Credit: Chesapeake Bay Journal
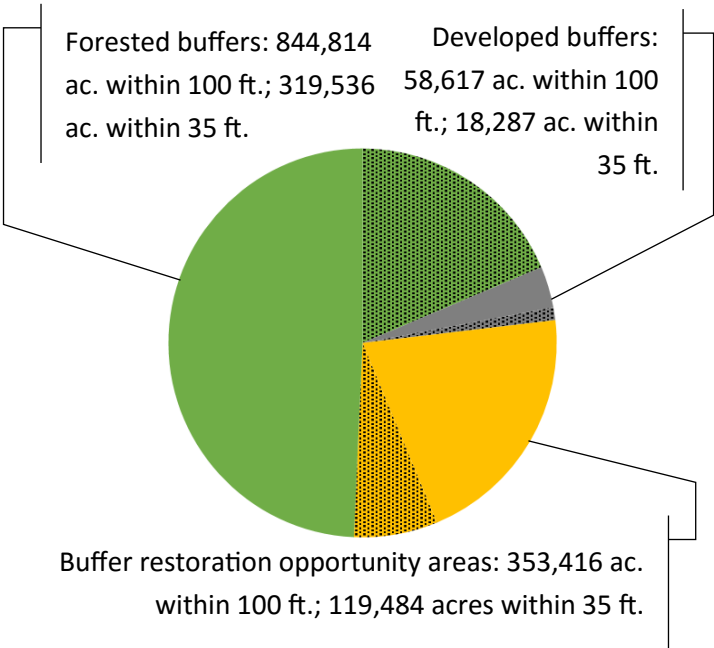
Forest Buffer Mapping for Pennsylvania's Chesapeake Bay Watershed
Supporting data-driven decision-making for collective impact
February 2019

Summary

The Chesapeake Conservancy recently completed an analysis to quantify forested buffer coverage across the entire 22,610 square miles of the Chesapeake Bay watershed within Pennsylvania. Of the total land area within a 35 ft. and 100 ft. buffer of the water network, approximately 70% and 67% of buffers are considered forested, respectively. The Chesapeake Conservancy is working with partners across Pennsylvania to use this data to make smarter decisions about restoration; and to set achievable, collective goals to maximize impact and accelerate water quality improvements.

Forested buffers: 844,814 ac. within 100 ft.; 319,536 ac. within 35 ft.

Developed buffers: 58,617 ac. within 100 ft.; 18,287 ac. within 35 ft.

Buffer restoration opportunity areas: 353,416 ac. within 100 ft.; 119,484 acres within 35 ft.

100 ft. buffer restoration opportunity areas by sector

Protected & public land: 21,059 ac. of 100 ft. buffer restoration opportunity areas are on properties with conservation easements,[1] and 13,310 ac. are on state property.[2]

Urbanized areas[3]: 13,751 ac. of 100 ft. buffer restoration opportunity areas are within urbanized areas of Municipal Separate Storm Sewer System (MS4) regulated municipalities.

Farmland[4]: 209,349 ac. of 100 ft. buffer restoration opportunity areas are on farmland.

info@chesapeakeconservancy.org
chesapeakeconservancy.org
(443) 321-3610

Foundational datasets: The analysis is based on two foundational Geospatial Information Systems (GIS) datasets to characterize the land-water interface with high precision and accuracy. Both datasets were created by the Chesapeake Conservancy and partners.

*Enhanced flow path water network**

This dataset was derived from 2006 & 2008 PA MAP Statewide. Digital Elevation Models (DEMs), developed from Lidar data, were hydro-conditioned to correct for bridges, pits, etc. Channel heads were assigned where upslope drainage accumulation reached 60 ac. Flow paths were widened based on US Geological Survey regional curves and enhanced with high-resolution land cover. Dataset resolution is 1 m.; accuracy is 82%. Buffer analysis is based on 51,425 mi. of enhanced flow paths.

*High-resolution land cover data**

This dataset was derived from 2013 National Agriculture Inventory Program imagery. Imagery was classified into 11 land cover classes: wetlands, low vegetation, barren, tree canopy, shrubland, structures, impervious surfaces, impervious roads, tree canopy over structures, tree canopy over impervious surfaces, tree canopy over impervious roads. Accuracy is 82%. Buffer analysis is based on 715 sq. mi. of land within 35 ft. buffer of water network and 1,924 sq. mi. of land within 100 ft. buffer of water network.

