



James River Water Quality Improvement Program (JRWQIP) Restoration Planner

Data Documentation

Layer List and Descriptions

Layer Groupings	Description
Boundary Layers	
Conservation Lands	Lands under conservation easement/protection
Sub-Watersheds with Local Implementation Plan	Sub-watersheds that have an implementation plan addressing local TMDLs
Area of Potential Effects	Area of Potential Effects of Dominion line
No Lidar in Middle James	Area with no Lidar coverage, excluded from analysis
Upper Middle Lower James Watershed	James River watershed boundaries
Soil and Water Conservation Districts	VA soil and water conservation district boundaries
Counties	County boundaries
HUC 10s	Hydrologic Unit Code 10 watershed boundaries
HUC 12s	Hydrologic Unit Code 12 watershed boundaries
Ecological Layers	
Impaired Waters	Non-attaining waters
Impaired Rivers	Category 4 or 5 impaired rivers
Impaired Reservoirs	Category 4 or 5 impaired reservoirs
Impaired Estuaries	Category 4 or 5 impaired estuaries
VIMS Shoreline	Shoreline Delineation
VIMS Tidal Marsh	Tidal marsh boundaries
NWI Non-Tidal Wetlands	Non-tidal wetland boundaries
Prioritization Layers	
HUC 12s Percent Unbuffered 35'	Hydrologic Unit Code 12 watershed boundaries summarized by percentage of unbuffered area within the 35' buffer zone of the enhanced flow paths
Enhanced Flow Paths	Enhanced flow path/ water network
Drainage Areas	
Drainage Areas 35'	Contributing upland to 35' restoration opportunity areas
Drainage Areas 100'	Contributing upland to 100' restoration opportunity areas
Lower James Prioritization Layers	
Restoration Opportunity Areas 35'	Prioritized restoration opportunity areas within 35' buffer of enhanced flow path
Restoration Opportunity Areas 100'	Prioritized restoration opportunity areas within 100' buffer of enhanced flow path
Parcels	Prioritized parcels
Middle James Prioritization Layers	
Restoration Opportunity Areas 35'	Prioritized restoration opportunity areas within 35' buffer of enhanced flow path

Restoration Opportunity Areas 100'	Prioritized restoration opportunity areas within 100' buffer of enhanced flow path
Parcels	Prioritized parcels
Additional Layers	
County Nitrogen Reduction Goal by Subsources (lbs/yr)	Nitrogen reduction goals by county and subsource according to the Phase 5.3.2 TMDL Model
County Phosphorus Reduction Goal by Subsources (lbs/yr)	Phosphorus reduction goals by county and subsource according to the Phase 5.3.2 TMDL Model
County Sediment Reduction Goal by Subsources (lbs/yr)	Nitrogen reduction goals by county and subsource according to the Phase 5.3.2 TMDL Model
Estimated Soil Loss (tons/year) (RUSLE)	Estimated soil loss (tons/year) using the Revised Universal Soil Loss Equation (RUSLE). The RUSLE model incorporates land cover, rainfall erosivity, soil erodibility, and topographic factors.
VA High-Resolution Land Cover	Land Cover (1-meter resolution) for Virginia

Definitions and Attribute Tables

Restoration Opportunity Areas: Criteria

1. Any contiguous area within a 35' or 100' buffer of the enhanced flow path
2. *Not* categorized as any of the following land cover classes:
 - 11 Hydro
 - 12 Automated Hydro extraction under wetlands
 - 41 Forest
 - 42 Tree
 - 43 Automated Forest extraction under wetlands
 - 51 Scrub/Shrub
 - 111 Tree Canopy over Hydro
 - 112 Tree Canopy over Automated Hydro

Descriptions of land cover classes can be found in the 'Virginia Statewide Land Cover Metadata' PDF at <http://chesapeakeconservancy.org/vee-web-viewer/>

3. *Not* within road right of ways
4. At least 25 square meters in area
5. Cut by parcel boundaries

HUC 12s Percent Unbuffered 35'

Attribute	Description
HUC 8	HUC 8 Code
HUC 10	HUC 10 Code
HUC 12	HUC 12 Code
HUC 10 Name	HUC 10 Name
HUC 12 Name	HUC 12 Name
Total ROA Area 35' (Acres)	Total acres of restoration opportunity area (ROA) identified within 35' buffer zone of enhanced flow paths
“Land Cover Class”35	Acres of the 35' buffer zone categorized as the land cover class
Total 35' Buffer Area (Acres)	Total acres of the 35' buffer zone of enhanced flow paths
Buffered* Area 35' (Acres)	Total buffered acres within the 35' buffer zone
Unbuffered** Area 35' (Acres)	Total unbuffered acres within the 35' buffer zone
Percent Buffered 35'	Percent of 35' buffer zone that is buffered
Percent Unbuffered 35'	Percent of 35' buffer zone that is unbuffered
Total ROA Area 100' (Acres)	Total acres of restoration opportunity area identified within 100' buffer zone of enhanced flow paths
“Land Cover Class”100	Acres of the 100' buffer zone categorized as the land cover class
Total 100' Buffer Area (Acres)	Total acres of the 100' buffer zone of enhanced flow paths
Buffered* Area 100' (Acres)	Total buffered acres within the 100' buffer zone
Unbuffered** Area 100' (Acres)	Total unbuffered acres within the 100' buffer zone
Percent Buffered 100'	Percent of 100' buffer zone that is buffered
Percent Unbuffered 100'	Percent of 100' buffer zone that is unbuffered

*Land cover categories considered buffered: Forest, Tree Canopy, Scrub/Shrub, all “x under Wetlands” classes (combined into ‘Wetlands’ class), and all “Tree Canopy over x” classes (combined into ‘Tree Canopy’ class).

