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Climate Benefits of Chesapeake Bay Restoration in Virginia

by Emily Wiggans, Susan Minnemeyer, Emily Mills, and Louis Keddell

Chesapeake Conservancy | Conservation Innovation Center

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Acknowledgments

The Chesapeake Conservancy would like to acknowledge the invaluable assistance of the COMET-Planner team at Colorado State University in supporting the estimation of carbon sequestration from agricultural conservation practices. We also thank the Virginia Department of Environmental Quality for support in developing the crosswalk of Virginia best management practices (BMPs) to USDA NRCS conservation practices and for reviewing and providing feedback on the draft report.

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Chesapeake Conservancy

We believe that the Chesapeake is a national treasure that should be accessible for everyone and a place where wildlife can thrive. We use technology to enhance the pace and quality of conservation, and we help build parks, trails and public access sites.

Our mission is to conserve and restore the natural and cultural resources of the Chesapeake Bay watershed for the enjoyment, education, and inspiration of this and future generations.

The Chesapeake Conservancy serves as a catalyst for change, advancing strong public and private partnerships, developing and using new technology, and driving innovation throughout our work. We empower the conservation community with access to the latest data and technology.

Conservation Innovation Center

The Chesapeake Conservancy's Conservation Innovation Center (CIC) was established in 2013 to use cutting-edge technology to empower data-driven conservation and restoration. Just as the use of technology changed the corporate world and made it more efficient, technology can do the same for the conservation movement. Through national and international partnerships, the CIC makes this data accessible for restoration professionals to practice precision conservation, yielding greater impact with less resources.

Table of Contents

Executive Summary

Agricultural conservation practices in Virginia implemented under the 2014 Chesapeake Bay Watershed Agreement provide significant climate mitigation co-benefits to Virginia's efforts to improve water quality. We estimate that 459,639 tons (416,987 metric tons) of CO_2 equivalent were removed from the atmosphere in 2019 by these conservation practices, equal to approximately 0.4% of Virginia's energy-related CO_2 emissions in 2018.[1] This amount equates to approximately 50,214 homes' electrical use for one year, the carbon sequestered by 6.8M tree seedlings grown for 10 years or the annual carbon sequestration of 510,000 acres of average U.S. forests.[2] This carbon sequestration demonstrates the potential to leverage the investment and expertise in Chesapeake Bay watershed restoration to further scale practices that maximize climate and water quality co-benefits of Bay restoration.

These findings are based on an analysis of best management practices (BMPs) in Virginia localities within the Chesapeake Bay watershed for the year 2019. The findings represent a conservative estimate of the climate mitigation provided by restoration actions taken in Virginia under the 2014 Chesapeake Bay Watershed Agreement. This analysis is limited to the agricultural BMPs that could be linked to USDA Natural Resources Conservation Service (NRCS) conservation practices included in COMET-Planner, the tool used in this study for estimating carbon sequestration. Other BMPs employed in Chesapeake Bay restoration, for example, animal agriculture practices, urban green stormwater management infrastructure and wetland restoration, offer significant climate benefits, but were not considered in this study. We estimated the carbon removal benefits of restoration practices for BMPs in Virginia reported to the Chesapeake Bay Program's Chesapeake Assessment Scenario Tool (CAST) model. COMET-Planner estimates greenhouse gas reduction and carbon sequestration benefits based on USDA NRCS Practice Standards in the state and county where the practice is implemented.

The Chesapeake Bay Watershed Agreement of 2014 includes a climate resiliency goal, rather than a climate mitigation goal, although the mitigation benefits of restoration are significant. New research shows that land-based natural climate solutions such as forest restoration and no-till agriculture have the potential to provide over one-third of the cost-effective climate change mitigation needed to limit climate warming to below 2°C.[2] With the United States back in the Paris Climate Agreement, there is new momentum behind implementing land-based climate mitigation. With a nearly 40-year history in implementing restoration practices that contribute to both water quality improvement and climate mitigation, the Chesapeake Bay Program offers significant infrastructure, partnerships and expertise for efforts to scale action with a heightened focus on climate benefits.

Altogether, the 459,639 tons of annual carbon removal benefits generated by ongoing restoration activities within the agricultural sector in Virginia is a conservative estimate of the potential climate benefits. Quantification of additional BMPs not included in this analysis could further expand accounting for the potential mitigation benefits of targeted restoration practices. Restoration provides a significant contribution to meeting climate goals in the Chesapeake Bay region.

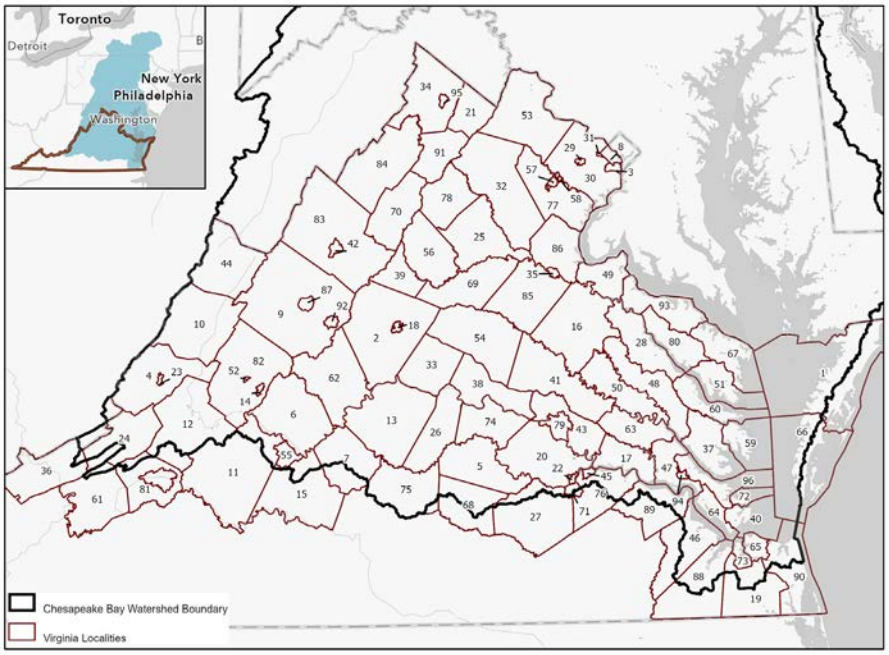
[1] Griscom, Bronson W., et al. "Natural climate solutions." Proceedings of the National Academy of Sciences 114.44 (2017): 11645-11650.

[2] "Greenhouse Gas Equivalencies Calculator" United States Environmental Protection Agency, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Introduction

The Commonwealth of Virginia has participated in Chesapeake Bay restoration efforts since the formation of the Chesapeake Bay Program, with the signing of the first Chesapeake Bay Agreement in 1983 as a partnership of federal, state, and local agencies; academic institutions and non-governmental organizations (Figure 1). The 2010 Chesapeake Bay Total Maximum Daily Load (TMDL), or "pollution diet," was established to improve water quality for the Chesapeake Bay watershed through reduction of nitrogen, phosphorus and sediment pollution. The 2014 Chesapeake Bay Watershed Agreement lays out 10 goals for bay restoration: Sustainable Fisheries, Vital Habitats, Water Quality, Toxic Contaminants, Healthy Watersheds, Stewardship, Land Conservation, Public Access, Environmental Literacy and Climate Resiliency. The Chesapeake Bay watershed has seen improvements in water quality,[3] despite a 43% increase in population growth between 1980 and 2017[4], and the Chesapeake Bay Program is recognized as a leader in ecosystem science and restoration partnerships.

Carbon sequestration, or carbon removal, refers to processes by which CO_2 is removed from the atmosphere and stored in the terrestrial environment (vegetation, soils and sediments), the ocean or geologic formations.[5]
While the Chesapeake Bay Program does not explicitly include carbon sequestration among its goals, many of the conservation practices, or best management practices (BMPs), that are implemented to improve water quality also provide significant co-benefits for climate mitigation, including absorbing greenhouse gases from the atmosphere or reducing emissions. Agricultural conservation practices with large carbon sequestration benefits include establishing forested riparian buffers, establishing cover crops, no-till agriculture and improved nutrient management. These practices may also improve resilience against adverse impacts of a warming climate and help human society adapt to climate change.



Locality Key

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Covington City	23	James City County	47	Petersburg City	71	Winchester City	95
Craig County	24	King and Queen Count	48	Poquoson City	72	York County	96

Figure 1. Virginia localities within the Chesapeake Bay watershed, with inset showing the entire state, and in transparent blue, the entire bay watershed.

[3] "Chesapeake Bay's water quality condition has been recovering." 1 Oct. 2018, https://www.sciencedirect.com/science/article/pii/S0048969718316577. Accessed 26 Oct. 2020.

[4] "Population Growth | Chesapeake Bay Program." 23 Jan. 2012, https://www.chesapeakebay.net/issues/population_growth. Accessed 26 Oct. 2020.

[5] "Carbon sequestration to mitigate climate change - USGS ...." https://pubs.er.usgs.gov/publication/fs20083097. Accessed 29 Oct. 2020.

Agricultural conservation practices are receiving increased attention as a form of natural climate solutions (NCS). NCS have been identified as a portfolio of "conservation, restoration, and/or improved land management actions that increase carbon storage and/or avoid greenhouse gas emissions across global forests, wetlands, grasslands, and agricultural lands."[6] These actions for improved land stewardship have the potential to contribute cost-effective CO_2 mitigation opportunities to complement efforts to reduce GHG emissions in industry, electricity and heat production, transportation and other sectors. NCS have the potential to contribute over one-third of the mitigation needed to meet the UNFCCC's Paris Agreement goal of limiting the increase in global average temperature to below 2°C.[7] Within the United States NCS could provide 26-28% of the US Nationally Determined Contribution (NDC) to reduce GHG emissions under the Paris Agreement.[8] The largest NCS opportunities nationally include pathways that are also implemented widely as BMPs in the Chesapeake watershed — for forests (reforestation, avoided forest conversion, urban reforestation), agriculture (cover crops, cropland nutrient management) and wetlands (tidal and nontidal wetland restoration, mitigating seagrass loss, seagrass restoration).

The existing structures for tracking, validating and crediting Chesapeake BMPs could also be harnessed for ramping up climate mitigation and resilience. First formed in 1983, the Chesapeake Bay Program brings together federal agencies, six states and the District of Columbia, and dozens of academic, research and nonprofit organizations. Restoration of the Chesapeake Bay relies to a large degree on conservation practices aimed at reducing nonpoint source pollution that are voluntarily implemented on private lands. Measuring progress towards restoration involves environmental monitoring, modeling of nutrient loads, and tracking and verification of conservation practice implementation. With this extensive management infrastructure, the Chesapeake Bay Program offers an opportunity for harnessing the climate benefits of collective conservation actions across millions of land parcels within an existing framework.

Climate Mitigation and Potential Carbon Markets

Virginia has recently initiated several programs towards limiting greenhouse gas emissions in the state. In July 2020, Virginia finalized regulations related to carbon dioxide emissions and entered the Regional Greenhouse Gas Initiative (RGGI), now comprised of 11 states in New England and the Mid-Atlantic regions: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont and Virginia.[9] States participating in RGGI cap CO_2 emissions from electric power plants and establish a trading system for CO_2 allowances. Compliance requires a reduction in emissions from power plants. Up to 3.3% of the compliance obligation may be met through offsets from other sectors in five categories: landfill methane capture, sulfur hexafluoride, forestry or afforestation, end-use efficiency, or avoided agricultural methane.[10]

In addition, Virginia is part of the U.S. Climate Alliance, a bipartisan coalition of governors committed to reducing greenhouse gas emissions in alignment with the 2015 Paris Agreement, which the U.S. rejoined in February 2021.[11] Other Chesapeake Bay watershed states, including Maryland, Pennsylvania, Delaware and New York, are also members. The Chesapeake Bay Agreement mandates water quality improvements achieved in part through conservation practices that also reduce greenhouse gas emissions by means of carbon sequestration. As documented in this study, Chesapeake Program BMPs generate significant climate co-benefits through carbon sequestration, and there is significant interest in demonstrating the carbon removal of restoration efforts and where this work could be targeted in the future.

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[6] Griscom, Bronson W., et al. "Natural climate solutions." Proceedings of the National Academy of Sciences 114.44 (2017): 11645-11650.

[7] Griscom, Bronson W., et al. "Natural climate solutions." Proceedings of the National Academy of Sciences 114.44 (2017): 11645-11650.

[8] Fargione, Joseph E., et al. "Natural climate solutions for the United States." Science Advances 4.11 (2018): eaat1869.

[9] RGGI States Welcome Virginia as Its CO2 Regulation Is …." 8 Jul. 2020, https://www.rggi.org/sites/default/files/Uploads/Press-Releases/2020_07_08_VA_Announcement_Release.pdf. Accessed 29 Oct. 2020.

[10] "Offsets | RGGI, Inc. - Regional Greenhouse Gas Initiative." https://www.rggi.org/allowance-tracking/offsets. Accessed 29 Oct. 2020.

Participation in voluntary carbon markets is widely employed on forest lands in Virginia, with 4.6 million metric tons of carbon offsets sold from Virginia in California's carbon market between 2013 and 2018, with the state ranking 7th nationally.[12] Opportunities within agriculture for carbon removal are emerging, with companies such as Nori and Indigo Ag[13] pioneering the development of markets for regenerative agricultural practices that build soil carbon.

The USDA is a significant funder of conservation practices that sequester carbon and improve water quality through the Natural Resources Conservation Service (NRCS) which funds a range of farm bill programs that compensate farmers for conservation practices such as the Conservation Stewardship Program (CSP) and the Environmental Quality Incentives Program (EQIP).[14] The Biden Administration is expected to leverage USDA funding as a key source of funding for climate action. These include establishing a carbon bank using the Commodity Credit Corporation to invest in climate smart agricultural practices and prioritizing climate in Farm Bill conservation programs such as the Conservation Reserve Program.[15]

Objective

Chesapeake Conservancy explored the potential for conservation practices implemented under the Chesapeake Bay Agreement to provide climate co-benefits with this study. We examined carbon removal benefits from primarily agricultural best management practices as contributions to climate mitigation. The Chesapeake Bay Program, with its nearly 40-year history in guiding the implementation of conservation and restoration practices, provides infrastructure to incentivize, fund, verify implementation and validate performance of BMPs. We explored whether this programmatic framework could also serve the monitoring and verification of GHG emission reductions that these land stewardship actions generate. This framework could enhance the potential for carbon markets to support the scaling of BMP implementation needed to meet both water quality and climate goals.

Carbon Accounting for Best Management Practices

The Conservancy used the COMET-Planner evaluation tool from USDA NRCS and Colorado State University (CSU), which is "designed to provide generalized estimates of the greenhouse gas impacts of conservation practices and is intended for initial planning purposes."[16] The tool targets primarily agricultural-based practices, but is not limited to farms. A companion tool, COMET-Farm, is designed for detailed carbon accounting for an individual farm or ranch. For work at the state level, COMET-Planner was deemed most appropriate, based on research and consultation with Mark Easter at CSU. COMET-Planner runs interactively in a web interface, but the underlying data was released as an Excel table, allowing for the calculations for this study to be done outside the web interface.

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[11] "US Climate Alliance." http://www.usclimatealliance.org/. Accessed 29 Oct. 2020.

[12] "Despite legislative blocks, one form of carbon cap-and-trade is …." 7 Aug. 2019, https://www.virginiamercury.com/2019/08/07/despite-legislative-blocks-one-form-of-carbon-cap-and-trade-is-alive-and-well-in-virginia/. Accessed 29 Oct. 2020.

[13] "Carbon harvest: Indigo Ag, Nori announce first corporate carbon credit buyers." AgFunder News, https://agfundernews.com/carbon-harvest-indigo-ag-nori-announce-first-corporate-carbon-credit-buyers.html.

