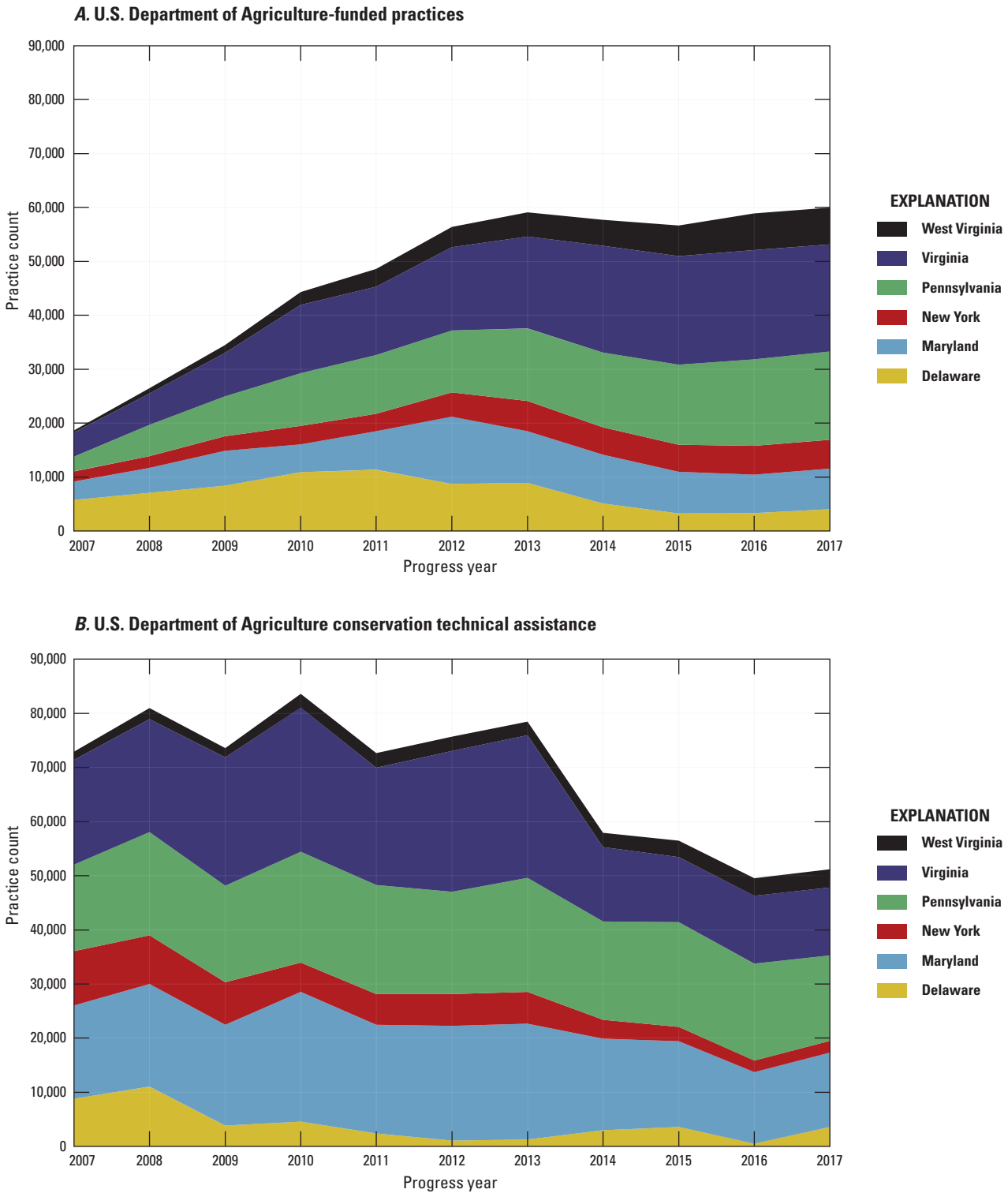


Figure 6. Cumulative number of A, U.S. Department of Agriculture (USDA)-funded practices and B, USDA conservation technical assistance practices that have not exceeded their planned lifespan, implemented within the Chesapeake Bay watershed from 2007 through 2017, by state (calculated from county aggregation).

Summary and Conclusions

The USGS, operating as a Conservation Cooperator with the USDA, obtains records of conservation implementation on Chesapeake Bay farms in October of each year, including all practices for which the USDA-NRCS or USDA-FSA provide either cost-share funding or conservation technical assistance. These data records are subsequently processed through quality control protocols, aggregated to protect farmer privacy, and provided to the public. This data series provides aggregation results at county and HUC-8 watershed scales, which respectively capture 92.6 percent and 94.6 percent of all records provided by USDA.

Effects of USGS Interactions on Data Quality

In the process of requesting, obtaining, and aggregating the datasets that were provided each year by the NRCS and the FSA, a number of inconsistencies in the datasets were identified by USGS. Collaboration between USGS and NRCS staff to understand and correct these issues has resulted in continuous improvements to the quality of data obtained from the NRCS. Examples include identifying and correcting missing links between Conservation Stewardship Program plans and contracts; improved tracking of program expenditures, payments, and cost-share estimates; and more accurate information on the location, land use, and animal type to which certain conservation practices were applied.

These improvements have allowed a greater number of conservation practices to be included in aggregated data provided to the states, enabling the agriculture community to receive more credit for conservation practice implementation in the CBP Partnership's annual progress review. A more integrated tracking of conservation practices has enhanced the NRCS's ability to maintain high-quality records of their conservation programs. Furthermore, the increased data quality supports collaborative efforts between the USGS and the USDA to understand how conservation practice implementation improves management of our natural resources and positively impacts water-quality trends in the Chesapeake Bay region.

Recommendations for Further Improvements

Within the database structure used to manage CRP and CREP contracts, the FSA is currently unable to link the producer ID for each record (used to count participants for aggregation purposes) with the site-specific locational data including common land unit shapefile identification code (CLUID) and watershed identification code. As a result, the FSA dataset can only be aggregated at a county scale based on FIPS code and cannot currently be aggregated by watershed. This limits the ability to link conservation reserve implementation with observed water-quality response in a publicly accessible context.