Forested buffer analysis: Pixels from the high-resolution land cover dataset within 35 ft. and 100 ft. distances of the enhanced flow path water network were considered in the buffer analysis. These areas were categorized into forest buffers, developed buffers, and buffer restoration opportunity areas.

*Buffer zone classification**

- Pixels classified as tree canopy and shrubland:

    forested buffers.

- Pixels classified as structures, impervious surfaces, impervious roads, tree canopy over structures, tree canopy over impervious surfaces, and tree canopy over impervious roads:

    developed buffers.

- Pixels classified as low vegetation, wetlands, and bare earth:

    buffer restoration opportunity areas.

Pennsylvania county analysis*

100 ft. restoration opportunity area acreages range from 13 to 30,074 acres by county; the median is 6,590 acres. Forested buffer coverage at a 100 ft. width ranges from 39% to 89% across counties; the median is 67%. Of the counties that fall mostly within the Bay watershed, Lackawanna has the most urbanized buffer area at 11% developed; Cameron is the most forested with 88% forested; and Lancaster has the most restoration area with 54% restorable.

100' Restoration Opportunity Area Acres by County
- up to 2,000
- 2,001 - 5,500
- 5,501 - 9,000
- 9,001 - 17,000
- 17,001 - 31,000
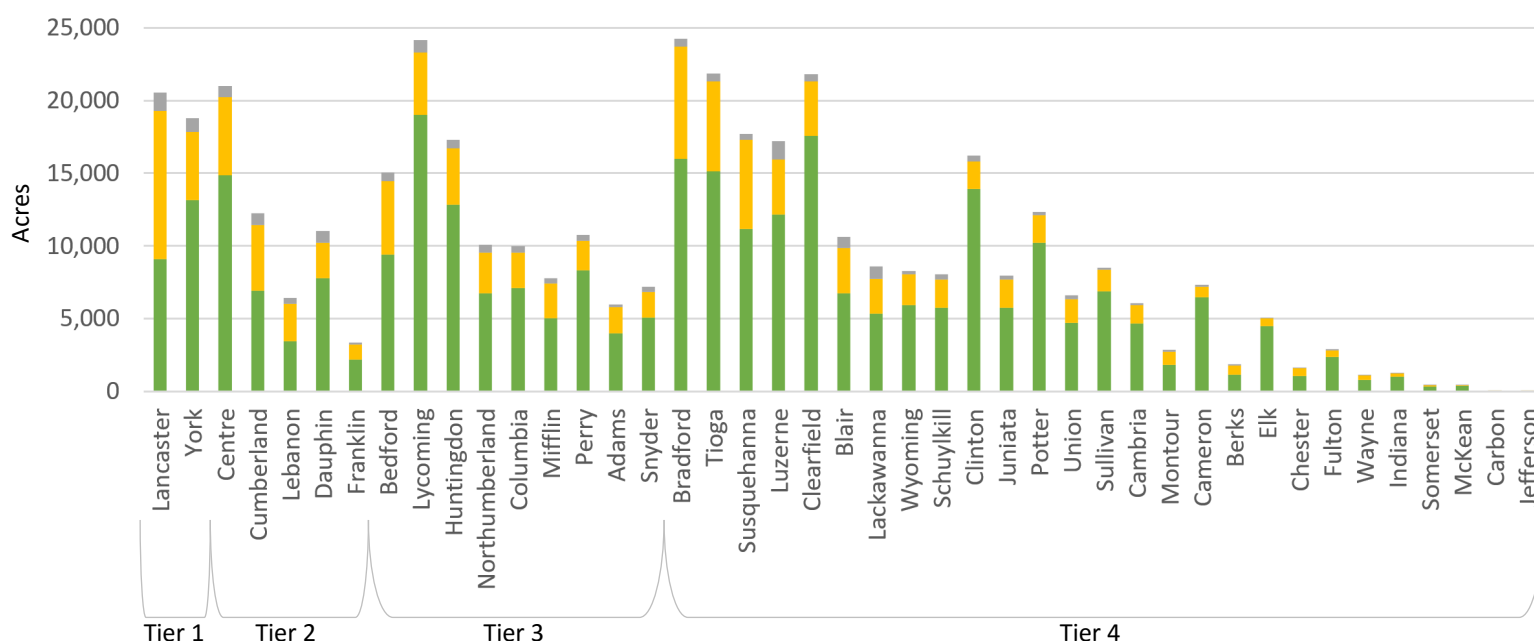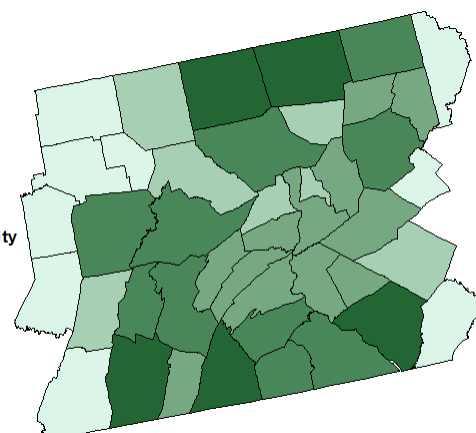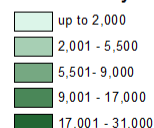
Phase III Chesapeake Bay Watershed Implementation Plan (WIP) County Tiers