[14] "Potential for Carbon Markets in Agriculture to Address Climate …." https://sustainableagriculture.net/blog/potential-carbon-markets-agriculture-address-climate-change/. Accessed 29 Oct. 2020.

[15] "Department of Agriculture - Climate 21 Project." https://climate21.org/documents/C21_USDA.pdf. Accessed 20 Feb. 2021.

[16] "COMET-Planner." http://comet-planner.com/. Accessed 5 Aug. 2020.

In Virginia, and throughout the Chesapeake Bay watershed, reporting of BMPs to meet TMDL requirements is provided to the Chesapeake Bay Program's Chesapeake Assessment Scenario Tool, or CAST, which serves as a model for pollution loads across the entire watershed. CAST is "used to assess jurisdiction's progress toward meeting the TMDL allocations[17]," as well as being used to develop Phase II and III Watershed Implementation Plans (WIPs) and local TMDLs. CAST "enables planners in the watershed to develop a plan for meeting a nitrogen, phosphorus, or sediment load allocation, using the most cost-effective strategy."[10] Specific reporting of a given BMP is done through the National Environmental Information Exchange Network, or NEIEN, which is then reflected in CAST. For this analysis, the Submitted vs. Credited report from CAST's 2009-2019 Progress scenario was used. CAST's 2019 Progress Scenario is a summary of actively creditable practices in 2019, including annual practices implemented in 2019, and practices implemented in years prior that are still verified as functioning for reductions. The "Amount Submitted" field, which represents the amount of area currently taken up by BMPs on a given locality, was used for calculations.

CAST uses Chesapeake Bay-specific reporting metrics for BMPs that target TMDL nutrients, but COMET-Planner uses NRCS practice standards. As such, it was necessary to develop a crosswalk (see Appendix C) to run the CAST results through the COMET-Planner interface. While CBP provides a partial crosswalk[18], it was necessary to go beyond those efforts. The Virginia Department of Environmental Quality (DEQ) offered valuable insights for this project by providing a similar effort to crosswalk practices, which was utilized with slight modifications for this analysis.

Methods

Modifying the crosswalk and determining the analysis approach for using the CAST Submitted vs. Credited report and COMET-Planner took considerable time and expert input prior to analysis. Many BMPs reported in CAST did not have a COMET-Planner NRCS equivalent (Table 1).

A comprehensive data and calculation spreadsheet was developed with multiple data sources for inputs, along with calculation and summarization tabs. Data sources included CAST data for each Virginia locality that falls at least partially within the Chesapeake Bay watershed, a uniform crosswalk of CAST BMPs along with their associated NRCS practices and a table linking NRCS practices with the estimate for its conservation practice implementation. A query was applied to every VA locality BMP against the crosswalk. Thus, every CAST BMP was matched with an NRCS practice, if one existed, from the crosswalk (Appendix C) and an additional conservation practice implementation. Non-matching practices were spot-checked to ensure no additional practices could potentially be added into the crosswalk. Outputs were summarized with pivot tables so dynamic filtering could aid in determining results. Many practices in urban areas, like street sweeping and wet ponds, could not be included in this method of analysis (Table 1).

COMET-Planner records practice area in values, and in general any record that did not record the area occupied by the practice was not included. Exceptions to this were two shoreline vegetation practices, Non-Urban Shoreline Erosion Control Vegetated and Urban Shoreline Erosion Control Vegetated. Under suggested guidance from the Virginia Department of Environmental Quality, estimated areas were calculated by converting the linear feet units to acres by assuming a standard width of eight feet.

[17] "About CAST - CAST." http://www.cast.org/about/about-cast. Accessed 29 Sep. 2020.

[18] "Chesapeake Assessment Scenario Tool - BMP Calculations" | Chesapeake Bay Program https://cast.chesapeakebay.net/Documentation/BMPs Accessed Aug. 12 2020.

Many of COMET-Planner's NRCS practices also include specific implementation methods, for example, for cover crop, "Add non-legume seasonal cover crop (with 25% fertilizer N reduction) to irrigated cropland." Based on CAST reporting, it was not feasible to crosswalk each implementation method individually within the scope of the project. In every instance of a COMET-Planner crosswalk practice, the most conservative implementation for carbon equivalent output values was assumed and assigned to the given practice, to avoid overestimating carbon sequestration. Estimates were determined from using the COMET-Planner web interface. For practices with potential multiyear carbon sequestration rates, only the carbon sequestration rate for 2019 was calculated. Multiyear practice sequestration rates were omitted from the analysis calculations for years prior to 2019, but further research into multiyear calculations in future studies should provide a more comprehensive accounting. The sequestration rates for practices with a soil carbon component were also based on assumptions built into the COMET-Planner tool as to whether soil disturbance had occurred, with default values being utilized, or otherwise omitted if the information could not be determined.

Table 1. Examples of some CAST BMPs that were unable to be matched to COMET-Planner conservation practice.

CAST BMP	Reasoning for Exclusion
Abandoned Mine Reclamation	COMET-Planner did not include this practice in VA
Wetland Restoration Upland Acres	COMET-Planner does not account for upland acres
Wet Ponds and Wetlands	COMET-Planner does not analyze this practice (common in urban, not agricultural sectors)
Dry Detention Ponds and Hydrodynamic Structures	COMET-Planner does not analyze this practice (common in urban, not agricultural sectors)
Barnyard Runoff Control	COMET-Planner does not analyze this practice
Urban Shoreline Erosion Control (non-Vegetated)	Non-vegetated erosion control practices were not included
Impervious Surface Reduction	COMET-Planner does not analyze this practice (common in urban, not agricultural sectors)
Permeable Pavement (specified further)	COMET-Planner does not analyze this practice (common in urban, not agricultural sectors)
Erosion and Sediment Control (Level 2)	COMET-Planner does not analyze this practice (common in urban, not agricultural sectors)
Nutrient Management	Nutrient Management Practices typically include both Nitrogen (N) and Phosphorus (P) practices. To eliminate double-dipping, only Nitrogen practices were included in the crosswalk
Permeable Pavement (specified further)	COMET-Planner does not analyze this practice (common in urban, not agricultural sectors)

Total CO_2 equivalents were then compiled on a county basis and totaled for a final reporting number. In addition to the CO_2 equivalents compiled, methane, a potent GHG often produced as a byproduct of livestock production and related practices, was also calculated. While COMET-Planner has the capability to calculate methane output, no methane values were found for practices in Virginia.

Results

The total amount of sequestered CO_2 equivalent was determined to be 459,639 tons (416,978 metric tons) of CO_2 equivalent for the year 2019. This is equal to 0.4% of the 113.8 million tons (103.2 million metric tons), of CO_2 emissions from Virginia's energy sector in 2017.[19] By using the EPA's Greenhouse Gas Equivalencies Calculator,[20] the emission reduction is equivalent to 50,214 homes' electricity use for one year, the carbon sequestered by 6.8M tree seedlings grown for 10 years, or the annual carbon sequestration of 510,000 acres of average US forests.[21]

Our estimate of 459,639 tons of CO_2 equivalent sequestered in 2019 compares to an estimate of 442,847 tons of CO_2 equivalent for Chesapeake Bay BMPs for 2019 estimated by the Virginia Department of Environmental Quality.[22] Virginia DEQ completed an analysis of carbon sequestered by Chesapeake Bay restoration BMPs covering 2009 to 2019 estimating a total of 4.6M tons of CO_2 equivalent sequestration over the 10-year period. Virginia DEQ followed a similar methodology to Chesapeake Conservancy's study, using COMET-Planner for carbon sequestration estimates, and provided feedback on our initial calculations, which resulted our revising calculation methods for selected practices based on their recommendations. Our estimate of CO_2 equivalent sequestered was 3.8% larger than Virginia DEQ's estimate, likely based on differences related to developing the crosswalk of Chesapeake BMPs to NRCS conservation practices.

The total carbon sequestration and total acres implemented for each NRCS conservation practice group is shown in Figure 2. Practices that establish woody vegetation, such as the riparian forest buffers, silvopasture[23] and tree or shrub establishment sequester the most carbon per acre. Practices that enhance soil carbon, such as reduced tillage, nutrient management and cover crops, sequester less carbon per acre, but are established across a large portion of agricultural land in the state and, in aggregate, store the most carbon of the practices included in this study.

Residue and Tillage Management practices removed the most carbon of the practices examined by "limiting soil-disturbing activities" and, "managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year-round" (Residue and Tillage Management,
Reduced Till, Practice 345).[24]

Practices that stored less carbon include Field Borders, Filter Strips and Prescribed Grazing. Field Borders involve grass cover, not a perennial shrub or tree cover, so while providing a carbon benefit, it is much smaller. Filter strips, similarly, are grass covered strips or areas that help remove contaminants from overland flow (Filter Strip, Practice 393). Prescribed Grazing involves "managing the harvest of vegetation with grazing and/or browsing animals" and again has a relatively small carbon sequestration benefit compared to plantings (Prescribed Grazing, Practice 528).

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[19] "State Carbon Dioxide Emissions Data - US Energy ... - EIA." https://www.eia.gov/environment/emissions/state/. Accessed 26 Jan. 2021.

[20] "Greenhouse Gas Equivalencies Calculator." | EPA
https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator. Accessed Sep. 28 2020.

[21] "Greenhouse Gas Equivalencies Calculator" United States Environmental Protection Agency,
https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

[22] James Davis Martin, Chesapeake Bay Coordinator, Virginia Department of Environmental Quality

[23] "Silvopasture." Virginia Cooperative Extension, Virginia Tech, Virginia State University, https://ext.vt.edu/agriculture/silvopasture.html.

[23] The practice standards for all NRCS conservation practices may be found on the NRCS website: "National Conservation Practice Standards | NRCS." https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/?cid=nrcsdev11_001020.

Localities in Virginia are diverse in size, demographics, land cover and land use, all of which contribute to the relative opportunities for both BMPs for water quality improvement and potential carbon co-benefits. Figure 3 is a chloropleth map of total sequestered carbon, in tons of carbon dioxide equivalent, per acre, per year, divided by the total square miles of the locality that are within the Chesapeake Bay watershed. Purple localities represent larger land areas with less sequestered carbon.

The counties with the highest rates of carbon removal per acre are largely rural and located across several watersheds — the Potomac, James, Rappahannock, York and Shenandoah. Mountainous regions and more densely populated areas have lower rates of carbon sequestration, as expected, with the agricultural focus of this study. Fairfax City and Richmond City, however, have high rates of carbon removal due to high rates of urban tree planting, reflecting the high rates of sequestration for practices establishing woody vegetation.

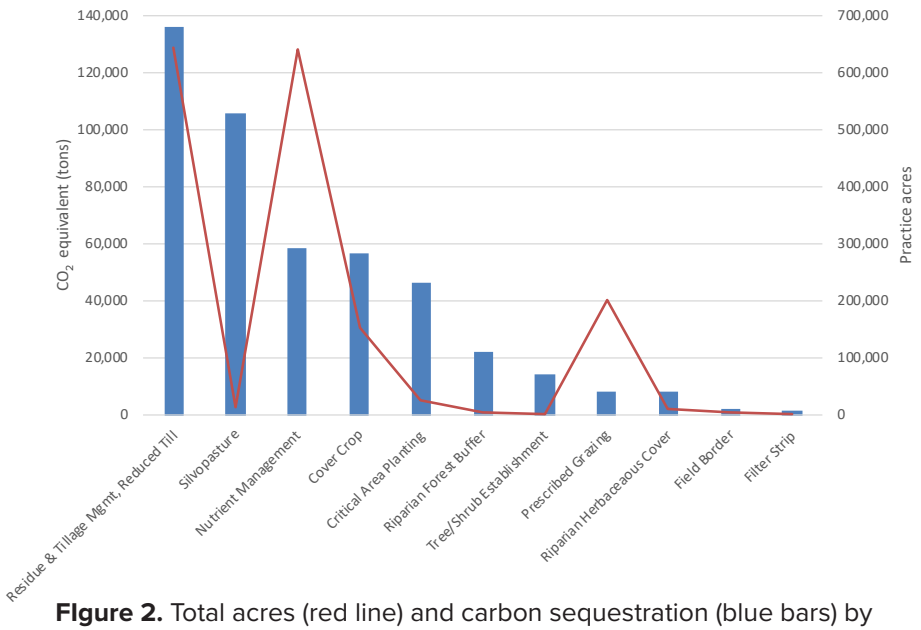
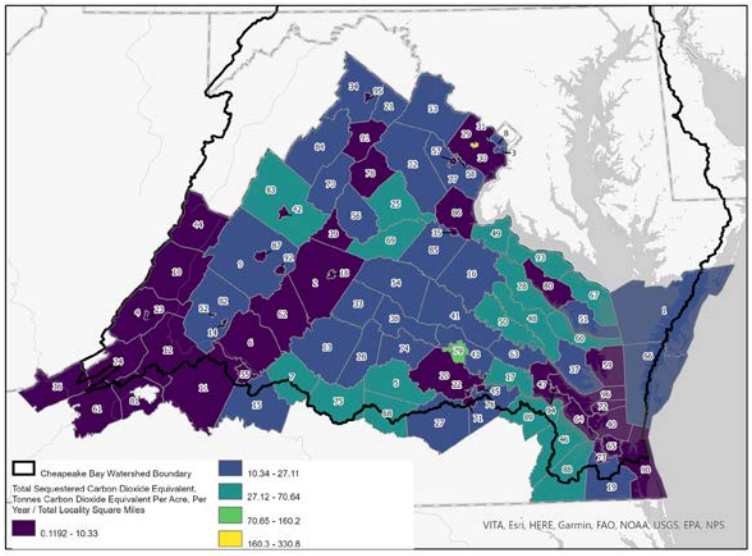


FIgure 2. Total acres (red line) and carbon sequestration (blue bars) by practice within the Chesapeake Bay watershed in Virginia.



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Colonial Heights City	22	Isle of Wight County	46	Page County	70	Williamsburg City	94
Covington City	23	James City County	47	Petersburg City	71	Winchester City	95
Craig County	24	King and Queen Count	48	Poquoson City	72	York County	96

Figure 3. Map of Virginia localities within the Chesapeake Bay watershed, ranked by carbon sequestered by NRCS conservation practices.

Discussion

Challenges

One of the challenges for this analysis was the lack of precise matching between CAST BMPs and NRCS conservation practice standards and implementations. Differences in spelling and syntax were found in BMP names submitted by individual counties for inclusion in the CAST model. These instances added an additional layer of difficulty in pairing the correct practices between CAST and COMET-Planner across all counties in the state. For this project, efforts were made to catch as many of these anomalies as possible, but only manual check through every county and jurisdiction would be able to flag and standardize practice names across the entire statewide database. Even if a BMP was similar in nature to a practice standard, sometimes the practice implementation options differed from the described CAST BMP. To avoid overestimating carbon sequestration, especially where there were one-to-many practice name pairings, the most conservative practice implementations (sequestering the least amount of carbon dioxide equivalent) were used from the possible options. While the study may underestimate carbon sequestration potential for some practices, this was the best option for a reasonable estimate, given that more in-depth research could not take place within the scope and timeline for this project.

For future efforts to account for carbon sequestration, expert consultation on different CAST BMPs and NRCS practices, along with the COMET-Planner team, would lead to more comprehensive and accurate results. Furthermore, there are undoubtedly carbon benefits for practices that did not have a COMET-Planner crosswalk equivalent either because units did not match or because COMET-Planner targets agricultural practices. Animal management practices, wetland restoration and urban green infrastructure practices are key restoration types not included in this study (Table 1) that likely generate significant carbon removals.

Another challenge for estimating the climate benefits of restoration practices is the uncertainty related to accounting for soil carbon. There is far greater uncertainty in soil carbon accounting than for above-ground vegetation, including methods for accounting for soil carbon accumulation over multiple years. For this reason, this study estimated soil carbon accumulation for one year only. The lack of consensus protocols for soil carbon accounting is also a challenge for establishing markets around soil carbon; markets for forest carbon are more advanced than those for regenerative farming practices.