In 2013 the FSA transitioned data management to the Conservation Contract Maintenance System (CCMS), which interacts with the Service Center Information Management System (SCIMS) and the Modernize and Innovate the Delivery of Agricultural Systems (MIDAS) Business Partner system (Farm Service Agency, 2017). With this transition, farm, field, and tract information is kept associated with the practice data. However, the farm, field, and tract are only present in the CCMS for new contracts or for older contracts that have been opened in the new web-based system. There are therefore many CRP practices implemented that do not have the farm, field, and tract associated with them in the current FSA data management system or in the dataset that is delivered to the USGS.

To determine the HUC-8 watershed location of an FSA practice, the geospatial information provided by FSA (CLU field boundaries) was joined to the tabular conservation practice dataset (including producer ID) using the contract number, farm, field, and tract. However, where contract number, farm, field, or tract was missing or represented by spaces, then the geographical location could not be determined. Because the number of unmatchable records was large, the FSA data was aggregated only at county scale. Additional work by FSA could improve the completeness of the farm, field, and tract information. This would allow for improved geospatial information of farm practices in the database, supporting data aggregation by watershed in addition to county.

Demonstrated Benefits of Data Availability

The aggregated datasets provided by the USGS have been regularly used by four of the six Chesapeake Bay state jurisdictions (Delaware, Pennsylvania, Virginia, and West Virginia) to report Federal conservation implementation to the CBP Partnership's annual progress review, providing a mechanism for farmers to be credited for their conservation activities, and increasing knowledge of progress toward conservation goals. The data have been used by the remaining two jurisdictions (Maryland and New York) to provide a quality control comparison with jurisdictional databases of USDA practice implementation.

By obtaining USDA datasets for the entire Chesapeake Bay watershed, the USGS has improved the accuracy and consistency of data used for the CBP Partnership's annual progress review. The datasets have also been useful in supporting watershed studies linking BMP implementation to trends in water quality (for example, Hyer and others, 2016). The USDA dataset is only part of the picture, and there are many other practices, supported by state agencies, nongovernmental programs, or adopted on an independent basis, that are not captured in the USDA dataset. This data series, along with information contained in Hively and others (2013) provides guidance on how to combine the datasets while reducing the risk of double counting.

The widespread implementation of agricultural conservation practices is a critical component of efforts to achieve

water-quality objectives in the Chesapeake Bay watershed. Accurate accounting of progress in BMP implementation will assist the various members of the CBP Partnership, including the many farmers striving to achieve environmental sustainability of food and fiber production, in assessing and adapting conservation efforts to achieve common goals of resilience, productivity, and health of Chesapeake Bay upland and estuary ecosystems.

Data Availability

The aggregated datasets documented in this data series are available from a USGS ScienceBase data release (Hively and others, 2018).

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Appendixes 1–3

Appendix 1A. Conservation cooperator memorandum of understanding between the U.S. Geological Survey and the Natural Resources Conservation Service, signed in 2015

MEMORANDUM OF UNDERSTANDING

Between
U.S. Geological Survey
AND
United States Department of Agriculture
Natural Resources Conservation Service

I. PARTIES

This Memorandum of Understanding (MOU) is entered into by the United States Department of Agriculture Natural Resources Conservation Service (NRCS) and the U.S. Geological Survey (USGS).

II. PURPOSE

The purpose of this MOU is to continue the existing cooperation between USGS and NRCS for the evaluation of conservation practices and systems for improving water quality throughout the Chesapeake Bay watershed. The USGS and NRCS will work collaboratively to develop geospatial conservation data sets that preserve the value of the conservation actions, but do not reveal privacy information about individual farms or ranches.

III. BACKGROUND AND MUTUAL BENEFITS

USGS and NRCS have a mutual interest in meeting responsibilities identified in the Presidential Executive Order (13508) on the Chesapeake Bay, and in determining the benefits and impacts of agricultural conservation systems on water quality. Understanding the sources of nutrients and sediment and how these nutrients move into streams and groundwater is critical to design effective nutrient management and erosion control strategies.

IV. SCOPE

The NRCS and USGS will collaborate to produce aggregated data sets that can be incorporated into the Chesapeake Bay Program Watershed Model to assess the impacts of conservation actions.

V. RESPONSIBILITIES

NRCS agrees to:

Provide to the USGS the protected information that has been approved for disclosure under this Agreement for the states in the Chesapeake Bay watershed (New York, Pennsylvania, West Virginia, Maryland, Delaware, and Virginia). The protected data types approved for disclosure are limited to:

- Spatially references (e.g. vector files useable in a Geographic Information System) NRCS program practice data for the Chesapeake Bay watershed. This data will be fully attributed and contain no financial information.
- Permit the USGS to release aggregated statistical information to Chesapeake Bay Program Partner organizations and the public following review and approval by NRCS of the USGS' data

aggregation procedures to ensure compliance with section 1244, section 1619 and other applicable law.

USGS agrees to:

- Provide technical assistance in the form of monitoring, assessment, and evaluation in support of NRCS programs by analyzing the impact of farming and ranching practices on water quality in the Chesapeake Bay Watershed.
- Acquire and assess agricultural conservation practice data records for USDA programs and transfer those datasets in aggregated format to State jurisdictional agencies for use in reporting conservation progress to the Chesapeake Bay Program Partnership (CBP Partnership).

VI. FINANCIAL ARRANGEMENTS

This MOU defines in general terms the basis on which the NRCS and USGS will collaborate, and as such, does not obligate the expenditure of any funds. Expenditures of funds, human resources, equipment, supplies, facilities, training, public information, and expertise will be provided by each agency to the extent that their participation is required and resources are available to achieve the collaborative products.

This MOU is neither a fiscal nor funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties of the MOU will be handled in accordance with applicable laws, regulations, and procedures. Such endeavors will be documented in separate agreements, with specific projects between parties articulated; separate agreements will reference this MOU. This MOU in no way restricts the NRCS or USGS from participating in similar activities or arrangements with other public or private agencies, organizations, or individuals. Nothing in this MOU will obligate the NRCS or USGS to expend appropriations or to enter into any contracts or other obligations.

VII. DATA DISTRIBUTION ARRANGEMENTS USDA

The exchange of data by NRCS and USGS, and the use of such data by the entities, will be carried out in compliance with the information gathering provisions of section 1619 of the Food, Conservation, and Energy Act of 2008 (7 U.S.C. 879l(b)), section 1244(b) of the Food Security Act of 1985, as amended (16 U.S.C. Section 3844(b)), the Privacy Act, the Freedom of Information Act, and related acts concerning privacy and the dissemination of government records.