Data references

1: Conservation and Farmland Preservation Easements (Pennsylvania Land Trust Association, 2019)

2: State-owned lands (Protected Areas Database of the United States, 2016)

3: Urban Area Boundary (Pennsylvania Department of Transportation, 2017)

4: Command Land Unit Boundaries (United States Department of Agriculture, Farm Service Agency, 2008)

5: Integrating List Non Attaining (Pennsylvania Department of Environmental Protection, 2017)

6: Exceptional Value or High Quality Streams, Streams Chapter 93 Designated Use (Pennsylvania Department of Environmental Protection, 2017)

*All data created by the Chesapeake Conservancy is open data and free for download. Download GIS datasets including buffer analysis, high resolution land cover, and all intermediate hydrography data at https://ChesapeakeConservancy.org. Search for "Pennsylvania Data Downloader." Also access PDF buffer reports for each county.

Credit: Chesapeake Conservancy

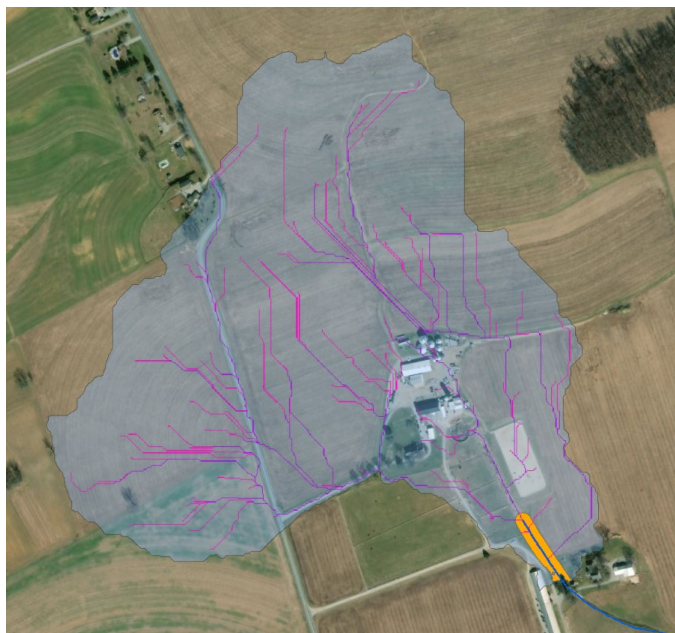## *Prioritizing parcels for restoration*

For collective impact: There are 10,992 acres of buffer restoration opportunity area in Huntingdon, Centre, Clinton, and Lycoming Counties across 6,286 parcels. Chesapeake Conservancy helped build consensus among 40 local partners to use GIS data to prioritize 278 parcels for restoration. Priority properties have large acreages of upslope land contributing runoff to impaired streams[5] through a buffer gap within important trout habitat.[6]

To build a project pipeline: In Huntingdon, Centre, Clinton, and Lycoming there are 17 catchments upstream of agriculturally-impaired streams that contain fewer than 10 high priority parcels. Chesapeake Conservancy is working with partners to focus outreach in these areas to implement farm-scale restoration to accelerate stream de-listing. Customized parcel reports are available through www.RestorationReports.com.

To prioritize funding: Chesapeake Conservancy is working with Turkey Hill Dairy, the Maryland & Virginia Milk Producers Cooperative Assn., Inc., and Alliance for the Chesapeake Bay to prioritize the spending of a multi-million dollar investment to restore Pennsylvania dairy farms. Farms with barnyards close to impaired streams that lack forested buffers and have large acreage of upslope contributing area will be restored first.

Prioritizing parcels for conservation

To protect water quality: The Chesapeake Conservancy is working with partners in Centre County to identify and prioritize protecting farms where existing forested buffers are intercepting runoff from large acreages of upslope farmland.

Support

info@chesapeakeconservancy.org
chesapeakeconservancy.org
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