Opportunities

The results of this analysis indicate numerous opportunities to maximize co-benefits of conservation practices to reduce nutrient pollution delivery to waterways. Practices that incorporate tree planting, such as riparian forest buffers, both sequester the most carbon per acre and have accepted more widely accepted protocols for carbon accounting. Silvopasture stands out as a practice with high sequestration rates that could be prioritized for increased adoption; the practice also supports climate adaptation by providing shade for grazing animals. The use of cover crops and conservation tillage already have high adoption rates in the watershed but could scale further with the right incentives to encourage expansion. Animal practices are of high interest for the potential to reduce or capture methane emissions.

Enabling landowners implementing BMPs on their properties to also attract carbon finance could be a promising means to increase the income generated per acre and encourage more farmers to enroll in conservation programs. Additional financing could also reward projects that exceed average pollution reductions and also sequester carbon, allowing landowners to “stack” benefits for additional income. Additional focus on how to incentivize practices and account for benefits generated is needed to verify benefits generated and enhance the quality of outcomes.

Conclusions

This retrospective analysis of BMPs implemented in the state of Virginia demonstrates the potential for generating carbon removal benefits within both Virginia and the greater Chesapeake Bay watershed and an opportunity for climate finance to increase the implementation of BMPs, as financing practices sufficiently is a key challenge in meeting Bay restoration goals. By incorporating carbon sequestration benefits to the established water quality benefits of BMP implementation, increased funding for conservation practices and, ultimately, a cleaner Bay, could be realized. Although this analysis was not able to capture all potential carbon benefits from BMPs implemented in Virginia to date, the estimate of just under 460,000 tons per year derived from this analysis provides a starting point for estimating climate mitigation potential with targeted planning.

Chesapeake Conservancy is currently producing updated high-resolution land cover, land use and change datasets for 2017/2018, to be released in summer 2021 as preliminary data, and as final data in early 2022. In addition, opportunities for establishing conservation practices — such as identifying waterways lacking riparian forest buffers — are being mapped for the Chesapeake Bay watershed. The Chesapeake Bay Program provides tools for estimating nutrient pollution benefits at a project scale. Extending these tools to also enable estimation of climate benefits could assist implementing organizations in securing funding and to support states and counties in meeting dual goals to improve water quality and mitigate climate change. While this analysis quantified climate benefits of implemented practices, future efforts could evolve to scope future opportunities.

Efforts to document the climate mitigation services of Chesapeake BMPs would benefit from a coordinated effort to crosswalk Chesapeake BMPs by NRCS conservation practices and provide guidance to the Chesapeake Bay Program on accounting for carbon sequestration. Many BMPs have a range of implementation options, so greater granularity for carbon sequestration across types or levels of implementation would provide greater accuracy for estimates. Targeted enhancement of tools such as COMET-Planner to cover the range of Chesapeake BMPs or their NRCS-matched practices would aid coordination between the restoration and climate communities and support better tracking of restoration and mitigation efforts. Similarly, urban tree canopy and green infrastructure BMPs and animal practices require guidance on preferred accounting methods, which vary widely across tools and geographies. Incorporating climate benefits into CAST or other tools employed in the Chesapeake Bay Program such as FieldDoc, NEIEN and others with peer-reviewed methodologies would be an approach for ensuring the best science is used in accounting for carbon sequestration.

Carbon markets are nascent in Virginia and the greater Chesapeake Bay watershed. The underlying focus of local and regional conservation and restoration efforts in relation to BMP implementation has largely focused on water quality benefits for local waterways and the larger bay cleanup effort. Building further understanding of BMP co-benefits and funding programs will not only benefit the Chesapeake Bay conservation and restoration movements, but will assist in the fight against global warming and climate change from anthropogenic greenhouse gas emissions. Increased public investment in the USDA's Conservation Reserve Program (CRP) along with higher payment rates, a greater focus on climate mitigation, and a goal to enroll four million new acres was announced in April 2021.[25] Private carbon markets in Virginia to date are largely focused on forest management opportunities, but there is great interest in the potential for marketing soil carbon.

Results of this study indicate that a large opportunity exists for accelerating climate action within the Chesapeake Bay watershed. The 459,639 tons of annual carbon removal benefits generated in 2019 by ongoing restoration activities within the agricultural sector in Virginia represent a fraction of the potential mitigation that could be generated with targeted planning and additional investment in the practices that promise the greatest co-benefits for water quality improvement and climate mitigation.

[25] "USDA Expands and Renews Conservation Reserve Program in Effort to Boost Enrollment and Address Climate Change" https://www.fsa.usda.gov/news-room/news-releases/2021/usda-expands-and-renews-conservation-reserve-program-in-effort-to-boost-enrollment-and-address-climate-change. Accessed 12 May 2021.

Appendix A - Virginia Locality Summary Results

Total CO_2 Reduction Calculation, Total N_2O Reduction Calculation, Total BMP Acres within Locality* and Total CO_2 equivalent sequestered†

**Total BMP Acres within Locality represent the amount of acres that contain BMP practices from the Submitted vs. Credited report, that also had a match within the crosswalk process.*
†Calculations are based on the CAST 2009-2019 Progress Scenario.

Locality	CO_2 Reduction	N_2O Reduction	Total CO_2 equivalent	Total Acres
Accomack	14,282	-1,357	12,925	45,995
Albemarle	4,682	306	4,988	21,586
Alexandria City	232	-10	222	121
Alleghany	1,107	-1	1,106	2,202
Amelia	11,636	-1,206	10,430	37,308
Amherst	2,451	-98	2,354	5,912
Appomattox	8,244	20	8,264	11,174
Arlington	588	-14	573	195
Augusta	26,811	-3,730	23,081	101,504
Bath	1,989	39	2,028	3,429
Bedford	759	-9	750	1,010
Botetourt	3,699	-77	3,622	12,604
Buckingham	9,358	-1,341	8,017	20,761
Buena Vista City	30	-12	18	134
Campbell	1,300	-16	1,284	1,270
Caroline	15,381	-1,615	13,766	44,144
Charles City	6,685	-521	6,163	23,675
Charlottesville City	133	-48	85	523
Chesapeake City	1,712	-113	1,599	2,625
Chesterfield	2,055	-274	1,780	5,339
Clarke	4,670	-212	4,458	15,893
Colonial Heights City	14	-9	5	63
Covington City	15	-5	11	50
Craig	818	25	842	2,394
Culpeper	14,367	-1,675	12,692	60,363
Cumberland	6,626	-604	6,022	14,441
Dinwiddie	1,830	-23	1,807	4,141

Essex	28,084	-7,874	20,210	107,626
Fairfax	2,439	-363	2,076	2,782
Fairfax City	62	-7	56	49
Falls Church City	68	-1	66	17
Fauquier	12,412	-271	12,142	57,174
Fluvanna	4,809	-365	4,445	10,159
Frederick	5,344	-79	5,266	15,285
Fredericksburg City	108	-10	97	87
Giles	2	0	2	5
Gloucester	6,537	-1,342	5,195	24,439
Goochland	5,650	-632	5,018	16,530
Greene	1,226	-25	1,202	7,466
Hampton City	271	-129	142	703
Hanover	14,313	-1,494	12,819	44,552
Harrisonburg City	163	-26	138	303
Henrico	4,011	-535	3,476	12,671
Highland	3,774	-110	3,663	7,694
Hopewell City	36	-10	27	70
Isle of Wight	12,803	-2,269	10,534	42,364
James City	687	-88	599	1,859
King and Queen	22,378	-6,126	16,252	84,453
King George	6,476	-498	5,978	15,369
King William	16,655	-3,548	13,107	60,964
Lancaster	5,567	-954	4,613	20,292
Lexington City	74	-26	48	289
Loudoun	8,586	-232	8,354	31,268
Louisa	10,016	-179	9,837	30,301
Lynchburg City	99	-44	55	315
Madison	5,959	147	6,106	28,612
Manassas City	60	-11	49	121
Manassas Park City	7	-3	4	23
Mathews	1,253	-281	972	4,489
Middlesex	7,926	-1,755	6,171	29,614
Montgomery	10	0	10	35
Nelson	5,164	-287	4,877	7,961
New Kent	5,300	-643	4,657	17,310
Newport News City	1,136	-172	965	946
Norfolk City	691	-106	586	581

Northampton	9,776	-607	9,169	29,165
Northumberland	15,196	-2,799	12,397	56,388
Nottoway	5,773	-250	5,523	9,940
Orange	13,063	-1,303	11,760	42,793
Page	5,543	-542	5,002	15,589
Petersburg City	63	-21	41	159
Poquoson City	38	-11	27	61
Portsmouth City	130	-72	59	387
Powhatan	4,261	-590	3,672	12,089
Prince Edward	11,036	-649	10,387	17,660
Prince George	3,720	-506	3,214	12,779
Prince William	5,006	-437	4,569	13,503
Rappahannock	2,674	87	2,761	5,822
Richmond	13,013	-3,017	9,995	50,005
Richmond City	475	-94	381	687
Roanoke	152	-5	147	375
Rockbridge	9,006	-737	8,269	37,487
Rockingham	28,096	-2,995	25,101	100,418
Shenandoah	11,569	-122	11,447	34,800
Spotsylvania	6,044	-462	5,582	15,660
Stafford	3,132	-343	2,789	8,659
Staunton City	141	-36	104	543
Suffolk City	8,626	-1,466	7,160	28,750
Surry	5,108	-719	4,389	17,503
Virginia Beach City	949	-274	676	1,794
Warren	1,872	-114	1,758	3,204
Waynesboro City	130	-30	100	401
Westmoreland	16,925	-2,859	14,067	57,677
Williamsburg City	73	-43	30	306
Winchester City	57	-15	42	172
York	376	-54	322	639
Grand Total	**523,648**	**-64,009**	**459,639**	**1,699,050**

Appendix B - Crosswalk Between Chesapeake BMPs and NRCS Conservation Practices

CAST BMP Name	NRCS Code	NRCS Practice Name
Tillage Management - Low Residue	329	Residue and Tillage Management, No Till*
Cover Crop Commodity Normal	340	Cover Crop
Cover Crop Traditional Annual Legume Early Aerial		
Cover Crop Traditional Annual Legume Normal Drilled		
Cover Crop Traditional Legume Plus Grass 25-50% Normal Drilled		
Cover Crop Traditional Legume Plus Grass 25-50% Normal Other		
Cover Crop Traditional Rye Early Other		
Cover Crop Traditional Rye Normal Other		
Cover Crop Traditional Wheat Early Aerial		
Cover Crop Traditional Wheat Late Other		
Cover Crop Traditional Wheat Normal Other		
Cover Crop Traditional with Fall Nutrients Rye Early Other		
Cover Crop Traditional with Fall Nutrients Rye Normal Other		
Cover Crop Traditional with Fall Nutrients Wheat Early Other		
Cover Crop Traditional with Fall Nutrients Wheat Normal Other		
Land Retirement to Ag Open Space	342	Critical Area Planting
Conservation Tillage	345	Residue and Tillage Management, Reduced Till
Tillage Management-Conservation		
Tillage Management-Continuous High Residue		
Tillage Management-Low Residue		
Tillage Management-Low Residue		
Tree Planting	381	Silvopasture
Grass Buffer - Narrow	386	Field Border
Grass Buffer-Narrow with Exclusion Fencing	390	Riparian Herbaceous Cover
Grass Buffer-Streamside with Exclusion Fencing		
Forest Buffer	391	Riparian Forest Buffer
Forest Buffer-Streamside with Exclusion Fencing		
Grass Buffer	393	Filter Strip
Pasture and Grazing Management Practices	512	Forage and Biomass Planting
Precision Intensive Rotational/Prescribed Grazing	528	Prescribed Grazing
Nutrient Management	590	Nutrient Management
Nutrient Management Core (N or P)		
Nutrient Management Core N		
Nutrient Management N Placement		
Nutrient Management N Rate		
Nutrient Management N Timing		
Nutrient Management Plan		

Non-Urban Shoreline Erosion Control Vegetated	612	Tree/Shrub Establishment
Forest Planting		
Tree Planting - Canopy		
Urban Shoreline Erosion Control Vegetated		
Wetland Restoration - Floodplain		
Wetland Restoration - Headwater		

**Assigned as such to Highland County only*

Appendix C - Carbon Sequestration CO_2 Equivalents by Locality, by Practice*

**Calculations are based on the CAST 2009-2019 Progress Scenario, and include all practices for which there was an applicable COMET-Planner crosswalk match.*

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Accomack	340	Cover Crop	5,906	2,920.4	129.6	3,050.0
Accomack	342	Critical Area Planting	148	281.9	0.0	281.9
Accomack	345	Residue and Tillage Management, Reduced Till	28,553	5,752.1	556.8	6,308.9
Accomack	381	Silvopasture	158	2,436.5	0.0	2,436.5
Accomack	386	Field Border	22	6.3	4.2	10.5
Accomack	391	Riparian Forest Buffer	10	96.4	0.0	96.4
Accomack	393	Filter Strip	86	25.1	16.5	41.6
Accomack	528	Prescribed Grazing	15	0.6	0.4	0.9
Accomack	590	Nutrient Management	11,092	2,572.7	-2,064.0	508.7
Accomack	612	Tree/Shrub Establishment	5	189.7	0.0	189.7
Accomack Total						**12,925.1**
Albemarle	340	Cover Crop	699	172.1	4.8	176.9
Albemarle	342	Critical Area Planting	333	631.6	0.0	631.6
Albemarle	345	Residue and Tillage Management, Reduced Till	7,250	1,742.4	159.7	1,902.0
Albemarle	381	Silvopasture	503	0.0	0.0	0.0
Albemarle	386	Field Border	77	27.5	11.9	39.3
Albemarle	390	Riparian Herbaceous Cover	831	487.4	263.9	751.2
Albemarle	391	Riparian Forest Buffer	139	686.2	0.0	686.2
Albemarle	393	Filter Strip	133	47.5	20.5	67.9
Albemarle	528	Prescribed Grazing	9,009	144.5	84.3	228.9
Albemarle	590	Nutrient Management	2,602	545.2	-238.8	306.4
Albemarle	612	Tree/Shrub Establishment	12	197.5	0.0	197.5
Albemarle Total						**4,988.1**
Alexandria City	340	Cover Crop	0	0.0	0.0	0.0
Alexandria City	342	Critical Area Planting	0	0.0	0.0	0.0
Alexandria City	381	Silvopasture	0	0.0	0.0	0.0
Alexandria City	386	Field Border	0	0.0	0.0	0.0
Alexandria City	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Alexandria City	393	Filter Strip	0	0.0	0.0	0.0
Alexandria City	528	Prescribed Grazing	0	0.0	0.0	0.0
Alexandria City	590	Nutrient Management	112	23.4	-10.3	13.2