**SEE ATTACHED ADDENDUM; 1619 COOPERATOR
ACKNOWLEDGEMENT DOCUMENT.**

VIII. PERIOD OF AGREEMENT

This MOU will become effective as of the date of approval of the last signature and will continue in effect for a period of 5 years, which is currently the amount of time permitted under the statutory limitations. No extension will be permitted. This MOU may be cancelled, renegotiated, amended, or modified by a written amendment through an exchange of correspondence between authorized officials of the signatory parties.

NRCS or USGS may terminate or withdraw from this MOU at any time before the expiration date by providing a 30-day written notice to all other signatory agencies.

IX. CONTACTS

NRCS Technical Contact

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Chesapeake Bay Coordinator
USDA Natural Resources Conservation Service
339 Busch's Frontage Road, Suite 301
Annapolis, MD 21409-5543
Office Phone: (443)482-2913
Timothy.Garcia@md.usda.gov

USGS

David A. Kirtland, Ph.D.
Director, Eastern Geographic Science Center
U.S. Geological Survey
12201 Sunrise Valley Dr.
Reston, VA 20192
Office Phone: 703-648-4712
dakirtland@usgs.gov

NRCS Administrative Contact

Frankie Comfort
Grants Management Specialist
USDA-NRCS
1400 Independence Ave SW
Rm. 6815-S
Washington, DC 20250
Office Phone: 202.720-0242
Frankie.Comfort@wdc.usda.gov

X. APPROVALS

Now, therefore, NRCS and USGS enter into this interagency agreement covering cooperative efforts characterizing the water quality effects of conservation activities on agricultural lands of the Chesapeake Bay watershed.

Authorized Signatures:



Thomas W. Christensen
Associate Chief for Operations, NRCS



Jess Weaver
Regional Director, Southeast Region.

ADDENDUM: 1619 COOPERATOR ACKNOWLEDGEMENT (Must be reviewed and signed)

Appendix 1*B*. Conservation cooperator acknowledgement of requirements between the U.S. Geological Survey and the Natural Resources Conservation Service, signed in 2015

NATURAL RESOURCES CONSERVATION SERVICE (NRCS) UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)

ACKNOWLEDGMENT OF REQUIREMENTS FOR PROTECTION OF PRIVACY OF PERSONAL AND GEOSPATIAL INFORMATION RELATING TO NATURAL RESOURCES CONSERVATION PROGRAMS

Purpose and Background

The purpose of this Acknowledgment (hereinafter "Acknowledgment compliance") is to require acknowledgment by the U.S. Geological Survey (USGS) of the requirements of the Privacy Act of 1974, as amended (5 USC 552), Section 1244 of the Food Security Act of 1985, as amended (16 USC 3844); and Section 1619 of the Food, Conservation, and Energy Act of 2008 (7 USC 8791)(the 2008 Farm Bill); which prohibits disclosure of certain information by the Department of Agriculture (USDA), and its cooperators. The U.S. Geological Survey (USGS) assists NRCS in the delivery of conservation-related services (for example, services that sustain agricultural productivity, improve environmental quality, reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters); or with monitoring, assessing, or evaluating of conservation benefits from USDA conservation programs under a memorandum of understanding. Those individuals or organizations (governmental or nongovernmental) that assist NRCS with providing conservation-related services are known as NRCS Conservation Cooperators.

Authority

Executive Order 13508 – Chesapeake Bay Protection and Restoration, and the Food, Conservation, and Energy act of 2008 – Sec. 1619

NRCS Conservation Cooperator

As an NRCS Conservation Cooperator, USGS is authorized access to otherwise-protected agricultural and client information. Such protected information must be strictly limited to only that information necessary for USGS to perform monitoring, assessing, or evaluating of conservation benefits. Disclosure to USGS can include receiving the protected information either 1) directly from NRCS; 2) directly from the producer or owner as part of the process required to enable a producer or owner to participate in a USDA program; 3) in another manner with the producer's permission; or 4) directly from another USDA Conservation Cooperator.

Privacy Act, Section 1244, of the Food Security Act of 1985, and Section 1619 of the 2008 Farm Bill

The Privacy Act (hereinafter referred to as Section 552a) provides that no agency shall disclose any record which is contained in a system of records by any means of communication to any person, or to another agency, except pursuant to a written request by, or with the prior written consent of, the individual to whom the record pertains, unless disclosure of the record would be for routine use in carrying out the agency's mission. Accordingly, USGS may not subsequently disclose ANY information protected by 552a. By signature on this Acknowledgment, USGS is

certifying future compliance with the statutory obligations under Section 552a. Upon execution of this Acknowledgment, NRCS may continue to provide to USGS the protected information provided under this memorandum of understanding. This agreement in NO way conveys to USGS the right of disclosure of privacy protected data (non-aggregated) to the public or other agencies.

Section 1244 of the Food Security Act of 1985, as amended (16 USC 3844), hereinafter "Section 1244" provides that information received for technical and financial assistance relating to NRCS and Farm Service Agency (FSA) natural resource conservation programs.

- (i) shall not be considered to be public information; and
- (ii) shall not be released to any person or Federal, State, local agency or Indian tribe (as defined by the Secretary) outside the Department of Agriculture.

Section 1244 allows NRCS to release information to a person or Federal, State, local, or tribal agency only for the purpose of assisting the Secretary--

- (I) in providing the requested technical or financial assistance; or
- (II) in collecting information from data gathering sites.

Further, participation in the program (technical and financial assistance) cannot be conditioned on the owner, operator, or producer in any program administered by USDA on providing a release of their protected information.

Violations and penalties of with respect to release of information collected will be applied consistent with 7 USC 2276(c).