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Alexandria City	612	Tree/Shrub Establishment	9	208.9	0.0	208.9
Alexandria City Total						**222.1**
Alleghany	340	Cover Crop	7	1.5	-0.1	1.5
Alleghany	342	Critical Area Planting	192	365.2	0.0	365.2
Alleghany	345	Residue and Tillage Management, Reduced Till	1,142	294.0	27.2	321.2
Alleghany	381	Silvopasture	63	283.6	0.0	283.6
Alleghany	386	Field Border	4	1.7	0.7	2.4
Alleghany	390	Riparian Herbaceous Cover	21	13.3	7.5	20.8
Alleghany	391	Riparian Forest Buffer	2	9.9	0.0	9.9
Alleghany	393	Filter Strip	4	1.5	0.7	2.2
Alleghany	528	Prescribed Grazing	330	5.3	3.1	8.4
Alleghany	590	Nutrient Management	435	91.1	-39.9	51.2
Alleghany	612	Tree/Shrub Establishment	2	39.4	0.0	39.4
Alleghany Total						**1,105.9**
Amelia	340	Cover Crop	5,539	1,580.7	4.5	1,585.2
Amelia	342	Critical Area Planting	330	627.3	0.0	627.3
Amelia	345	Residue and Tillage Management, Reduced Till	14,175	2,698.2	174.3	2,872.5
Amelia	381	Silvopasture	202	3,119.4	0.0	3,119.4
Amelia	386	Field Border	17	3.1	3.2	6.3
Amelia	390	Riparian Herbaceous Cover	201	79.6	44.5	124.1
Amelia	391	Riparian Forest Buffer	75	690.6	0.0	690.6
Amelia	393	Filter Strip	15	2.7	2.8	5.5
Amelia	528	Prescribed Grazing	5,610	242.7	119.7	362.5
Amelia	590	Nutrient Management	11,139	2,476.6	-1,555.1	921.4
Amelia	612	Tree/Shrub Establishment	5	114.9	0.0	114.9
Amelia Total						**10,429.5**
Amherst	340	Cover Crop	403	115.1	0.3	115.4
Amherst	342	Critical Area Planting	190	360.4	0.0	360.4
Amherst	345	Residue and Tillage Management, Reduced Till	1,487	283.0	18.3	301.3
Amherst	381	Silvopasture	234	1,055.5	0.0	1,055.5
Amherst	386	Field Border	9	1.7	1.7	3.4
Amherst	390	Riparian Herbaceous Cover	96	38.0	21.3	59.3
Amherst	391	Riparian Forest Buffer	19	99.2	0.0	99.2
Amherst	393	Filter Strip	9	1.6	1.6	3.2
Amherst	528	Prescribed Grazing	2,127	92.0	45.4	137.4
Amherst	590	Nutrient Management	1,334	296.7	-186.3	110.4

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Amherst	612	Tree/Shrub Establishment	5	108.3	0.0	108.3
Amherst Total						**2,353.8**
Appomattox	340	Cover Crop	456	130.2	0.4	130.6
Appomattox	342	Critical Area Planting	51	97.4	0.0	97.4
Appomattox	345	Residue and Tillage Management, Reduced Till	1,512	287.7	18.6	306.3
Appomattox	381	Silvopasture	391	6,029.0	0.0	6,029.0
Appomattox	386	Field Border	7	1.3	1.4	2.7
Appomattox	390	Riparian Herbaceous Cover	299	118.5	66.3	184.8
Appomattox	391	Riparian Forest Buffer	89	821.6	0.0	821.6
Appomattox	393	Filter Strip	24	4.4	4.6	9.0
Appomattox	528	Prescribed Grazing	6,788	293.7	144.9	438.6
Appomattox	590	Nutrient Management	1,551	344.9	-216.6	128.3
Appomattox	612	Tree/Shrub Establishment	5	115.6	0.0	115.6
Appomattox Total						**8,263.9**
Arlington	340	Cover Crop	0	0.0	0.0	0.0
Arlington	342	Critical Area Planting	0	0.0	0.0	0.0
Arlington	381	Silvopasture	0	0.0	0.0	0.0
Arlington	386	Field Border	0	0.0	0.0	0.0
Arlington	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Arlington	393	Filter Strip	1	0.6	0.2	0.7
Arlington	528	Prescribed Grazing	0	0.0	0.0	0.0
Arlington	590	Nutrient Management	159	33.4	-14.6	18.8
Arlington	612	Tree/Shrub Establishment	35	553.7	0.0	553.7
Arlington Total						**573.2**
Augusta	340	Cover Crop	5,503	1,246.0	-44.6	1,201.3
Augusta	342	Critical Area Planting	2,429	4,612.7	0.0	4,612.7
Augusta	345	Residue and Tillage Management, Reduced Till	23,907	6,152.9	569.8	6,722.7
Augusta	381	Silvopasture	975	0.0	0.0	0.0
Augusta	386	Field Border	478	186.1	83.9	270.0
Augusta	390	Riparian Herbaceous Cover	635	408.2	231.5	639.6
Augusta	391	Riparian Forest Buffer	557	2,746.3	0.0	2,746.3
Augusta	393	Filter Strip	78	30.2	13.6	43.8
Augusta	528	Prescribed Grazing	15,404	247.2	144.2	391.3
Augusta	590	Nutrient Management	51,515	10,795.2	-4,728.1	6,067.1
Augusta	612	Tree/Shrub Establishment	24	385.9	0.0	385.9
Augusta Total						**23,080.8**
Bath	340	Cover Crop	12	2.8	-0.1	2.7

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Bath	342	Critical Area Planting	473	898.9	0.0	898.9
Bath	345	Residue and Tillage Management, Reduced Till	1,509	388.3	36.0	424.3
Bath	381	Silvopasture	93	420.5	0.0	420.5
Bath	386	Field Border	4	1.6	0.7	2.3
Bath	390	Riparian Herbaceous Cover	62	39.6	22.5	62.1
Bath	391	Riparian Forest Buffer	18	95.0	0.0	95.0
Bath	393	Filter Strip	3	1.3	0.6	1.9
Bath	528	Prescribed Grazing	928	14.9	8.7	23.6
Bath	590	Nutrient Management	324	67.8	-29.7	38.1
Bath	612	Tree/Shrub Establishment	3	58.4	0.0	58.4
Bath Total						**2,027.8**
Bedford	340	Cover Crop	1	0.4	0.0	0.4
Bedford	342	Critical Area Planting	2	4.1	0.0	4.1
Bedford	345	Residue and Tillage Management, Reduced Till	199	37.8	2.4	40.3
Bedford	381	Silvopasture	34	518.6	0.0	518.6
Bedford	386	Field Border	2	0.3	0.3	0.6
Bedford	390	Riparian Herbaceous Cover	33	12.9	7.2	20.2
Bedford	391	Riparian Forest Buffer	7	67.4	0.0	67.4
Bedford	393	Filter Strip	12	2.1	2.2	4.3
Bedford	528	Prescribed Grazing	494	21.4	10.5	31.9
Bedford	590	Nutrient Management	225	50.1	-31.5	18.6
Bedford	612	Tree/Shrub Establishment	2	43.9	0.0	43.9
Bedford Total						**750.3**
Botetourt	340	Cover Crop	430	190.5	5.7	196.2
Botetourt	342	Critical Area Planting	339	643.2	0.0	643.2
Botetourt	345	Residue and Tillage Management, Reduced Till	3,314	608.4	42.5	650.8
Botetourt	381	Silvopasture	204	922.6	0.0	922.6
Botetourt	386	Field Border	13	2.6	2.4	4.9
Botetourt	390	Riparian Herbaceous Cover	122	44.2	32.0	76.2
Botetourt	391	Riparian Forest Buffer	47	243.9	0.0	243.9
Botetourt	393	Filter Strip	61	12.1	11.3	23.4
Botetourt	528	Prescribed Grazing	5,476	278.1	73.6	351.7
Botetourt	590	Nutrient Management	2,591	605.1	-244.6	360.5
Botetourt	612	Tree/Shrub Establishment	7	148.4	0.0	148.4
Botetourt Total						**3,621.6**
Buckingham	340	Cover Crop	96	27.4	0.1	27.5

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Buckingham	342	Critical Area Planting	198	376.8	0.0	376.8
Buckingham	345	Residue and Tillage Management, Reduced Till	1,133	215.6	13.9	229.5
Buckingham	381	Silvopasture	332	5,122.3	0.0	5,122.3
Buckingham	386	Field Border	385	70.9	72.9	143.8
Buckingham	390	Riparian Herbaceous Cover	208	82.5	46.2	128.7
Buckingham	391	Riparian Forest Buffer	48	447.4	0.0	447.4
Buckingham	393	Filter Strip	37	6.7	6.9	13.6
Buckingham	528	Prescribed Grazing	6,686	289.3	142.7	432.0
Buckingham	590	Nutrient Management	11,631	2,586.0	-1,623.8	962.1
Buckingham	612	Tree/Shrub Establishment	6	133.0	0.0	133.0
Buckingham Total						**8,016.8**
Buena Vista City	340	Cover Crop	0	0.0	0.0	0.0
Buena Vista City	342	Critical Area Planting	0	0.0	0.0	0.0
Buena Vista City	381	Silvopasture	0	1.5	0.0	1.5
Buena Vista City	386	Field Border	0	0.0	0.0	0.0
Buena Vista City	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Buena Vista City	393	Filter Strip	0	0.0	0.0	0.0
Buena Vista City	528	Prescribed Grazing	1	0.0	0.0	0.0
Buena Vista City	590	Nutrient Management	133	27.9	-12.2	15.7
Buena Vista City	612	Tree/Shrub Establishment	0	0.6	0.0	0.6
Buena Vista City Total						**17.9**
Campbell	340	Cover Crop	12	3.3	0.0	3.3
Campbell	342	Critical Area Planting	4	7.3	0.0	7.3
Campbell	345	Residue and Tillage Management, Reduced Till	697	132.7	8.6	141.3
Campbell	381	Silvopasture	30	466.5	0.0	466.5
Campbell	386	Field Border	2	0.3	0.3	0.7
Campbell	390	Riparian Herbaceous Cover	3	1.1	0.6	1.6
Campbell	391	Riparian Forest Buffer	66	608.5	0.0	608.5
Campbell	393	Filter Strip	2	0.3	0.3	0.6
Campbell	528	Prescribed Grazing	232	10.0	4.9	15.0
Campbell	590	Nutrient Management	223	49.5	-31.1	18.4
Campbell	612	Tree/Shrub Establishment	1	20.8	0.0	20.8
Campbell Total						**1,283.9**
Caroline	340	Cover Crop	9,839	3,973.2	119.5	4,092.7
Caroline	342	Critical Area Planting	400	759.4	0.0	759.4
Caroline	345	Residue and Tillage Management, Reduced Till	19,531	3,215.7	169.3	3,385.0

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Caroline	381	Silvopasture	201	3,904.5	0.0	3,904.5
Caroline	386	Field Border	25	10.3	4.5	14.7
Caroline	390	Riparian Herbaceous Cover	28	12.0	6.0	17.9
Caroline	391	Riparian Forest Buffer	32	296.6	0.0	296.6
Caroline	393	Filter Strip	28	11.6	5.1	16.7
Caroline	528	Prescribed Grazing	267	11.6	5.7	17.3
Caroline	590	Nutrient Management	13,788	3,065.6	-1,925.0	1,140.6
Caroline	612	Tree/Shrub Establishment	5	120.9	0.0	120.9
Caroline Total						**13,766.3**
Charles City	340	Cover Crop	2,826	1,141.3	34.3	1,175.6
Charles City	342	Critical Area Planting	98	185.6	0.0	185.6
Charles City	345	Residue and Tillage Management, Reduced Till	15,649	2,576.6	135.6	2,712.2
Charles City	381	Silvopasture	80	1,563.8	0.0	1,563.8
Charles City	386	Field Border	11	4.5	2.0	6.4
Charles City	391	Riparian Forest Buffer	5	44.9	0.0	44.9
Charles City	393	Filter Strip	9	3.8	1.6	5.4
Charles City	528	Prescribed Grazing	16	0.7	0.3	1.0
Charles City	590	Nutrient Management	4,979	1,106.9	-695.1	411.8
Charles City	612	Tree/Shrub Establishment	3	56.5	0.0	56.5
Charles City Total						**6,163.4**
Charlottesville City	340	Cover Crop	0	0.0	0.0	0.0
Charlottesville City	342	Critical Area Planting	0	0.0	0.0	0.0
Charlottesville City	381	Silvopasture	0	0.2	0.0	0.2
Charlottesville City	386	Field Border	0	0.0	0.0	0.0
Charlottesville City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0
Charlottesville City	391	Riparian Forest Buffer	0	2.2	0.0	2.2
Charlottesville City	393	Filter Strip	0	0.0	0.0	0.0
Charlottesville City	528	Prescribed Grazing	0	0.0	0.0	0.0
Charlottesville City	590	Nutrient Management	522	109.4	-47.9	61.5
Charlottesville City	612	Tree/Shrub Establishment	1	21.5	0.0	21.5
Charlottesville City Total						**85.3**
Chesapeake City	340	Cover Crop	375	185.5	8.2	193.7
Chesapeake City	342	Critical Area Planting	13	24.8	0.0	24.8
Chesapeake City	345	Residue and Tillage Management, R educed Till	1,118	225.3	21.8	247.1
Chesapeake City	381	Silvopasture	14	216.3	0.0	216.3
Chesapeake City	386	Field Border	2	0.5	0.3	0.9

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Chesapeake City	390	Riparian Herbaceous Cover	1	0.6	0.3	0.9
Chesapeake City	391	Riparian Forest Buffer	1	8.4	0.0	8.4
Chesapeake City	393	Filter Strip	150	43.8	28.8	72.6
Chesapeake City	528	Prescribed Grazing	2	0.1	0.1	0.1
Chesapeake City	590	Nutrient Management	930	215.7	-173.0	42.6
Chesapeake City	612	Tree/Shrub Establishment	19	791.3	0.0	791.3
Chesapeake City Total						**1,598.8**
Chesterfield	340	Cover Crop	239	68.1	0.2	68.3
Chesterfield	342	Critical Area Planting	14	26.6	0.0	26.6
Chesterfield	345	Residue and Tillage Management, Reduced Till	2,524	480.5	31.0	511.5
Chesterfield	381	Silvopasture	55	841.0	0.0	841.0
Chesterfield	386	Field Border	4	0.7	0.7	1.4
Chesterfield	390	Riparian Herbaceous Cover	6	2.5	1.4	3.9
Chesterfield	391	Riparian Forest Buffer	2	15.9	0.0	15.9
Chesterfield	393	Filter Strip	50	9.1	9.4	18.6
Chesterfield	528	Prescribed Grazing	148	6.4	3.2	9.6
Chesterfield	590	Nutrient Management	2,294	510.1	-320.3	189.8
Chesterfield	612	Tree/Shrub Establishment	4	93.7	0.0	93.7
Chesterfield Total						**1,780.1**
Clarke	340	Cover Crop	693	156.9	-5.6	151.3
Clarke	342	Critical Area Planting	916	1,738.9	0.0	1,738.9
Clarke	345	Residue and Tillage Management, Reduced Till	5,026	1,293.6	119.8	1,413.4
Clarke	381	Silvopasture	266	0.0	0.0	0.0
Clarke	386	Field Border	13	5.1	2.3	7.4
Clarke	390	Riparian Herbaceous Cover	133	85.4	48.4	133.8
Clarke	391	Riparian Forest Buffer	51	250.9	0.0	250.9
Clarke	393	Filter Strip	16	6.1	2.8	8.9
Clarke	528	Prescribed Grazing	4,203	67.4	39.3	106.8
Clarke	590	Nutrient Management	4,569	957.4	-419.3	538.1
Clarke	612	Tree/Shrub Establishment	7	108.7	0.0	108.7
Clarke Total						**4,457.9**
Colonial Heights City	340	Cover Crop	0	0.0	0.0	0.0
Colonial Heights City	342	Critical Area Planting	0	0.0	0.0	0.0
Colonial Heights City	381	Silvopasture	0	0.0	0.0	0.0
Colonial Heights City	386	Field Border	0	0.0	0.0	0.0
Colonial Heights City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0
Colonial Heights City	391	Riparian Forest Buffer	0	0.0	0.0	0.0

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Colonial Heights City	393	Filter Strip	0	0.0	0.0	0.0
Colonial Heights City	528	Prescribed Grazing	0	0.0	0.0	0.0
Colonial Heights City	590	Nutrient Management	63	13.9	-8.7	5.2
Colonial Heights City	612	Tree/Shrub Establishment	0	0.0	0.0	0.0
Colonial Heights City Total						**5.2**
Covington City	340	Cover Crop	0	0.2	0.0	0.2
Covington City	342	Critical Area Planting	0	0.9	0.0	0.9
Covington City	381	Silvopasture	1	2.3	0.0	2.3
Covington City	386	Field Border	0	0.0	0.0	0.0
Covington City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0
Covington City	391	Riparian Forest Buffer	0	0.1	0.0	0.1
Covington City	393	Filter Strip	0	0.0	0.0	0.0
Covington City	528	Prescribed Grazing	0	0.0	0.0	0.0
Covington City	590	Nutrient Management	49	11.4	-4.6	6.8
Covington City	612	Tree/Shrub Establishment	0	0.3	0.0	0.3
Covington City Total						**10.7**
Craig	340	Cover Crop	5	2.2	0.1	2.3
Craig	342	Critical Area Planting	128	243.5	0.0	243.5
Craig	345	Residue and Tillage Management, Reduced Till	701	128.6	9.0	137.6
Craig	381	Silvopasture	63	284.0	0.0	284.0
Craig	386	Field Border	3	0.6	0.6	1.2
Craig	390	Riparian Herbaceous Cover	38	13.8	10.0	23.8
Craig	391	Riparian Forest Buffer	1	7.0	0.0	7.0
Craig	393	Filter Strip	7	1.4	1.3	2.7
Craig	528	Prescribed Grazing	1,300	66.0	17.5	83.5
Craig	590	Nutrient Management	146	34.1	-13.8	20.3
Craig	612	Tree/Shrub Establishment	2	36.6	0.0	36.6
Craig Total						**842.3**
Culpeper	340	Cover Crop	7,007	1,725.8	48.3	1,774.1
Culpeper	342	Critical Area Planting	768	1,457.8	0.0	1,457.8
Culpeper	345	Residue and Tillage Management, Reduced Till	19,988	4,803.8	440.2	5,244.0
Culpeper	381	Silvopasture	390	0.0	0.0	0.0
Culpeper	386	Field Border	49	17.5	7.5	25.0
Culpeper	390	Riparian Herbaceous Cover	367	215.4	116.6	332.0
Culpeper	391	Riparian Forest Buffer	103	509.5	0.0	509.5
Culpeper	393	Filter Strip	35	12.6	5.4	18.0
Culpeper	528	Prescribed Grazing	6,050	97.1	56.6	153.7

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Culpeper	590	Nutrient Management	25,596	5,363.7	-2,349.2	3,014.5
Culpeper	612	Tree/Shrub Establishment	10	163.6	0.0	163.6
Culpeper Total						**12,692.2**
Cumberland	340	Cover Crop	972	277.3	0.8	278.1
Cumberland	342	Critical Area Planting	241	456.9	0.0	456.9
Cumberland	345	Residue and Tillage Management, Reduced Till	1,092	207.9	13.4	221.3
Cumberland	381	Silvopasture	219	3,374.6	0.0	3,374.6
Cumberland	386	Field Border	162	29.8	30.7	60.5
Cumberland	390	Riparian Herbaceous Cover	188	74.7	41.8	116.5
Cumberland	391	Riparian Forest Buffer	63	579.7	0.0	579.7
Cumberland	393	Filter Strip	20	3.7	3.8	7.6
Cumberland	528	Prescribed Grazing	5,644	244.2	120.4	364.6
Cumberland	590	Nutrient Management	5,837	1,297.7	-814.9	482.8
Cumberland	612	Tree/Shrub Establishment	4	79.4	0.0	79.4
Cumberland Total						**6,022.2**
Dinwiddie	340	Cover Crop	813	232.0	0.7	232.7
Dinwiddie	342	Critical Area Planting	53	100.2	0.0	100.2
Dinwiddie	345	Residue and Tillage Management, Reduced Till	2,387	454.3	29.3	483.6
Dinwiddie	381	Silvopasture	45	697.3	0.0	697.3
Dinwiddie	386	Field Border	2	0.4	0.5	0.9
Dinwiddie	390	Riparian Herbaceous Cover	13	5.0	2.8	7.8
Dinwiddie	391	Riparian Forest Buffer	22	205.5	0.0	205.5
Dinwiddie	393	Filter Strip	8	1.4	1.5	2.9
Dinwiddie	528	Prescribed Grazing	333	14.4	7.1	21.5
Dinwiddie	590	Nutrient Management	465	103.3	-64.9	38.4
Dinwiddie	612	Tree/Shrub Establishment	1	15.8	0.0	15.8
Dinwiddie Total						**1,806.7**
Essex	340	Cover Crop	10,046	4,057.1	122.0	4,179.1
Essex	342	Critical Area Planting	286	542.9	0.0	542.9
Essex	345	Residue and Tillage Management, Reduced Till	37,110	6,109.9	321.6	6,431.5
Essex	381	Silvopasture	197	3,833.4	0.0	3,833.4
Essex	386	Field Border	25	10.3	4.5	14.8
Essex	390	Riparian Herbaceous Cover	17	7.4	3.7	11.1
Essex	391	Riparian Forest Buffer	13	116.6	0.0	116.6
Essex	393	Filter Strip	29	12.0	5.2	17.2
Essex	528	Prescribed Grazing	194	8.4	4.1	12.5

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Essex	590	Nutrient Management	59,704	13,274.1	-8,335.4	4,938.8
Essex	612	Tree/Shrub Establishment	5	112.0	0.0	112.0
Essex Total						**20,209.8**
Fairfax	340	Cover Crop	0	0.0	0.0	0.0
Fairfax	342	Critical Area Planting	0	0.2	0.0	0.2
Fairfax	345	Residue and Tillage Management, Reduced Till	19	3.7	0.2	3.9
Fairfax	381	Silvopasture	4	69.2	0.0	69.2
Fairfax	386	Field Border	0	0.0	0.0	0.0
Fairfax	390	Riparian Herbaceous Cover	1	0.2	0.1	0.4
Fairfax	391	Riparian Forest Buffer	0	0.3	0.0	0.3
Fairfax	393	Filter Strip	31	5.7	5.9	11.6
Fairfax	528	Prescribed Grazing	4	0.2	0.1	0.2
Fairfax	590	Nutrient Management	2,643	587.6	-369.0	218.6
Fairfax	612	Tree/Shrub Establishment	79	1,771.4	0.0	1,771.4
Fairfax Total						**2,076.0**
Fairfax City	340	Cover Crop	0	0.0	0.0	0.0
Fairfax City	342	Critical Area Planting	0	0.0	0.0	0.0
Fairfax City	381	Silvopasture	0	0.0	0.0	0.0
Fairfax City	386	Field Border	0	0.0	0.0	0.0
Fairfax City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0
Fairfax City	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Fairfax City	393	Filter Strip	0	0.0	0.0	0.0
Fairfax City	528	Prescribed Grazing	0	0.0	0.0	0.0
Fairfax City	590	Nutrient Management	47	10.4	-6.5	3.9
Fairfax City	612	Tree/Shrub Establishment	2	51.8	0.0	51.8
Fairfax City Total						**55.7**
Falls Church City	340	Cover Crop	0	0.0	0.0	0.0
Falls Church City	342	Critical Area Planting	0	0.0	0.0	0.0
Falls Church City	381	Silvopasture	3	38.7	0.0	38.7
Falls Church City	386	Field Border	0	0.0	0.0	0.0
Falls Church City	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Falls Church City	393	Filter Strip	0	0.0	0.0	0.0
Falls Church City	528	Prescribed Grazing	0	0.0	0.0	0.0
Falls Church City	590	Nutrient Management	14	2.9	-1.2	1.6
Falls Church City	612	Tree/Shrub Establishment	1	26.0	0.0	26.0
Falls Church City Total						**66.3**
Fauquier	340	Cover Crop	1,465	360.9	10.1	371.0

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Fauquier	342	Critical Area Planting	667	1,267.4	0.0	1,267.4
Fauquier	345	Residue and Tillage Management, Reduced Till	25,097	6,031.6	552.7	6,584.3
Fauquier	381	Silvopasture	595	0.0	0.0	0.0
Fauquier	386	Field Border	41	14.7	6.3	21.1
Fauquier	390	Riparian Herbaceous Cover	1,256	737.2	399.1	1,136.3
Fauquier	391	Riparian Forest Buffer	64	314.9	0.0	314.9
Fauquier	393	Filter Strip	121	43.2	18.6	61.8
Fauquier	528	Prescribed Grazing	12,837	206.0	120.1	326.1
Fauquier	590	Nutrient Management	15,012	3,145.8	-1,377.8	1,768.0
Fauquier	612	Tree/Shrub Establishment	18	290.6	0.0	290.6
Fauquier Total						**12,141.6**
Fluvanna	340	Cover Crop	1,530	436.6	1.2	437.8
Fluvanna	342	Critical Area Planting	40	76.1	0.0	76.1
Fluvanna	345	Residue and Tillage Management, Reduced Till	2,309	439.5	28.4	467.8
Fluvanna	381	Silvopasture	165	2,545.2	0.0	2,545.2
Fluvanna	386	Field Border	7	1.3	1.4	2.7
Fluvanna	390	Riparian Herbaceous Cover	148	58.7	32.9	91.6
Fluvanna	391	Riparian Forest Buffer	29	266.7	0.0	266.7
Fluvanna	393	Filter Strip	17	3.2	3.3	6.5
Fluvanna	528	Prescribed Grazing	2,443	105.7	52.1	157.9
Fluvanna	590	Nutrient Management	3,466	770.5	-483.8	286.7
Fluvanna	612	Tree/Shrub Establishment	5	105.8	0.0	105.8
Fluvanna Total						**4,444.9**
Frederick	340	Cover Crop	354	80.1	-2.9	77.3
Frederick	342	Critical Area Planting	1,133	2,151.8	0.0	2,151.8
Frederick	345	Residue and Tillage Management, Reduced Till	7,644	1,967.3	182.2	2,149.5
Frederick	381	Silvopasture	309	0.0	0.0	0.0
Frederick	386	Field Border	22	8.6	3.9	12.4
Frederick	390	Riparian Herbaceous Cover	82	52.7	29.9	82.5
Frederick	391	Riparian Forest Buffer	33	162.4	0.0	162.4
Frederick	393	Filter Strip	19	7.4	3.3	10.7
Frederick	528	Prescribed Grazing	2,235	35.9	20.9	56.8
Frederick	590	Nutrient Management	3,445	721.9	-316.2	405.7
Frederick	612	Tree/Shrub Establishment	10	156.4	0.0	156.4
Frederick Total						**5,265.5**
Fredericksburg City	340	Cover Crop	6	2.3	0.1	2.4

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Fredericksburg City	342	Critical Area Planting	1	1.3	0.0	1.3
Fredericksburg City	381	Silvopasture	0	3.8	0.0	3.8
Fredericksburg City	386	Field Border	0	0.0	0.0	0.0
Fredericksburg City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0
Fredericksburg City	391	Riparian Forest Buffer	0	0.1	0.0	0.1
Fredericksburg City	393	Filter Strip	0	0.0	0.0	0.0
Fredericksburg City	528	Prescribed Grazing	1	0.1	0.0	0.1
Fredericksburg City	590	Nutrient Management	76	16.8	-10.6	6.3
Fredericksburg City	612	Tree/Shrub Establishment	4	83.1	0.0	83.1
Fredericksburg City Total						**97.1**
Giles	340	Cover Crop	0	0.0	0.0	0.0
Giles	342	Critical Area Planting	0	0.1	0.0	0.1
Giles	345	Residue and Tillage Management, Reduced Till	3	0.5	0.0	0.5
Giles	381	Silvopasture	0	0.5	0.0	0.5
Giles	386	Field Border	0	0.0	0.0	0.0
Giles	390	Riparian Herbaceous Cover	0	0.0	0.0	0.1
Giles	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Giles	393	Filter Strip	0	0.0	0.0	0.0
Giles	528	Prescribed Grazing	1	0.1	0.0	0.1
Giles	590	Nutrient Management	1	0.2	-0.1	0.1
Giles	612	Tree/Shrub Establishment	0	0.1	0.0	0.1
Giles Total						**1.5**
Gloucester	340	Cover Crop	2,393	966.3	29.1	995.4
Gloucester	342	Critical Area Planting	72	136.6	0.0	136.6
Gloucester	345	Residue and Tillage Management, Reduced Till	11,295	1,859.7	97.9	1,957.5
Gloucester	381	Silvopasture	71	1,088.7	0.0	1,088.7
Gloucester	386	Field Border	8	3.5	1.5	5.1
Gloucester	390	Riparian Herbaceous Cover	2	0.8	0.4	1.2
Gloucester	391	Riparian Forest Buffer	4	37.8	0.0	37.8
Gloucester	393	Filter Strip	7	3.0	1.3	4.3
Gloucester	528	Prescribed Grazing	36	1.6	0.8	2.3
Gloucester	590	Nutrient Management	10,549	2,345.5	-1,472.8	872.7
Gloucester	612	Tree/Shrub Establishment	2	93.0	0.0	93.0
Gloucester Total						**5,194.6**
Goochland	340	Cover Crop	578	165.0	0.5	165.5
Goochland	342	Critical Area Planting	109	206.6	0.0	206.6

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Goochland	345	Residue and Tillage Management, Reduced Till	8,242	1,568.9	101.4	1,670.3
Goochland	381	Silvopasture	141	2,171.9	0.0	2,171.9
Goochland	386	Field Border	11	2.0	2.0	4.0
Goochland	390	Riparian Herbaceous Cover	92	36.5	20.4	56.9
Goochland	391	Riparian Forest Buffer	7	61.0	0.0	61.0
Goochland	393	Filter Strip	39	7.2	7.4	14.6
Goochland	528	Prescribed Grazing	1,594	69.0	34.0	103.0
Goochland	590	Nutrient Management	5,713	1,270.3	-797.6	472.6
Goochland	612	Tree/Shrub Establishment	4	91.4	0.0	91.4
Goochland Total						**5,017.8**
Greene	340	Cover Crop	295	72.7	2.0	74.7
Greene	342	Critical Area Planting	152	289.4	0.0	289.4
Greene	345	Residue and Tillage Management, Reduced Till	512	123.0	11.3	134.2
Greene	381	Silvopasture	80	0.0	0.0	0.0
Greene	386	Field Border	5	1.9	0.8	2.8
Greene	390	Riparian Herbaceous Cover	252	147.7	80.0	227.7
Greene	391	Riparian Forest Buffer	22	108.1	0.0	108.1
Greene	393	Filter Strip	9	3.3	1.4	4.8
Greene	528	Prescribed Grazing	4,380	70.3	41.0	111.3
Greene	590	Nutrient Management	1,756	367.9	-161.2	206.8
Greene	612	Tree/Shrub Establishment	3	42.0	0.0	42.0
Greene Total						**1,201.8**
Hampton City	340	Cover Crop	1	0.5	0.0	0.6
Hampton City	342	Critical Area Planting	1	1.0	0.0	1.0
Hampton City	381	Silvopasture	1	19.2	0.0	19.2
Hampton City	386	Field Border	0	0.0	0.0	0.1
Hampton City	391	Riparian Forest Buffer	1	5.0	0.0	5.0
Hampton City	393	Filter Strip	0	0.0	0.0	0.1
Hampton City	528	Prescribed Grazing	1	0.0	0.0	0.0
Hampton City	590	Nutrient Management	696	161.5	-129.5	31.9
Hampton City	612	Tree/Shrub Establishment	2	84.2	0.0	84.2
Hampton City Total						**142.0**
Hanover	340	Cover Crop	5,358	2,163.8	65.1	2,228.9
Hanover	342	Critical Area Planting	286	542.4	0.0	542.4
Hanover	345	Residue and Tillage Management, Reduced Till	24,887	4,097.5	215.7	4,313.1
Hanover	381	Silvopasture	271	4,183.7	0.0	4,183.7