Section 1619 of the Food, Conservation, and Energy Act of 2008 (7 USC 8791); hereinafter "Section 1619" provides that USDA, or any "contractor or cooperator" of USDA, "shall not disclose—(A) information provided by an agricultural producer or owner of agricultural land concerning the agricultural operation, farming or conservation practices, or the land itself, in order to participate in the programs of the Department; or (B) geospatial information otherwise maintained by the Secretary about agricultural land or operations for which information described in subparagraph (A) is provided." USDA may disclose protected information to a USDA cooperator when such cooperator is "providing technical or financial assistance with respect to the agricultural operation, agricultural land, or farming or conservation practices" if USDA determines that the protected information will not be subsequently disclosed, except in accordance with the exceptions contained in Section 1619. USGS is a "contractor or cooperator" of USDA within the meaning of Section 1619.

Responsibilities

USGS (hereinafter the "Conservation Cooperator") certifies that:

- Signature on this Acknowledgment indicates acknowledgment and understanding that the Conservation Cooperator is legally bound by Federal statute to comply with the provisions of Section 552a, Section 1244, and Section 1619; and that the Conservation Cooperator will not subsequently disclose Personally Identifiable Information, or information protected by Sections 1244 and 1619 to any individual or organization that is not directly covered by this Acknowledgment. Any such subsequent disclosure of the protected information will be considered a violation of 552a, Section 1244, and/or

Section 1619. The Conservation Cooperator will be held responsible should disclosure of the protected information occur.

- Signature on this Acknowledgment legally binds every owner, manager, supervisor, employee, contractor, agent, and representative of the Conservation Cooperator to comply with the provisions in Section 552a, Section 1244, and Section 1619. The Conservation Cooperator must secure expressed written concurrence prior to providing protected information to an entity or individual outside of the Conservation Cooperator and as necessary to implement the program to ensure that such release is permissible.
- The Conservation Cooperator will use the protected information only to perform work that is directly connected to perform monitoring, assessing, or evaluating conservation benefits. Use of the protected information to perform work that is not directly connected to perform monitoring, assessing, or evaluating conservation benefits is expressly prohibited.
- The Conservation Cooperator must internally restrict access to Personally Identifiable Information or other protected information to only those individuals who have a demonstrated need to know the protected information in order to perform monitoring, assessing, or evaluation of conservation benefits.
- The provisions in Section 552a, Section 1244, and Section 1619 are continuing obligations. Even when the Conservation Cooperator is no longer an NRCS Conservation Cooperator, or when individuals currently affiliated with the Conservation Cooperator become no longer so affiliated, every person having been provided access to the protected information will continue to be legally bound to comply with the provisions of this Acknowledgment.
- The Conservation Cooperator must notify all agency employees who will have access to the restricted information about this Acknowledgment and the requirements of Section 552a, Section 1244, and Section 1619. For the duration of this Acknowledgment, notifications about the existence of this Acknowledgment must be made to those individuals who are new to the organization and periodic notifications must be sent throughout the organization (as well as to all contractors and agents) to remind all about the ongoing and continuing requirements.
- When the Conservation Cooperator is unsure whether particular information is covered or protected by Section 552a, Section 1244, or Section 1619, the Conservation Cooperator must consult with NRCS to determine whether the information must be withheld.
- This Acknowledgment is nontransferable and may not be bought, sold, traded, assigned, extended to, or given free of charge to any other individual or organization not directly covered by this Acknowledgment.
- Use of the protected information for any purpose is expressly prohibited when an individual or organization is no longer an NRCS Conservation Cooperator. When the Conservation Cooperator is no longer an NRCS Conservation Cooperator, any protected information provided under this Acknowledgment must be immediately destroyed or

returned to NRCS. The Conservation Cooperator must provide to NRCS written certification that the protected information (paper copy, electronic copy, or both) has been properly destroyed, removed from any electronic storage media, or both.

Protected Information

An example of the type of information prohibited by disclosure under Section 552a, Section 1244, and/or Section 1619 includes, but is **not limited to**, the following:

- Personally Identifiable Information (PII), refers to information that can be used to distinguish or trace an individual's identity, either alone or when combined with other personal or identifying information that is linked or linkable to a specific individual
- State identification and county number (where reported and where located).
- Owner, operator, or producer name, business full address, phone number, Social Security Number, and similar personal identifying information.
- Farm, tract, field, and contract numbers.
- Production shares and share of acres for each Farm Serial Number (FSN) field.
- Acreage information, including crop codes.
- All attributes for Common Land Units (CLUs) in USDA's Geospatial Information System
- Any photographic, map, or geospatial data that, when combined with other maps, can be used to identify a landowner.
- Location of conservation practices.
- Conservation program related application lists with names, funding request, ranking score, and related information.
- Case file documentation relating to application evaluation and ranking for conservation program participation.
- Operation and monitoring reports for easements.

Sections 1244 and 1619 allows disclosure of "payment information (including payment information and the names and addresses of recipients of payments) under any Department program *that is otherwise authorized by law*" (emphasis added). The names and payment information of producers generally may be provided to the public; however the Conservation Cooperator shall consult with NRCS before releasing any such information..

Sections 1244 and 1619 also allows disclosure of otherwise protected information if "the information has been transformed into a statistical or aggregate form without naming any—(i) individual owner, operator, or producer; or (ii) specific data gathering cite." The Conservation Cooperator must consult with NRCS as to whether specific information falls within this exception prior to relying on this exception.

Violations

The Conservation Cooperator will be held responsible for violations of this Acknowledgment and Section 1619. A violation of this Acknowledgment by the Conservation Cooperator may result in action by NRCS, including termination of the underlying memorandum of understanding.

Section 552a indicates any officer or employee, who by virtue of his employment or official position, has possession of, or access to, agency records which contain individually identifiable

information the disclosure of which is prohibited by this section or by rules or regulations established thereunder, and who knowing that disclosure of the specific material is so prohibited, willfully discloses the material in any manner to any person or agency not entitled to receive it, shall be guilty of a misdemeanor and fined up to \$5,000.

Section 1244 offers penalties up to \$10,000 and up to 1 year in prison via reference to 7 USC 2776c for any person who shall publish, cause to be published, or otherwise publicly release information collected pursuant to a provision of law.

Effective Period

This Acknowledgment will be in effect on the date of the final signature and continues until NRCS notifies the Conservation Cooperator that the Acknowledgment is no longer required based on changes in applicable Federal law.

Signature of the NRCS Conservation Cooperator and the Date Signed

A redacted signature consisting of a series of black and white squares.

Jess Weaver, Regional Director, Southeast Region

Executed this  day of 

SEC. 1619. INFORMATION GATHERING.