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Hanover	386	Field Border	30	12.4	5.4	17.9
Hanover	390	Riparian Herbaceous Cover	60	25.7	12.8	38.4
Hanover	391	Riparian Forest Buffer	20	181.9	0.0	181.9
Hanover	393	Filter Strip	39	16.3	7.1	23.4
Hanover	528	Prescribed Grazing	608	26.3	13.0	39.3
Hanover	590	Nutrient Management	12,986	2,887.2	-1,813.0	1,074.2
Hanover	612	Tree/Shrub Establishment	8	176.1	0.0	176.1
Hanover Total						**12,819.3**
Harrisonburg City	340	Cover Crop	7	1.5	-0.1	1.5
Harrisonburg City	342	Critical Area Planting	3	5.5	0.0	5.5
Harrisonburg City	381	Silvopasture	2	0.0	0.0	0.0
Harrisonburg City	386	Field Border	0	0.1	0.0	0.1
Harrisonburg City	390	Riparian Herbaceous Cover	0	0.2	0.1	0.2
Harrisonburg City	391	Riparian Forest Buffer	0	0.8	0.0	0.8
Harrisonburg City	393	Filter Strip	1	0.2	0.1	0.4
Harrisonburg City	528	Prescribed Grazing	4	0.1	0.0	0.1
Harrisonburg City	590	Nutrient Management	281	58.9	-25.8	33.1
Harrisonburg City	612	Tree/Shrub Establishment	6	96.0	0.0	96.0
Harrisonburg City Total						**137.7**
Henrico	340	Cover Crop	2,176	878.8	26.4	905.2
Henrico	342	Critical Area Planting	34	63.7	0.0	63.7
Henrico	345	Residue and Tillage Management, Reduced Till	5,913	973.5	51.2	1,024.7
Henrico	381	Silvopasture	38	743.8	0.0	743.8
Henrico	386	Field Border	5	2.0	0.9	2.9
Henrico	390	Riparian Herbaceous Cover	1	0.5	0.2	0.8
Henrico	391	Riparian Forest Buffer	3	26.6	0.0	26.6
Henrico	393	Filter Strip	25	10.4	4.5	14.9
Henrico	528	Prescribed Grazing	31	1.3	0.7	2.0
Henrico	590	Nutrient Management	4,431	985.1	-618.6	366.5
Henrico	612	Tree/Shrub Establishment	15	325.2	0.0	325.2
Henrico Total						**3,476.3**
Highland	340	Cover Crop	89	20.1	-0.7	19.3
Highland	342	Critical Area Planting	383	727.7	0.0	727.7
Highland	345	Residue and Tillage Management, Reduced Till	669	172.3	16.0	188.2
Highland	381	Silvopasture	300	1,358.0	0.0	1,358.0
Highland	386	Field Border	44	17.1	7.7	24.7
Highland	390	Riparian Herbaceous Cover	132	84.7	48.1	132.8

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Highland	391	Riparian Forest Buffer	136	697.6	0.0	697.6
Highland	393	Filter Strip	10	4.1	1.8	5.9
Highland	528	Prescribed Grazing	3,567	57.2	33.4	90.6
Highland	590	Nutrient Management	2,357	493.9	-216.3	277.6
Highland	612	Tree/Shrub Establishment	6	140.9	0.0	140.9
Highland Total						**3,663.5**
Hopewell City	340	Cover Crop	0	0.0	0.0	0.0
Hopewell City	342	Critical Area Planting	0	0.0	0.0	0.0
Hopewell City	381	Silvopasture	0	0.1	0.0	0.1
Hopewell City	386	Field Border	0	0.0	0.0	0.0
Hopewell City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0
Hopewell City	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Hopewell City	393	Filter Strip	0	0.0	0.0	0.0
Hopewell City	528	Prescribed Grazing	0	0.0	0.0	0.0
Hopewell City	590	Nutrient Management	69	15.3	-9.6	5.7
Hopewell City	612	Tree/Shrub Establishment	1	20.9	0.0	20.9
Hopewell City Total						**26.7**
Isle of Wight	340	Cover Crop	7,062	2,862.9	167.5	3,030.4
Isle of Wight	342	Critical Area Planting	273	517.8	0.0	517.8
Isle of Wight	345	Residue and Tillage Management, Reduced Till	18,953	3,886.4	452.0	4,338.4
Isle of Wight	381	Silvopasture	107	1,651.3	0.0	1,651.3
Isle of Wight	386	Field Border	14	3.8	2.4	6.1
Isle of Wight	390	Riparian Herbaceous Cover	32	16.2	8.1	24.2
Isle of Wight	391	Riparian Forest Buffer	6	62.3	0.0	62.3
Isle of Wight	393	Filter Strip	32	8.5	5.4	13.9
Isle of Wight	528	Prescribed Grazing	239	8.8	5.9	14.6
Isle of Wight	590	Nutrient Management	15,641	3,627.8	-2,910.4	717.4
Isle of Wight	612	Tree/Shrub Establishment	4	157.0	0.0	157.0
Isle of Wight Total						**10,533.6**
James City	340	Cover Crop	132	53.4	1.6	55.0
James City	342	Critical Area Planting	10	19.6	0.0	19.6
James City	345	Residue and Tillage Management, Reduced Till	976	160.7	8.5	169.2
James City	381	Silvopasture	12	237.7	0.0	237.7
James City	386	Field Border	1	0.6	0.3	0.8
James City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.1
James City	391	Riparian Forest Buffer	1	5.8	0.0	5.8
James City	393	Filter Strip	3	1.0	0.5	1.5

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
James City	528	Prescribed Grazing	12	0.5	0.3	0.8
James City	590	Nutrient Management	709	157.6	-98.9	58.6
James City	612	Tree/Shrub Establishment	2	49.8	0.0	49.8
James City Total						**598.8**
King and Queen	340	Cover Crop	8,252	3,332.6	100.2	3,432.8
King and Queen	342	Critical Area Planting	379	718.7	0.0	718.7
King and Queen	345	Residue and Tillage Management, Reduced Till	28,908	4,759.6	250.5	5,010.1
King and Queen	381	Silvopasture	156	3,025.2	0.0	3,025.2
King and Queen	386	Field Border	20	8.3	3.6	12.0
King and Queen	390	Riparian Herbaceous Cover	14	6.2	3.1	9.2
King and Queen	391	Riparian Forest Buffer	9	83.7	0.0	83.7
King and Queen	393	Filter Strip	17	7.1	3.1	10.2
King and Queen	528	Prescribed Grazing	203	8.8	4.3	13.1
King and Queen	590	Nutrient Management	46,490	10,336.3	-6,490.6	3,845.7
King and Queen	612	Tree/Shrub Establishment	4	91.2	0.0	91.2
King and Queen Total						**16,252.0**
King George	340	Cover Crop	3,011	1,216.1	36.6	1,252.7
King George	342	Critical Area Planting	144	272.8	0.0	272.8
King George	345	Residue and Tillage Management, Reduced Till	6,352	1,045.7	55.0	1,100.8
King George	381	Silvopasture	112	2,183.9	0.0	2,183.9
King George	386	Field Border	7	3.0	1.3	4.4
King George	390	Riparian Herbaceous Cover	10	4.5	2.2	6.7
King George	391	Riparian Forest Buffer	51	474.3	0.0	474.3
King George	393	Filter Strip	331	137.2	59.8	197.0
King George	528	Prescribed Grazing	583	25.2	12.4	37.7
King George	590	Nutrient Management	4,764	1,059.3	-665.2	394.1
King George	612	Tree/Shrub Establishment	2	53.6	0.0	53.6
King George Total						**5,977.9**
King William	340	Cover Crop	6,396	2,583.1	77.7	2,660.7
King William	342	Critical Area Planting	239	453.7	0.0	453.7
King William	345	Residue and Tillage Management, Reduced Till	26,342	4,337.0	228.3	4,565.3
King William	381	Silvopasture	151	2,942.2	0.0	2,942.2
King William	386	Field Border	19	7.8	3.4	11.2
King William	390	Riparian Herbaceous Cover	1	0.3	0.2	0.5
King William	391	Riparian Forest Buffer	9	78.6	0.0	78.6
King William	393	Filter Strip	17	7.3	3.2	10.4

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
King William	528	Prescribed Grazing	116	5.0	2.5	7.5
King William	590	Nutrient Management	27,670	6,152.0	-3,863.1	2,288.9
King William	612	Tree/Shrub Establishment	4	87.6	0.0	87.6
King William Total						**13,106.7**
Lancaster	340	Cover Crop	1,652	667.3	20.1	687.4
Lancaster	342	Critical Area Planting	146	277.1	0.0	277.1
Lancaster	345	Residue and Tillage Management, Reduced Till	10,570	1,740.2	91.6	1,831.8
Lancaster	381	Silvopasture	55	1,075.6	0.0	1,075.6
Lancaster	386	Field Border	7	3.1	1.3	4.4
Lancaster	390	Riparian Herbaceous Cover	28	11.9	5.9	17.7
Lancaster	391	Riparian Forest Buffer	3	31.4	0.0	31.4
Lancaster	393	Filter Strip	6	2.6	1.1	3.7
Lancaster	528	Prescribed Grazing	113	4.9	2.4	7.3
Lancaster	590	Nutrient Management	7,709	1,714.0	-1,076.3	637.7
Lancaster	612	Tree/Shrub Establishment	2	38.5	0.0	38.5
Lancaster Total						**4,612.7**
Lexington City	340	Cover Crop	0	0.0	0.0	0.0
Lexington City	342	Critical Area Planting	0	0.0	0.0	0.0
Lexington City	381	Silvopasture	0	0.6	0.0	0.6
Lexington City	386	Field Border	0	0.0	0.0	0.0
Lexington City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0
Lexington City	391	Riparian Forest Buffer	0	0.2	0.0	0.2
Lexington City	393	Filter Strip	0	0.0	0.0	0.0
Lexington City	528	Prescribed Grazing	1	0.0	0.0	0.0
Lexington City	590	Nutrient Management	287	60.2	-26.4	33.8
Lexington City	612	Tree/Shrub Establishment	1	12.9	0.0	12.9
Lexington City Total						**47.5**
Loudoun	340	Cover Crop	797	196.4	5.5	201.9
Loudoun	342	Critical Area Planting	1,482	2,813.6	0.0	2,813.6
Loudoun	345	Residue and Tillage Management, Reduced Till	11,162	2,682.6	245.8	2,928.4
Loudoun	381	Silvopasture	483	0.0	0.0	0.0
Loudoun	386	Field Border	30	10.7	4.6	15.3
Loudoun	390	Riparian Herbaceous Cover	637	373.7	202.3	576.0
Loudoun	391	Riparian Forest Buffer	49	243.0	0.0	243.0
Loudoun	393	Filter Strip	36	12.8	5.5	18.3
Loudoun	528	Prescribed Grazing	8,152	130.8	76.3	207.1

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Loudoun	590	Nutrient Management	8,417	1,763.7	-772.5	991.3
Loudoun	612	Tree/Shrub Establishment	23	359.0	0.0	359.0
Loudoun Total						**8,353.9**
Louisa	340	Cover Crop	1,189	339.3	1.0	340.2
Louisa	342	Critical Area Planting	370	702.1	0.0	702.1
Louisa	345	Residue and Tillage Management, Reduced Till	5,750	1,094.6	70.7	1,165.3
Louisa	381	Silvopasture	245	3,773.7	0.0	3,773.7
Louisa	386	Field Border	636	117.1	120.5	237.6
Louisa	390	Riparian Herbaceous Cover	309	122.3	68.5	190.8
Louisa	391	Riparian Forest Buffer	187	1,723.1	0.0	1,723.1
Louisa	393	Filter Strip	20	3.7	3.8	7.5
Louisa	528	Prescribed Grazing	15,968	690.9	340.8	1,031.7
Louisa	590	Nutrient Management	5,618	1,249.1	-784.4	464.7
Louisa	612	Tree/Shrub Establishment	9	200.5	0.0	200.5
Louisa Total						**9,837.3**
Lynchburg City	340	Cover Crop	0	0.0	0.0	0.0
Lynchburg City	342	Critical Area Planting	0	0.1	0.0	0.1
Lynchburg City	381	Silvopasture	0	3.6	0.0	3.6
Lynchburg City	386	Field Border	0	0.0	0.0	0.0
Lynchburg City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0
Lynchburg City	391	Riparian Forest Buffer	0	0.1	0.0	0.1
Lynchburg City	393	Filter Strip	0	0.0	0.0	0.0
Lynchburg City	528	Prescribed Grazing	1	0.1	0.0	0.1
Lynchburg City	590	Nutrient Management	312	69.4	-43.6	25.8
Lynchburg City	612	Tree/Shrub Establishment	1	25.6	0.0	25.6
Lynchburg City Total						**55.3**
Madison	340	Cover Crop	2,486	612.2	17.1	629.3
Madison	342	Critical Area Planting	632	1,199.9	0.0	1,199.9
Madison	345	Residue and Tillage Management, Reduced Till	10,459	2,513.7	230.4	2,744.0
Madison	381	Silvopasture	306	0.0	0.0	0.0
Madison	386	Field Border	19	6.7	2.9	9.6
Madison	390	Riparian Herbaceous Cover	490	287.7	155.8	443.4
Madison	391	Riparian Forest Buffer	45	220.7	0.0	220.7
Madison	393	Filter Strip	33	11.9	5.1	17.0
Madison	528	Prescribed Grazing	10,214	163.9	95.6	259.5
Madison	590	Nutrient Management	3,920	821.5	-359.8	461.7
Madison	612	Tree/Shrub Establishment	8	120.3	0.0	120.3

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Madison Total						**6,105.6**
Manassas City	340	Cover Crop	0	0.0	0.0	0.0
Manassas City	342	Critical Area Planting	0	0.0	0.0	0.0
Manassas City	381	Silvopasture	0	0.0	0.0	0.0
Manassas City	386	Field Border	0	0.0	0.0	0.0
Manassas City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0
Manassas City	391	Riparian Forest Buffer	3	31.4	0.0	31.4
Manassas City	393	Filter Strip	0	0.0	0.0	0.0
Manassas City	528	Prescribed Grazing	0	0.0	0.0	0.0
Manassas City	590	Nutrient Management	117	24.6	-10.8	13.8
Manassas City	612	Tree/Shrub Establishment	0	4.2	0.0	4.2
Manassas City Total						**49.5**
Manassas Park City	340	Cover Crop	0	0.0	0.0	0.0
Manassas Park City	342	Critical Area Planting	0	0.0	0.0	0.0
Manassas Park City	381	Silvopasture	0	0.0	0.0	0.0
Manassas Park City	386	Field Border	0	0.0	0.0	0.0
Manassas Park City	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Manassas Park City	393	Filter Strip	0	0.0	0.0	0.0
Manassas Park City	528	Prescribed Grazing	0	0.0	0.0	0.0
Manassas Park City	590	Nutrient Management	23	5.1	-3.2	1.9
Manassas Park City	612	Tree/Shrub Establishment	0	1.9	0.0	1.9
Manassas Park City Total						**3.8**
Mathews	340	Cover Crop	137	67.8	3.0	70.9
Mathews	342	Critical Area Planting	12	22.1	0.0	22.1
Mathews	345	Residue and Tillage Management, Reduced Till	2,445	492.6	47.7	540.3
Mathews	381	Silvopasture	14	221.5	0.0	221.5
Mathews	386	Field Border	2	0.5	0.4	0.9
Mathews	391	Riparian Forest Buffer	1	8.4	0.0	8.4
Mathews	393	Filter Strip	6	1.8	1.2	3.0
Mathews	528	Prescribed Grazing	69	2.5	1.7	4.2
Mathews	590	Nutrient Management	1,802	418.0	-335.4	82.7
Mathews	612	Tree/Shrub Establishment	0	18.1	0.0	18.1
Mathews Total						**972.1**
Middlesex	340	Cover Crop	3,096	1,250.3	37.6	1,287.9
Middlesex	342	Critical Area Planting	110	209.1	0.0	209.1
Middlesex	345	Residue and Tillage Management, Reduced Till	12,254	2,017.5	106.2	2,123.7
Middlesex	381	Silvopasture	67	1,295.2	0.0	1,295.2