(a) **GEOSPATIAL SYSTEMS**—The Secretary shall ensure that all the geospatial data of the agencies of the Department of Agriculture are portable and standardized.

(b) **LIMITATION ON DISCLOSURES**—

(1) **DEFINITION OF AGRICULTURAL OPERATION**—In this subsection, the term “agricultural operation” includes the production and marketing of agricultural commodities and livestock.

(2) **PROHIBITION**—Except as provided in paragraphs (3) and (4), the Secretary, any officer or employee of the Department of Agriculture, or any contractor or cooperator of the Department, shall not disclose—

(A) Information provided by an agricultural producer or owner of agricultural land concerning the agricultural operation, farming or conservation practices, or the land itself, in order to participate in programs of the Department; or

(B) Geospatial information otherwise maintained by the Secretary about agricultural land or operations for which information described in subparagraph (A) is provided.

(3) **AUTHORIZED DISCLOSURES**—

(A) **LIMITED RELEASE OF INFORMATION**—If the Secretary determines that the information described in paragraph (2) will not be subsequently disclosed except in accordance with paragraph (4), the Secretary may release or disclose the information to a person or Federal, State, local, or tribal agency working in cooperation with the Secretary in any Department program—

(i) When providing technical or financial assistance with respect to the agricultural operation, agricultural land, or farming or conservation practices; or

(ii) When responding to a disease or pest threat to agricultural operations, if the Secretary determines that a threat to agricultural operations exists and the disclosure of information to a person or cooperating government entity is necessary to assist the Secretary in responding to the disease or pest threat as authorized by law.

(4) **EXCEPTIONS**—Nothing in this subsection affects—

(A) The disclosure of payment information (including payment information and the names and addresses of recipients of payments) under any Department program that is otherwise authorized by law;

(B) The disclosure of information described in paragraph (2) if the information has been transformed into a statistical or aggregate form without naming any—

(i) Individual owner, operator, or producer; or

(ii) Specific data gathering site; or

(C) The disclosure of information described in paragraph (2) pursuant to the consent of the agricultural producer or owner of agricultural land.

(5) **CONDITION OF OTHER PROGRAMS**—The participation of the agricultural producer or owner of agricultural land in, or receipt of any benefit under, any program administered by the Secretary may not be conditioned on the consent of the agricultural producer or owner of agricultural land under paragraph 4(c).

(6) **WAIVER OF PRIVILEGE OR PROTECTION**—The disclosure of information under paragraph (2) shall not constitute a waiver of any applicable privilege or protection under Federal law, including trade secret protection.

Appendix 1C. Conservation cooperator memorandum of understanding between the U.S. Geological Survey and the Farm Service Agency, signed in 2015

UNITED STATES DEPARTMENT OF AGRICULTURE
MEMORANDUM OF UNDERSTANDING
WITH
U.S. GEOLOGICAL SURVEY
CERTIFYING USDA AGENCY: FARM SERVICE AGENCY
UNDERSTANDING NUMBER: FSA/USGS-001-2015

Purpose

This USDA Cooperator Memorandum of Understanding is being issued by Farm Service Agency (FSA) to establish that U.S. Geological Survey (USGS) has been certified by FSA to be working in cooperation with the Secretary of Agriculture by providing technical assistance to a USDA program that concerns an agricultural operation, agricultural land, farming practice, or conservation practice. An individual or organization (governmental or non-governmental) certified by FSA to be working in cooperation with the Secretary of Agriculture on a USDA program where access is required to data that is protected by 7 U.S.C. § 8791 of the Food, Conservation and Energy Act of 2008 is known as a USDA Cooperator.

USDA Cooperator

As a certified USDA Cooperator, USGS is authorized access to protected agricultural data. Protected data approved for disclosure under this Memorandum of Understanding shall be strictly limited to only that data necessary for USGS to provide technical assistance concerning the monitoring, assessment, and evaluation of the Conservation Reserve Program and Conservation Reserve Enhancement Program. Disclosure of information to USGS can include receiving the protected data either (1) directly from FSA or (2) receiving the protected data directly from the producer or owner as part of the process required to enable a producer or owner to participate in the USDA program.

USDA Cooperator Use of the Protected Data

USGS has provided information to FSA indicating that the protected data shall be used to consistent with Executive Order 13508--Chesapeake Bay Protection and Restoration, protect and restore the health, heritage, natural resources, and social and economic value of the Nation's largest estuarine ecosystem and the natural sustainability of its watershed. USGS has responsibility for acquiring and assessing agricultural conservation practice data records for USDA programs and transferring those datasets in aggregated format to State jurisdictional agencies for use in reporting conservation progress to the Chesapeake Bay Program Partnership (CBP Partnership). USGS will provide technical assistance in the form of monitoring, assessment, and evaluation in support of Conservation Reserve Program and Conservation Reserve Enhancement Program objectives by analyzing the impact of farming and ranching practices on water quality in the Chesapeake Bay Watershed.

Responsibilities

FSA agrees to:

Provide to USGS the protected data that has been approved for disclosure under this Memorandum of Understanding. The protected data types approved for disclosure are limited to:

- For the states in the Chesapeake Bay watershed (New York, Pennsylvania, West Virginia, Maryland, Delaware, and Virginia):
 - Spatially referenced Conservation Reserve Program databases fully attributed with non-financial information.
 - Spatially referenced Conservation Reserve Enhancement Program databases fully attributed with non-financial information.
 - Spatially referenced and fully attributed Common Land Unit databases.
- Contingent upon review and approval by FSA of USGS data aggregation procedures (designed to safeguard producer privacy) and of the final product to be disclosed, permit USGS to release FSA provided information that has been transformed into an acceptable statistical or aggregate form to Chesapeake Bay Program Partner organizations and to the public.

USGS agrees that:

- Signature on this Memorandum of Understanding indicates acknowledgement and understanding that data types identified in this Memorandum of Understanding are protected from unauthorized use/unauthorized disclosure pursuant to the administrative and/or civil remedies/criminal penalties as identified in applicable Federal statutes to include the Privacy Act of 1974 (5 U.S.C. 552a - as amended), the Freedom of Information Act (5 U.S.C. § 552 - as amended), and 7 U.S.C. § 8791 of the Food, Conservation and Energy Act of 2008 (see Exhibit 1).
 - Individuals/organizations covered by this MOU can be held administratively, civilly, and/or criminally liable should they commit an unauthorized use/unauthorized disclose of protected data in violation of the applicable Federal statutes.

The USGS agrees to be responsible for damages to persons or property caused by the negligent acts or omissions of USGS employees acting within the scope of their employment in accordance with the Federal Tort Claims Act, codified at 28 USC 2671 et seq.

- Signature on this Memorandum of Understanding legally binds USGS to comply with the provisions in 7 U.S.C. § 8791.

Note: When signature is made on behalf of an organization, signature also legally binds every owner, manager, supervisor, employee, contractor, agent, and representative of the organization to comply with the provisions in 7 U.S.C. § 8791.

- USGS shall use the protected data only to perform work that is directly connected to providing technical assistance with respect to the Conservation Reserve Program and Conservation Reserve Enhancement Program. Use of the protected data to perform work that is not directly connected to the Conservation Reserve Program and Conservation Reserve Enhancement Program is expressly prohibited.

- Data provided in support of this Memorandum of Understanding is protected from unauthorized use and unauthorized disclosure pursuant to the administrative and/or civil remedies/criminal penalties as identified in applicable Federal statutes to include the Privacy Act of 1974 (5 U.S.C. § 552a - as amended) and the Freedom of Information Act (5 U.S.C. § 552 - as amended).
- USGS shall not disclose the protected data to any individual or organization that is not directly covered by this Memorandum of Understanding.
- USGS shall internally restrict access to the protected data to only those individuals within the organization that have a demonstrated need to know the protected data in order to perform work on the Conservation Reserve Program and Conservation Reserve Enhancement Program.
- The provisions in 7 U.S.C. § 8791 are continuing obligations. Even when USGS is no longer a USDA Cooperator, or when individuals currently affiliated USGS should leave the organization, every person having been provided access to the protected data shall continue to be legally bound to comply with the provisions in 7 U.S.C. § 8791.
- USGS shall notify all members of the organization that will be provided access to the protected data about the existence of this Memorandum of Understanding. Also, for the duration of this Memorandum of Understanding (1) notification about this Memorandum of Understanding shall be made to any individual new to the organization if that individual will be provided access to the protected data (notification shall be made prior to the individual being provided access to the protected data) and (2) periodic notification will be sent (at a frequency not to exceed 180 calendar days) to remind all with access to the protected data about the ongoing/continuing requirement to comply with this Memorandum of Understanding.
- This Memorandum of Understanding is non-transferable. Certification to obtain protected data may not be bought, sold, traded, assigned, extended to, or given free of charge to any other individual or organization that is not directly covered by this Memorandum of Understanding.
- USGS shall notify FSA immediately when USGS is no longer, or within 30 calendar days of the date on which USGS will no longer be a USDA Cooperator working in cooperation with the Secretary of Agriculture concerning the Conservation Reserve Program and Conservation Reserve Enhancement Program as the programs relate to the Chesapeake Bay Watershed Initiative, whichever is sooner.
- Use of the protected data for any purpose is expressly prohibited when USGS is no longer a USDA Cooperator. When USGS is no longer a USDA Cooperator, any protected data provided under this Memorandum of Understanding must be immediately destroyed. USGS shall provide to FSA written certification that the protected data (paper and/or electronic copy) has been properly destroyed and/or removed from any electronic storage media.

Amendments

This Memorandum of Understanding may be amended at any time by the mutual written agreement of FSA and USGS.

Administrative Provisions

Nothing in this MOU may be construed to obligate the USGS or the United States Government to any current or future expenditure of resources either in advance of the availability of appropriations from Congress or when funds are available.

This MOU does not create an actual or implied intention, or requirement for the USGS to enter into a contract or an assistance agreement (e.g., grant or cooperative agreement).

No onetime, recurring, or continuing fiscal obligations are being created through the activation, implementation, and/or execution of this MOU. If an as yet unspecified fiscal obligation is created through a subsequent update/modification to this MOU, FSA and USGS shall develop an addendum to this MOU that specifically details the fiscal responsibilities of both agencies. FSA and USGS must formally agree in writing prior to implementation/activation under an addendum to this MOU of any data sharing based product, process, service, and/or support action that creates a fiscal obligation on the other agency.

Termination

This Memorandum of Understanding may be terminated:

- Immediately by FSA if it is confirmed or even suspected that USGS has committed an unauthorized use/unauthorized disclosure of protected data in violation of 7 U.S.C. § 8791.
- Immediately by FSA if it is confirmed that USGS is no longer a USDA Cooperator requiring access to data protected by 7 U.S.C. § 8791.
- Immediately at the request of USGS upon identification that USGS no longer requires access to 7 U.S.C. § 8791 protected data and therefore requests that the USDA Cooperator certification be rescinded.
- At any time by the mutual written agreement of FSA and USGS or independently by FSA or USGS with a 30 calendar day written notice between both parties.

Effective Period

This Memorandum of Understanding shall be in effect on the date of the final signature and shall continue until September 30, 2020.

Should the need for this Memorandum of Understanding continue beyond the identified effective period, this Memorandum of Understanding shall be reviewed, updated as necessary, and revalidated prior to the identified expiration date for this Memorandum of Understanding. The extension of this Memorandum of Understanding shall be documented in an appropriate addendum that is signed by both parties.

Signature of the USDA Cooperator and the Date Signed



Jess D. Weaver
Regional Director, Southeast Region
U.S. Geological Survey

Date Signed: 

Signature of the Farm Service Agency Certifying Official and the Date Signed



Mark A. Rucker
Deputy Administrator for Management
U.S. Department of Agriculture – Farm Service Agency

Date Signed: 

7 U.S.C. § 8791 of the Food, Conservation and Energy Act of 2008

7 U.S.C. § 8791 - INFORMATION GATHERING.

(a) GEOSPATIAL SYSTEMS.—The Secretary shall ensure that all the geospatial data of the agencies of the Department of Agriculture are portable and standardized.

(b) LIMITATION ON DISCLOSURES.—

(1) DEFINITION OF AGRICULTURAL OPERATION.—In this subsection, the term “agricultural operation” includes the production and marketing of agricultural commodities and livestock.