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Middlesex	386	Field Border	9	3.7	1.6	5.4
Middlesex	390	Riparian Herbaceous Cover	11	4.7	2.3	7.1
Middlesex	391	Riparian Forest Buffer	4	38.9	0.0	38.9
Middlesex	393	Filter Strip	8	3.3	1.4	4.7
Middlesex	528	Prescribed Grazing	360	15.6	7.7	23.2
Middlesex	590	Nutrient Management	13,694	3,044.7	-1,911.9	1,132.8
Middlesex	612	Tree/Shrub Establishment	2	43.2	0.0	43.2
Middlesex Total						**6,171.2**
Montgomery	340	Cover Crop	0	0.1	0.0	0.1
Montgomery	342	Critical Area Planting	0	0.5	0.0	0.5
Montgomery	345	Residue and Tillage Management, Reduced Till	27	4.9	0.3	5.3
Montgomery	381	Silvopasture	1	2.7	0.0	2.7
Montgomery	386	Field Border	1	0.1	0.1	0.3
Montgomery	391	Riparian Forest Buffer	0	0.1	0.0	0.1
Montgomery	393	Filter Strip	0	0.0	0.0	0.0
Montgomery	528	Prescribed Grazing	1	0.1	0.0	0.1
Montgomery	590	Nutrient Management	5	1.2	-0.5	0.7
Montgomery	612	Tree/Shrub Establishment	0	0.4	0.0	0.4
Montgomery Total						**10.0**
Nelson	340	Cover Crop	162	46.4	0.1	46.5
Nelson	342	Critical Area Planting	43	82.3	0.0	82.3
Nelson	345	Residue and Tillage Management, Reduced Till	1,816	345.6	22.3	367.9
Nelson	381	Silvopasture	213	3,281.0	0.0	3,281.0
Nelson	386	Field Border	62	11.5	11.8	23.3
Nelson	390	Riparian Herbaceous Cover	226	89.6	50.2	139.8
Nelson	391	Riparian Forest Buffer	46	422.5	0.0	422.5
Nelson	393	Filter Strip	32	5.9	6.1	11.9
Nelson	528	Prescribed Grazing	2,302	99.6	49.1	148.7
Nelson	590	Nutrient Management	3,054	679.0	-426.4	252.6
Nelson	612	Tree/Shrub Establishment	4	100.2	0.0	100.2
Nelson Total						**4,876.8**
New Kent	340	Cover Crop	2,435	983.3	29.6	1,012.9
New Kent	342	Critical Area Planting	200	379.0	0.0	379.0
New Kent	345	Residue and Tillage Management, Reduced Till	8,739	1,438.9	75.7	1,514.6
New Kent	381	Silvopasture	56	1,090.5	0.0	1,090.5
New Kent	386	Field Border	7	2.9	1.2	4.1

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
New Kent	391	Riparian Forest Buffer	3	29.4	0.0	29.4
New Kent	393	Filter Strip	210	87.2	38.0	125.2
New Kent	528	Prescribed Grazing	17	0.8	0.4	1.1
New Kent	590	Nutrient Management	5,641	1,254.1	-787.5	466.6
New Kent	612	Tree/Shrub Establishment	2	33.6	0.0	33.6
New Kent Total						**4,657.1**
Newport News City	340	Cover Crop	0	0.2	0.0	0.2
Newport News City	342	Critical Area Planting	0	0.2	0.0	0.2
Newport News City	381	Silvopasture	0	5.9	0.0	5.9
Newport News City	386	Field Border	0	0.0	0.0	0.0
Newport News City	391	Riparian Forest Buffer	0	3.6	0.0	3.6
Newport News City	393	Filter Strip	0	0.0	0.0	0.0
Newport News City	528	Prescribed Grazing	0	0.0	0.0	0.0
Newport News City	590	Nutrient Management	922	213.9	-171.6	42.3
Newport News City	612	Tree/Shrub Establishment	22	912.4	0.0	912.4
Newport News City Total						**964.6**
Norfolk City	340	Cover Crop	0	0.0	0.0	0.0
Norfolk City	342	Critical Area Planting	0	0.0	0.0	0.0
Norfolk City	381	Silvopasture	0	0.6	0.0	0.6
Norfolk City	386	Field Border	0	0.0	0.0	0.0
Norfolk City	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Norfolk City	393	Filter Strip	0	0.0	0.0	0.0
Norfolk City	528	Prescribed Grazing	0	0.0	0.0	0.0
Norfolk City	590	Nutrient Management	567	131.6	-105.6	26.0
Norfolk City	612	Tree/Shrub Establishment	13	558.9	0.0	558.9
Norfolk City Total						**585.6**
Northampton	340	Cover Crop	4,596	2,272.4	100.8	2,373.2
Northampton	342	Critical Area Planting	255	484.6	0.0	484.6
Northampton	345	Residue and Tillage Management, Reduced Till	18,385	3,703.6	358.5	4,062.1
Northampton	381	Silvopasture	114	1,763.5	0.0	1,763.5
Northampton	386	Field Border	16	4.7	3.1	7.7
Northampton	390	Riparian Herbaceous Cover	2	1.0	0.5	1.5
Northampton	391	Riparian Forest Buffer	7	71.1	0.0	71.1
Northampton	393	Filter Strip	13	3.9	2.6	6.5
Northampton	528	Prescribed Grazing	6	0.2	0.2	0.4
Northampton	590	Nutrient Management	5,767	1,337.7	-1,073.2	264.5
Northampton	612	Tree/Shrub Establishment	3	133.3	0.0	133.3

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Northampton Total						**9,168.5**
Northumberland	340	Cover Crop	6,083	2,456.6	73.9	2,530.5
Northumberland	342	Critical Area Planting	223	423.1	0.0	423.1
Northumberland	345	Residue and Tillage Management, Reduced Till	27,365	4,505.5	237.2	4,742.7
Northumberland	381	Silvopasture	136	2,642.9	0.0	2,642.9
Northumberland	386	Field Border	19	7.8	3.4	11.2
Northumberland	390	Riparian Herbaceous Cover	19	8.3	4.1	12.4
Northumberland	391	Riparian Forest Buffer	8	78.4	0.0	78.4
Northumberland	393	Filter Strip	19	7.8	3.4	11.2
Northumberland	528	Prescribed Grazing	137	5.9	2.9	8.8
Northumberland	590	Nutrient Management	22,375	4,974.7	-3,123.8	1,850.9
Northumberland	612	Tree/Shrub Establishment	4	84.5	0.0	84.5
Northumberland Total						**12,396.8**
Nottoway	340	Cover Crop	1,200	342.5	1.0	343.4
Nottoway	342	Critical Area Planting	215	407.4	0.0	407.4
Nottoway	345	Residue and Tillage Management, Reduced Till	3,282	624.7	40.4	665.0
Nottoway	381	Silvopasture	207	3,192.8	0.0	3,192.8
Nottoway	386	Field Border	6	1.2	1.2	2.4
Nottoway	390	Riparian Herbaceous Cover	132	52.3	29.3	81.5
Nottoway	391	Riparian Forest Buffer	45	417.9	0.0	417.9
Nottoway	393	Filter Strip	5	1.0	1.0	2.0
Nottoway	528	Prescribed Grazing	2,200	95.2	46.9	142.1
Nottoway	590	Nutrient Management	2,645	588.2	-369.3	218.8
Nottoway	612	Tree/Shrub Establishment	2	49.9	0.0	49.9
Nottoway Total						**5,523.3**
Orange	340	Cover Crop	3,485	994.5	2.8	997.3
Orange	342	Critical Area Planting	291	552.5	0.0	552.5
Orange	345	Residue and Tillage Management, Reduced Till	13,155	2,503.9	161.8	2,665.7
Orange	381	Silvopasture	314	4,849.3	0.0	4,849.3
Orange	386	Field Border	64	11.7	12.1	23.8
Orange	390	Riparian Herbaceous Cover	457	181.3	101.5	282.8
Orange	391	Riparian Forest Buffer	36	332.7	0.0	332.7
Orange	393	Filter Strip	28	5.1	5.2	10.3
Orange	528	Prescribed Grazing	11,788	510.1	251.6	761.6
Orange	590	Nutrient Management	13,166	2,927.2	-1,838.1	1,089.1
Orange	612	Tree/Shrub Establishment	9	195.0	0.0	195.0

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Orange Total						**11,760.2**
Page	340	Cover Crop	231	52.2	-1.9	50.4
Page	342	Critical Area Planting	525	996.1	0.0	996.1
Page	345	Residue and Tillage Management, Reduced Till	3,748	964.7	89.3	1,054.1
Page	381	Silvopasture	225	1,018.9	0.0	1,018.9
Page	386	Field Border	39	15.2	6.8	22.0
Page	390	Riparian Herbaceous Cover	93	59.8	33.9	93.6
Page	391	Riparian Forest Buffer	126	649.6	0.0	649.6
Page	393	Filter Strip	16	6.1	2.8	8.9
Page	528	Prescribed Grazing	2,952	47.4	27.6	75.0
Page	590	Nutrient Management	7,628	1,598.5	-700.1	898.4
Page	612	Tree/Shrub Establishment	6	134.6	0.0	134.6
Page Total						**5,001.6**
Petersburg City	340	Cover Crop	3	1.3	0.0	1.4
Petersburg City	342	Critical Area Planting	1	1.2	0.0	1.2
Petersburg City	381	Silvopasture	1	24.7	0.0	24.7
Petersburg City	386	Field Border	0	0.1	0.0	0.1
Petersburg City	391	Riparian Forest Buffer	0	0.6	0.0	0.6
Petersburg City	393	Filter Strip	0	0.1	0.0	0.1
Petersburg City	528	Prescribed Grazing	1	0.0	0.0	0.1
Petersburg City	590	Nutrient Management	153	33.9	-21.3	12.6
Petersburg City	612	Tree/Shrub Establishment	0	0.8	0.0	0.8
Petersburg City Total						**41.5**
Poquoson City	340	Cover Crop	0	0.0	0.0	0.0
Poquoson City	342	Critical Area Planting	0	0.0	0.0	0.0
Poquoson City	381	Silvopasture	0	2.2	0.0	2.2
Poquoson City	386	Field Border	0	0.0	0.0	0.0
Poquoson City	391	Riparian Forest Buffer	0	1.6	0.0	1.6
Poquoson City	393	Filter Strip	0	0.0	0.0	0.0
Poquoson City	528	Prescribed Grazing	0	0.0	0.0	0.0
Poquoson City	590	Nutrient Management	60	13.9	-11.2	2.8
Poquoson City	612	Tree/Shrub Establishment	0	20.1	0.0	20.1
Poquoson City Total						**26.7**
Portsmouth City	340	Cover Crop	0	0.0	0.0	0.0
Portsmouth City	342	Critical Area Planting	0	0.0	0.0	0.0
Portsmouth City	381	Silvopasture	0	0.3	0.0	0.3
Portsmouth City	386	Field Border	0	0.0	0.0	0.0

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Portsmouth City	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Portsmouth City	393	Filter Strip	0	0.0	0.0	0.0
Portsmouth City	528	Prescribed Grazing	0	0.0	0.0	0.0
Portsmouth City	590	Nutrient Management	386	89.4	-71.7	17.7
Portsmouth City	612	Tree/Shrub Establishment	1	40.6	0.0	40.6
Portsmouth City Total						**58.7**
Powhatan	340	Cover Crop	1,493	426.0	1.2	427.2
Powhatan	342	Critical Area Planting	92	174.5	0.0	174.5
Powhatan	345	Residue and Tillage Management, Reduced Till	4,732	900.7	58.2	958.9
Powhatan	381	Silvopasture	98	1,510.7	0.0	1,510.7
Powhatan	386	Field Border	6	1.2	1.2	2.4
Powhatan	390	Riparian Herbaceous Cover	61	24.1	13.5	37.5
Powhatan	391	Riparian Forest Buffer	6	51.1	0.0	51.1
Powhatan	393	Filter Strip	8	1.4	1.5	2.9
Powhatan	528	Prescribed Grazing	717	31.0	15.3	46.3
Powhatan	590	Nutrient Management	4,874	1,083.7	-680.5	403.2
Powhatan	612	Tree/Shrub Establishment	3	56.8	0.0	56.8
Powhatan Total						**3,671.6**
Prince Edward	340	Cover Crop	678	193.6	0.6	194.2
Prince Edward	342	Critical Area Planting	161	305.6	0.0	305.6
Prince Edward	345	Residue and Tillage Management, Reduced Till	2,847	541.9	35.0	576.9
Prince Edward	381	Silvopasture	399	6,152.3	0.0	6,152.3
Prince Edward	386	Field Border	10	1.9	2.0	3.9
Prince Edward	390	Riparian Herbaceous Cover	340	134.8	75.5	210.3
Prince Edward	391	Riparian Forest Buffer	204	1,882.7	0.0	1,882.7
Prince Edward	393	Filter Strip	11	2.0	2.0	4.0
Prince Edward	528	Prescribed Grazing	6,536	282.8	139.5	422.3
Prince Edward	590	Nutrient Management	6,469	1,438.3	-903.2	535.1
Prince Edward	612	Tree/Shrub Establishment	4	99.8	0.0	99.8
Prince Edward Total						**10,387.0**
Prince George	340	Cover Crop	1,588	641.5	19.3	660.8
Prince George	342	Critical Area Planting	44	82.7	0.0	82.7
Prince George	345	Residue and Tillage Management, Reduced Till	6,869	1,131.0	59.5	1,190.5
Prince George	381	Silvopasture	44	853.6	0.0	853.6
Prince George	386	Field Border	5	2.2	1.0	3.2
Prince George	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Prince George	391	Riparian Forest Buffer	2	22.5	0.0	22.5
Prince George	393	Filter Strip	5	1.9	0.8	2.7
Prince George	528	Prescribed Grazing	17	0.7	0.4	1.1
Prince George	590	Nutrient Management	4,202	934.3	-586.7	347.6
Prince George	612	Tree/Shrub Establishment	2	49.3	0.0	49.3
Prince George Total						**3,214.0**
Prince William	340	Cover Crop	423	104.3	2.9	107.2
Prince William	342	Critical Area Planting	64	121.4	0.0	121.4
Prince William	345	Residue and Tillage Management, Reduced Till	5,411	1,300.3	119.2	1,419.5
Prince William	381	Silvopasture	116	1,792.1	0.0	1,792.1
Prince William	386	Field Border	9	3.2	1.4	4.6
Prince William	390	Riparian Herbaceous Cover	140	82.1	44.5	126.6
Prince William	391	Riparian Forest Buffer	11	104.7	0.0	104.7
Prince William	393	Filter Strip	22	7.8	3.4	11.2
Prince William	528	Prescribed Grazing	611	9.8	5.7	15.5
Prince William	590	Nutrient Management	6,692	1,402.4	-614.2	788.2
Prince William	612	Tree/Shrub Establishment	3	77.5	0.0	77.5
Prince William Total						**4,568.5**
Rappahannock	340	Cover Crop	152	37.4	1.0	38.5
Rappahannock	342	Critical Area Planting	998	1,895.9	0.0	1,895.9
Rappahannock	345	Residue and Tillage Management, Reduced Till	1,100	264.3	24.2	288.5
Rappahannock	381	Silvopasture	205	0.0	0.0	0.0
Rappahannock	386	Field Border	12	4.2	1.8	6.0
Rappahannock	390	Riparian Herbaceous Cover	214	125.3	67.8	193.2
Rappahannock	391	Riparian Forest Buffer	26	126.7	0.0	126.7
Rappahannock	393	Filter Strip	16	5.7	2.4	8.1
Rappahannock	528	Prescribed Grazing	2,704	43.4	25.3	68.7
Rappahannock	590	Nutrient Management	390	81.8	-35.8	46.0
Rappahannock	612	Tree/Shrub Establishment	6	89.2	0.0	89.2
Rappahannock Total						**2,760.8**
Richmond	340	Cover Crop	3,297	1,331.6	40.0	1,371.6
Richmond	342	Critical Area Planting	169	320.4	0.0	320.4
Richmond	345	Residue and Tillage Management, Reduced Till	22,487	3,702.4	194.9	3,897.3
Richmond	381	Silvopasture	115	2,229.8	0.0	2,229.8
Richmond	386	Field Border	16	6.6	2.9	9.5
Richmond	390	Riparian Herbaceous Cover	84	36.1	18.0	54.1