(2) PROHIBITION.—Except as provided in paragraphs (3) and (4), the Secretary, any officer or employee of the Department of Agriculture, or any contractor or cooperator of the Department, shall not disclose—

(A) information provided by an agricultural producer or owner of agricultural land concerning the agricultural operation, farming or conservation practices, or the land itself, in order to participate in programs of the Department; or

(B) geospatial information otherwise maintained by the Secretary about agricultural land or operations for which information described in subparagraph (A) is provided.

(3) AUTHORIZED DISCLOSURES.—

(A) LIMITED RELEASE OF INFORMATION.—If the Secretary determines that the information described in paragraph (2) will not be subsequently disclosed except in accordance with paragraph (4), the Secretary may release or disclose the information to a person or Federal, State, local, or tribal agency working in cooperation with the Secretary in any Department program—

(i) when providing technical or financial assistance with respect to the agricultural operation, agricultural land, or farming or conservation practices; or

(ii) when responding to a disease or pest threat to agricultural operations, if the Secretary determines that a threat to agricultural operations exists and the disclosure of information to a person or cooperating government entity is necessary to assist the Secretary in responding to the disease or pest threat as authorized by law.

(4) EXCEPTIONS.—Nothing in this subsection affects—

(A) the disclosure of payment information (including payment information and the names and addresses of recipients of payments) under any Department program that is otherwise authorized by law;

(B) the disclosure of information described in paragraph (2) if the information has been transformed into a statistical or aggregate form without naming any—

(i) individual owner, operator, or producer; or

(ii) specific data gathering site; or

(C) the disclosure of information described in paragraph (2) pursuant to the consent of the agricultural producer or owner of agricultural land.

(5) CONDITION OF OTHER PROGRAMS.—The participation of the agricultural producer or owner of agricultural land in, or receipt of any benefit under, any program administered by the Secretary may not be conditioned on the consent of the agricultural producer or owner of agricultural land under paragraph 4(c).

(6) WAIVER OF PRIVILEGE OR PROTECTION.—The disclosure of information under paragraph (2) shall not constitute a waiver of any applicable privilege or protection under Federal law, including trade secret protection.

Appendix 1D. U.S. Geological Survey approved protocol for data handling and aggregation to protect farmer privacy

**United States Geological Survey
Data Storage and Aggregation Procedures and Employee Agreement
for compliance with
7 U.S.C. § 8791 of the Food, Conservation and Energy Act of 2008
(Formerly Section 1619 of the 2008 Farm Bill)**

The USGS is an official USDA Conservation Cooperator and has been authorized access to protected geospatial and tabular information on farming and conservation practices in the Mid-Atlantic States (i.e. New York, Pennsylvania, West Virginia, Maryland, Delaware, and Virginia). The protected data are managed and maintained by the USDA Farm Service Agency (FSA) and the USDA Natural Resource Conservation Service (NRCS)¹. The USGS has been granted access to these data to analyze the impact of farming practices on water quality in the Chesapeake Bay watershed. The protected data may be viewed and analyzed by any USGS employee who has signed and agreed to the terms of this Agreement.

To comply with 7 U.S.C. § 8791 (see Exhibit 1), all USGS employees granted access to protected FSA and NRCS information and their immediate supervisors must read the referenced Memoranda of Agreement and Acknowledgement related to 7 U.S.C. § 8791, and agree to and sign the data use, storage and aggregation protocols outlined below.

USGS² shall not disclose protected information to any individuals or organizations that are not verifiable and official USDA Conservation Cooperators with permitted access to the data. USGS shall use the protected information only to perform work that is directly connected to providing technical assistance, in the form of monitoring, assessment, and evaluation, concerning NRCS and FSA Farm Bill programs. USGS may be legally liable should disclosure of the protected information occur in violation of the Federal statute 7 U.S.C. § 8791.

The following procedures pertain to the storage, use, aggregation, reporting and release of data and information protected under 7 U.S.C. § 8791. These procedures have been reviewed and approved by FSA and NRCS. Any deviation from or amendment to these procedures must be approved by FSA and/or NRCS and documented for the record.

Data Analysis, Storage, and Destruction Procedures

1. All FSA and NRCS protected data shall be stored in an encrypted, password protected format. Acceptable encryption formats include the use of BitLocker software to encrypt an external hard drive, and/or the use of 7-zip or Winzip software to require a password to access data stored in zipped format.

¹ USDA-NRCS Cooperative Agreement and Acknowledgement of Section 1619 Compliance, signed December 14, 2010. USDA-FSA Cooperative Agreement, USDA Section 1619 Cooperator, signed August 2, 2010.

² This restriction applies to all USGS employees and their immediate supervisors who have signed this agreement.

Passwords shall be at least 16 characters in length, and will contain at least one capital letter, one lower case letter, one numeric character, and one special character (@, #, \$ etc...). Alternatively, unencrypted data can be stored on a dedicated external storage device that is kept in a secure location when not in use (e.g., locked cabinet or area). The storage device should be an externally-connected hard drive that is larger than a USB stick to minimize the risk of accidental loss, and access to the storage device should be password protected. Access to the encrypted data and/or the data kept on a secure external storage device shall be restricted to USGS employees who have signed this Agreement. Passwords may be communicated among authorized users via telephone or in person, but not by email.

2. All analyses of the FSA and NRCS data that include the protected data must be saved in encrypted password protected format or on a secure dedicated external hard drive. Analyses and unencrypted data can be temporarily saved on a password protected computer that is disconnected from all networks and servers (including wireless networks), has an active firewall, and up-to-date virus protection software. All protected analyses, raw data, and temporary files must be converted to encrypted format or permanently deleted from the computer before it is connected to a network and the computer must be stored in a secure area when not in use.
3. Only data aggregated according to procedures approved, in writing, by FSA and/or NRCS can be stored in unencrypted format and released to the public.
4. While in use, the data will only be accessible to authorized personnel (i.e., signatories to this Agreement). Access to the data includes viewing the data in hard or softcopy formats.
5. When the protected data are no longer needed, all encrypted files containing the data will be permanently deleted from computers and storage devices; written, dated and signed confirmation verifying destruction of the protected data must be provided to David Kirtland (dakirtland@usgs.gov) and W. Dean Hively (whively@usgs.gov) within the week following permanent deletion.