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Richmond	391	Riparian Forest Buffer	7	66.1	0.0	66.1
Richmond	393	Filter Strip	18	7.5	3.3	10.8
Richmond	528	Prescribed Grazing	295	12.8	6.3	19.1
Richmond	590	Nutrient Management	23,513	5,227.8	-3,282.8	1,945.1
Richmond	612	Tree/Shrub Establishment	3	71.3	0.0	71.3
Richmond Total						**9,995.1**
Richmond City	340	Cover Crop	0	0.0	0.0	0.0
Richmond City	342	Critical Area Planting	0	0.1	0.0	0.1
Richmond City	381	Silvopasture	0	1.0	0.0	1.0
Richmond City	386	Field Border	0	0.0	0.0	0.0
Richmond City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0
Richmond City	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Richmond City	393	Filter Strip	0	0.0	0.0	0.0
Richmond City	528	Prescribed Grazing	0	0.0	0.0	0.0
Richmond City	590	Nutrient Management	672	149.5	-93.9	55.6
Richmond City	612	Tree/Shrub Establishment	14	324.0	0.0	324.0
Richmond City Total						**380.8**
Roanoke	340	Cover Crop	2	0.8	0.0	0.8
Roanoke	342	Critical Area Planting	11	21.5	0.0	21.5
Roanoke	345	Residue and Tillage Management, Reduced Till	54	9.9	0.7	10.6
Roanoke	381	Silvopasture	15	67.5	0.0	67.5
Roanoke	386	Field Border	1	0.2	0.1	0.3
Roanoke	390	Riparian Herbaceous Cover	3	0.9	0.7	1.6
Roanoke	391	Riparian Forest Buffer	2	10.1	0.0	10.1
Roanoke	393	Filter Strip	1	0.1	0.1	0.2
Roanoke	528	Prescribed Grazing	192	9.8	2.6	12.3
Roanoke	590	Nutrient Management	95	22.1	-8.9	13.2
Roanoke	612	Tree/Shrub Establishment	0	9.4	0.0	9.4
Roanoke Total						**147.5**
Rockbridge	340	Cover Crop	1,274	288.4	-10.3	278.1
Rockbridge	342	Critical Area Planting	665	1,262.5	0.0	1,262.5
Rockbridge	345	Residue and Tillage Management, Reduced Till	4,192	1,078.8	99.9	1,178.7
Rockbridge	381	Silvopasture	429	1,937.8	0.0	1,937.8
Rockbridge	386	Field Border	690	268.4	121.0	389.5
Rockbridge	390	Riparian Herbaceous Cover	213	136.7	77.5	214.2
Rockbridge	391	Riparian Forest Buffer	146	752.2	0.0	752.2
Rockbridge	393	Filter Strip	32	12.4	5.6	18.0

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Rockbridge	528	Prescribed Grazing	16,882	270.9	158.0	428.9
Rockbridge	590	Nutrient Management	12,952	2,714.3	-1,188.8	1,525.5
Rockbridge	612	Tree/Shrub Establishment	13	283.4	0.0	283.4
Rockbridge Total						**8,268.8**
Rockingham	340	Cover Crop	8,354	1,891.6	-67.8	1,823.8
Rockingham	342	Critical Area Planting	2,555	4,851.1	0.0	4,851.1
Rockingham	345	Residue and Tillage Management, Reduced Till	34,598	8,904.4	824.5	9,729.0
Rockingham	381	Silvopasture	825	0.0	0.0	0.0
Rockingham	386	Field Border	616	239.6	108.0	347.6
Rockingham	390	Riparian Herbaceous Cover	253	162.5	92.2	254.7
Rockingham	391	Riparian Forest Buffer	438	2,161.6	0.0	2,161.6
Rockingham	393	Filter Strip	149	58.0	26.2	84.2
Rockingham	528	Prescribed Grazing	8,405	134.9	78.7	213.5
Rockingham	590	Nutrient Management	44,198	9,262.0	-4,056.6	5,205.4
Rockingham	612	Tree/Shrub Establishment	27	429.9	0.0	429.9
Rockingham Total						**25,100.8**
Shenandoah	340	Cover Crop	803	181.8	-6.5	175.2
Shenandoah	342	Critical Area Planting	2,452	4,655.6	0.0	4,655.6
Shenandoah	345	Residue and Tillage Management, Reduced Till	13,938	3,587.3	332.2	3,919.5
Shenandoah	381	Silvopasture	465	0.0	0.0	0.0
Shenandoah	386	Field Border	343	133.4	60.2	193.6
Shenandoah	390	Riparian Herbaceous Cover	307	197.4	112.0	309.4
Shenandoah	391	Riparian Forest Buffer	155	762.9	0.0	762.9
Shenandoah	393	Filter Strip	34	13.0	5.9	18.9
Shenandoah	528	Prescribed Grazing	8,596	137.9	80.4	218.4
Shenandoah	590	Nutrient Management	7,690	1,611.4	-705.8	905.6
Shenandoah	612	Tree/Shrub Establishment	18	287.9	0.0	287.9
Shenandoah Total						**11,447.2**
Spotsylvania	340	Cover Crop	3,529	1,007.1	2.9	1,010.0
Spotsylvania	342	Critical Area Planting	254	483.1	0.0	483.1
Spotsylvania	345	Residue and Tillage Management, Reduced Till	5,844	1,112.5	71.9	1,184.3
Spotsylvania	381	Silvopasture	124	1,920.7	0.0	1,920.7
Spotsylvania	386	Field Border	8	1.5	1.6	3.1
Spotsylvania	390	Riparian Herbaceous Cover	76	30.2	16.9	47.1
Spotsylvania	391	Riparian Forest Buffer	26	238.9	0.0	238.9
Spotsylvania	393	Filter Strip	11	2.0	2.1	4.1

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Spotsylvania	528	Prescribed Grazing	1,546	66.9	33.0	99.9
Spotsylvania	590	Nutrient Management	4,229	940.2	-590.4	349.8
Spotsylvania	612	Tree/Shrub Establishment	11	241.0	0.0	241.0
Spotsylvania Total						**5,582.1**
Stafford	340	Cover Crop	1,575	449.4	1.3	450.7
Stafford	342	Critical Area Planting	145	274.9	0.0	274.9
Stafford	345	Residue and Tillage Management, Reduced Till	3,722	708.5	45.8	754.2
Stafford	381	Silvopasture	47	728.0	0.0	728.0
Stafford	386	Field Border	5	0.9	1.0	1.9
Stafford	390	Riparian Herbaceous Cover	8	3.1	1.7	4.8
Stafford	391	Riparian Forest Buffer	6	57.7	0.0	57.7
Stafford	393	Filter Strip	25	4.6	4.7	9.3
Stafford	528	Prescribed Grazing	232	10.0	5.0	15.0
Stafford	590	Nutrient Management	2,883	641.1	-402.5	238.5
Stafford	612	Tree/Shrub Establishment	11	253.4	0.0	253.4
Stafford Total						**2,788.5**
Staunton City	340	Cover Crop	1	0.2	0.0	0.2
Staunton City	342	Critical Area Planting	3	5.0	0.0	5.0
Staunton City	381	Silvopasture	19	0.0	0.0	0.0
Staunton City	386	Field Border	0	0.1	0.1	0.2
Staunton City	390	Riparian Herbaceous Cover	6	3.8	2.1	5.9
Staunton City	391	Riparian Forest Buffer	3	17.2	0.0	17.2
Staunton City	393	Filter Strip	0	0.1	0.1	0.2
Staunton City	528	Prescribed Grazing	81	1.3	0.8	2.1
Staunton City	590	Nutrient Management	428	89.7	-39.3	50.4
Staunton City	612	Tree/Shrub Establishment	1	23.3	0.0	23.3
Staunton City Total						**104.4**
Suffolk City	340	Cover Crop	3,870	1,568.6	91.8	1,660.4
Suffolk City	342	Critical Area Planting	100	189.3	0.0	189.3
Suffolk City	345	Residue and Tillage Management, Reduced Till	14,377	2,948.1	342.9	3,290.9
Suffolk City	381	Silvopasture	85	1,313.9	0.0	1,313.9
Suffolk City	386	Field Border	11	3.0	1.9	5.0
Suffolk City	391	Riparian Forest Buffer	5	50.6	0.0	50.6
Suffolk City	393	Filter Strip	26	7.0	4.4	11.4
Suffolk City	528	Prescribed Grazing	20	0.7	0.5	1.2
Suffolk City	590	Nutrient Management	10,252	2,377.9	-1,907.7	470.2
Suffolk City	612	Tree/Shrub Establishment	4	167.0	0.0	167.0

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Suffolk City Total						**7,159.9**
Surry	340	Cover Crop	2,622	1,059.1	31.8	1,090.9
Surry	342	Critical Area Planting	157	298.4	0.0	298.4
Surry	345	Residue and Tillage Management, Reduced Till	8,660	1,425.8	75.1	1,500.9
Surry	381	Silvopasture	48	934.5	0.0	934.5
Surry	386	Field Border	6	2.5	1.1	3.6
Surry	390	Riparian Herbaceous Cover	1	0.6	0.3	0.9
Surry	391	Riparian Forest Buffer	3	25.5	0.0	25.5
Surry	393	Filter Strip	5	2.1	0.9	3.1
Surry	528	Prescribed Grazing	57	2.5	1.2	3.7
Surry	590	Nutrient Management	5,942	1,321.0	-829.5	491.5
Surry	612	Tree/Shrub Establishment	2	35.6	0.0	35.6
Surry Total						**4,388.6**
Virginia Beach City	340	Cover Crop	17	8.6	0.4	9.0
Virginia Beach City	342	Critical Area Planting	2	4.7	0.0	4.7
Virginia Beach City	345	Residue and Tillage Management, Reduced Till	258	52.0	5.0	57.0
Virginia Beach City	381	Silvopasture	3	42.1	0.0	42.1
Virginia Beach City	386	Field Border	0	0.1	0.1	0.2
Virginia Beach City	391	Riparian Forest Buffer	0	1.6	0.0	1.6
Virginia Beach City	393	Filter Strip	0	0.1	0.1	0.1
Virginia Beach City	528	Prescribed Grazing	1	0.0	0.0	0.0
Virginia Beach City	590	Nutrient Management	1,500	347.9	-279.1	68.8
Virginia Beach City	612	Tree/Shrub Establishment	12	491.9	0.0	491.9
Virginia Beach City Total						**675.6**
Warren	340	Cover Crop	7	1.5	-0.1	1.4
Warren	342	Critical Area Planting	295	560.3	0.0	560.3
Warren	345	Residue and Tillage Management, Reduced Till	636	163.7	15.2	178.9
Warren	381	Silvopasture	120	540.9	0.0	540.9
Warren	386	Field Border	7	2.7	1.2	3.9
Warren	390	Riparian Herbaceous Cover	27	17.6	10.0	27.6
Warren	391	Riparian Forest Buffer	5	26.8	0.0	26.8
Warren	393	Filter Strip	9	3.3	1.5	4.8
Warren	528	Prescribed Grazing	492	7.9	4.6	12.5
Warren	590	Nutrient Management	1,596	334.6	-146.5	188.0
Warren	612	Tree/Shrub Establishment	9	212.7	0.0	212.7
Warren Total						**1,758.1**

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Waynesboro City	340	Cover Crop	2	0.4	0.0	0.4
Waynesboro City	342	Critical Area Planting	2	3.8	0.0	3.8
Waynesboro City	381	Silvopasture	3	0.0	0.0	0.0
Waynesboro City	386	Field Border	0	0.0	0.0	0.1
Waynesboro City	390	Riparian Herbaceous Cover	3	1.7	1.0	2.7
Waynesboro City	391	Riparian Forest Buffer	1	3.6	0.0	3.6
Waynesboro City	393	Filter Strip	0	0.0	0.0	0.1
Waynesboro City	528	Prescribed Grazing	45	0.7	0.4	1.1
Waynesboro City	590	Nutrient Management	343	71.9	-31.5	40.4
Waynesboro City	612	Tree/Shrub Establishment	3	47.8	0.0	47.8
Waynesboro City Total						**99.9**
Westmoreland	340	Cover Crop	5,837	2,357.3	70.9	2,428.2
Westmoreland	342	Critical Area Planting	347	658.0	0.0	658.0
Westmoreland	345	Residue and Tillage Management, Reduced Till	26,587	4,377.4	230.4	4,607.9
Westmoreland	381	Silvopasture	205	3,979.1	0.0	3,979.1
Westmoreland	386	Field Border	22	9.0	3.9	12.9
Westmoreland	390	Riparian Herbaceous Cover	162	69.7	34.6	104.3
Westmoreland	391	Riparian Forest Buffer	11	99.6	0.0	99.6
Westmoreland	393	Filter Strip	135	56.1	24.4	80.5
Westmoreland	528	Prescribed Grazing	1,111	48.1	23.7	71.8
Westmoreland	590	Nutrient Management	23,257	5,170.7	-3,246.9	1,923.8
Westmoreland	612	Tree/Shrub Establishment	4	100.5	0.0	100.5
Westmoreland Total						**14,066.6**
Williamsburg City	340	Cover Crop	0	0.0	0.0	0.0
Williamsburg City	342	Critical Area Planting	0	0.0	0.0	0.0
Williamsburg City	381	Silvopasture	0	0.3	0.0	0.3
Williamsburg City	386	Field Border	0	0.0	0.0	0.0
Williamsburg City	390	Riparian Herbaceous Cover	0	0.0	0.0	0.0
Williamsburg City	391	Riparian Forest Buffer	0	0.0	0.0	0.0
Williamsburg City	393	Filter Strip	0	0.0	0.0	0.0
Williamsburg City	528	Prescribed Grazing	0	0.0	0.0	0.0
Williamsburg City	590	Nutrient Management	306	68.0	-42.7	25.3
Williamsburg City	612	Tree/Shrub Establishment	0	4.3	0.0	4.3
Williamsburg City Total						**30.0**
Winchester City	340	Cover Crop	0	0.0	0.0	0.0
Winchester City	342	Critical Area Planting	0	0.3	0.0	0.3
Winchester City	381	Silvopasture	1	0.0	0.0	0.0

Locality	Code	NRCS Practice Name	Acres	CO_2 sum	N_2O sum	CO_2 equivalent
Winchester City	386	Field Border	0	0.0	0.0	0.0
Winchester City	390	Riparian Herbaceous Cover	0	0.1	0.0	0.1
Winchester City	391	Riparian Forest Buffer	0	0.2	0.0	0.2
Winchester City	393	Filter Strip	0	0.0	0.0	0.0
Winchester City	528	Prescribed Grazing	3	0.0	0.0	0.1
Winchester City	590	Nutrient Management	167	35.0	-15.3	19.6
Winchester City	612	Tree/Shrub Establishment	1	21.5	0.0	21.5
Winchester City Total						**41.9**
York	340	Cover Crop	20	7.9	0.2	8.2
York	342	Critical Area Planting	1	2.2	0.0	2.2
York	345	Residue and Tillage Management, Reduced Till	210	34.5	1.8	36.4
York	381	Silvopasture	3	39.6	0.0	39.6
York	386	Field Border	0	0.1	0.0	0.2
York	391	Riparian Forest Buffer	0	4.7	0.0	4.7
York	393	Filter Strip	0	0.1	0.0	0.1
York	528	Prescribed Grazing	1	0.1	0.0	0.1
York	590	Nutrient Management	399	88.7	-55.7	33.0
York	612	Tree/Shrub Establishment	5	197.6	0.0	197.6
York Total						**322.1**
Grand Total						**459,639.4**