Data Aggregation Procedures

The protected conservation practice data may be aggregated to a mapping unit (e.g., county, watershed, grid cell, or hexagon) and released to the public if five or more farm owners or producers participate in the practice within the aggregation unit or at least three owners or producers participate in the practice in the aggregation unit and no one owner or producer provides 50% or more of the variation. **If these conditions are not met for a particular aggregation unit, the data shall not be reported, displayed or otherwise revealed for that unit.**

Options for aggregating the data while ensuring full reporting of all conservation practices in a region include:

- combining information from units that do not meet the above conditions with information from neighboring units and spatially merging those units;
- increasing the size of all units (e.g., from 12-digit to 11-digit HUCs) to ensure all units meet the above conditions;

- translating the conservation practices into their nutrient and sediment reduction equivalents (thus only revealing the net reduction in nutrients and sediment, not the individual practices) so long as a minimum of three farms exist in the unit; or
- a combination of the above.

Description of Data Use

Please describe your intended use of the protected data consistent with permitted uses described in the FSA and NRCS Memoranda of Understanding and Acknowledgement. If the use changes from the description below, this Agreement must be revised and resigned. If more space is needed to describe your use, please use an additional page.

I _____ have read the FSA and NRCS Cooperative
Print Name

Agreements, 7 U.S.C. § 8791 of the Food, Conservation and Energy Act of 2008, and I agree to the above data use, analysis, storage, aggregation and reporting procedures.

USGS Employee Signature

Date

USGS Supervisor Signature

Date

IMPORTANT! Please send an electronic copy (pdf) of this signed Agreement to David Kirtland (dakirtland@usgs.gov) and W. Dean Hively (whively@usgs.gov). Please contact W. Dean Hively (whively@usgs.gov) to receive the data.

Exhibit 1

7 U.S. C. § 8791 – INFORMATION GATHERING.

(a) **GEOSPATIAL SYSTEMS.**—The Secretary shall ensure that all the geospatial data of the agencies of the Department of Agriculture are portable and standardized.

(b) **LIMITATION ON DISCLOSURES.**—

(1) **DEFINITION OF AGRICULTURAL OPERATION.**—In this subsection, the term “agricultural operation” includes the production and marketing of agricultural commodities and livestock.

(2) **PROHIBITION.**—Except as provided in paragraphs (3) and (4), the Secretary, any officer or employee of the Department of Agriculture, or any contractor or cooperator of the Department, shall not disclose—

(A) information provided by an agricultural producer or owner of agricultural land concerning the agricultural operation, farming or conservation practices, or the land itself, in order to participate in programs of the Department; or

(B) geospatial information otherwise maintained by the Secretary about agricultural land or operations for which information described in subparagraph (A) is provided.

(3) **AUTHORIZED DISCLOSURES.**—

(A) **LIMITED RELEASE OF INFORMATION.**—If the Secretary determines that the information described in paragraph (2) will not be subsequently disclosed except in accordance with paragraph (4), the Secretary may release or disclose the information to a person or Federal, State, local, or tribal agency working in cooperation with the Secretary in any Department program—

(i) when providing technical or financial assistance with respect to the agricultural operation, agricultural land, or farming or conservation practices; or

(ii) when responding to a disease or pest threat to agricultural operations, if the Secretary determines that a threat to agricultural operations exists and the disclosure of information to a person or cooperating government entity is necessary to assist the Secretary in responding to the disease or pest threat as authorized by law.

(4) **EXCEPTIONS.**—Nothing in this subsection affects—

(A) the disclosure of payment information (including payment information and the names and addresses of recipients of payments) under any Department program that is otherwise authorized by law;

(B) the disclosure of information described in paragraph (2) if the information has been transformed into a statistical or aggregate form without naming any—

(i) individual owner, operator, or producer; or

(ii) specific data gathering site; or

(C) the disclosure of information described in paragraph (2) pursuant to the consent of the agricultural producer or owner of agricultural land.

(5) **CONDITION OF OTHER PROGRAMS.**—The participation of the agricultural producer or owner of agricultural land in, or receipt of any benefit under, any program administered by the Secretary may not be conditioned on the consent of the agricultural producer or owner of agricultural land under paragraph 4(c).

(6) **WAIVER OF PRIVILEGE OR PROTECTION.**—The disclosure of information under paragraph (2) shall not constitute a waiver of any applicable privilege or protection under Federal law, including trade secret protection.

Appendix 2. Effect of Aggregation Scale

Record_Counts.csv available for download at <https://doi.org/10.3133/ds1102>. Contains the count of conservation practices provided by the U.S. Department of Agriculture in the unaggregated dataset versus various levels of aggregation (county, HUC-8, HUC-12), documenting the effect of aggregation scale on data reportability.

Appendix 3A. Aggregated Dataset for Public Release

NRCS_County_Funded.csv available for download at <https://doi.org/10.3133/ds1102>. Contains implementation data for Natural Resources Conservation Service funded practices, aggregated by county; yearly totals from 2007–17.

Appendix 3B. Aggregated Dataset for Public Release

NRCS_County_CTA.csv available for download at <https://doi.org/10.3133/ds1102>. Contains implementation data for Natural Resources Conservation Service practices supported by conservation technical assistance, aggregated by county; yearly totals from 2007–17.

Appendix 3C. Aggregated Dataset for Public Release

NRCS_HUC8_Funded_CBW.csv available for download at <https://doi.org/10.3133/ds1102>. Contains implementation data for Natural Resources Conservation Service funded practices, aggregated by HUC-8 watersheds within the Chesapeake Bay watershed; yearly totals from 2007–17.

Appendix 3D. Aggregated Dataset for Public Release

NRCS_HUC8_CTA_CBW.csv available for download at <https://doi.org/10.3133/ds1102>. Contains implementation data for Natural Resources Conservation Service practices supported by conservation technical assistance, aggregated by HUC-8 watersheds within the Chesapeake Bay watershed; yearly totals from 2007–17.

Appendix 3E. Aggregated Dataset for Public Release

FSA_County.csv available for download at <https://doi.org/10.3133/ds1102>. Contains implementation data for Farm Service Agency Conservation Reserve Program and Conservation Reserve Enhancement Program practices, aggregated by county; yearly totals from 2007–17.

For additional information, contact:
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