**Land cover categories considered unbuffered: Roads, Hydro, Extracted Impervious and External Impervious (combined into ‘Impervious’ class), Barren, Harvested/Disturbed, Turf, Pasture, and Cropland

Descriptions of land cover classes can be found in the ‘Virginia Statewide Land Cover Metadata’ PDF at <http://chesapeakeconservancy.org/vee-web-viewer/>

Restoration Opportunity Areas

Attribute	Description
Tier	Project tier (1-5) where 1 is highest priority, 5 is lowest priority. Tiers were based on the natural breaks of the distribution of final weighted scores, which incorporated attributes such as land cover and soil loss in the drainage area, proximity to impaired waters, etc.
ROA Area (Acres)	Total area of restoration opportunity areas (ROAs) (acres)
Drainage Area (Acres)	Drainage area (DA), the total land area draining to the ROA (acres)
Agriculture in DA (Acres)	Total land area classified as Agriculture within the drainage area (Acres)
Impervious in DA (Acres)	Total land area classified as Impervious within the drainage area (Acres)
Turf in DA (Acres)	Total land area classified as Turf within the drainage area (Acres)
Land Cover of Concern in DA (Acres)	Total land area classified as land cover (LC) categories of concern for water quality within the drainage area (Acres). Land cover categories of concern are: agriculture, impervious surfaces, and turf
Ratio (LC of Concern) : (ROA Area)	Ratio of (LC of concern in drainage area) : (ROA area), a measure of cost effectiveness--runoff in the upland area treated relative to the cost of project
Soil Loss in DA (Tons/Year)	Estimated soil loss in the drainage area (tons/year)
Ratio (Soil Loss) : (ROA Area)	Ratio of (soil loss in drainage area) : (ROA area), a measure of cost effectiveness--soil loss in the upland area treated relative to the cost of project
Tidal	Within tidal marsh areas (0 = No; 1 = Yes)
Impaired Waters	Proximity to impaired waters (within 30 meters) (0 = No; 1 = Yes)
Sub-Watershed with Local Implementation Plan	In a sub-watershed with a local implementation plan to address local TMDLs (0 = No; 1 = Yes)
APE	Within area of potential effects (APE) (0 = No; 1 = Yes)
Conservation Lands	Within lands under conservation/easement protection (0 = No; 1 = Yes)
Urban Growth	Within areas of projected urban growth (0 = No; 1 = Yes)
Upper/Middle/Lower	Upper/Middle/Lower portion of James watershed
Parcel ID	ID of parcel that contains the ROA
County	County that contains the ROA
Soil and Water Conservation District	Soil and Water Conservation District that contains the ROA
HUC 10 Name	HUC 10 that contains the ROA
HUC 12 Name	HUC 12 that contains the ROA

Parcels

Attribute	Description
Tier	Parcel tier (1-5) where 1 is highest priority, 5 is lowest priority. Tiers were based on the natural breaks of the distribution of final weighted scores, which incorporated attributes such as land cover and soil loss in the drainage area, proximity to impaired waters, etc. The parcel prioritization aggregated statistics for the 35' restoration opportunity areas.
Total ROA Area (Acres)	Total area of restoration opportunity areas (ROAs) on parcel (acres)
Total Drainage Area to ROAs (Acres)	Total area of drainage areas, upland land draining to ROAs on parcel (acres)
Total Agriculture in DAs (Acres)	Total land area classified as Agriculture within the drainage areas to ROAs on parcel (acres).
Total Impervious in DAs (Acres)	Total land area classified as Impervious within the drainage areas to ROAs on parcel (acres).
Total Turf in DAs (Acres)	Total land area classified as Turf within the drainage areas to ROAs on parcel (acres).
Total Land Cover of Concern in DAs (Acres)	Total land area classified as land cover (LC) categories of concern for water quality within the drainage areas to ROAs on parcel (acres). Land cover categories of concern are: agriculture, impervious surfaces, and turf
Soil Loss in DAs to ROAs (Tons/Year)	Estimated soil loss within the drainage areas to ROAs on parcel (tons/year)
Total Area of DAs on Parcel (Acres)	Total area of drainage areas cut to parcel boundaries (acres)
Total LC of Concern in DAs on Parcel (Acres)	Total land area classified as land cover (LC) categories of concern for water quality within the drainage areas on parcel (Acres).
Soil Loss in DAs on Parcel (Acres)	Estimated soil loss within the drainage areas on parcel (tons/year)
Vegetated Area in DAs on Parcel (Acres)*	Total area of vegetated land in DAs on parcel (acres)
Restorable Area in DAs on Parcel (Acres)**	Total area of restorable land in DAs on parcel (acres)
Unrestorable Area in DAs on Parcel (Acres)***	Total area of unrestorable land in DAs on parcel (acres)
Vegetated Area on Parcel (Acres)*	Total area of vegetated land on parcel (acres)
Restorable Area on Parcel (Acres)**	Total area of restorable land on parcel (acres)
Unrestorable Area on Parcel (Acres)***	Total area of unrestorable land on parcel (acres)
Tidal	Within tidal marsh areas (0 = No; 1 = Yes)
Impaired Waters	Proximity to impaired waters (within 30 meters) (0 = No; 1 = Yes)

Sub-Watershed with Local Implementation Plan	In a sub-watershed with a local implementation plan to address local TMDLs (0 = No; 1 = Yes)
APE	Within area of potential effects (APE) (0 = No; 1 = Yes)
Conservation Lands	Within lands under conservation/easement protection (0 = No; 1 = Yes)
Urban Growth	Within areas of projected urban growth (0 = No; 1 = Yes)
Upper/Middle/Lower	Upper/Middle/Lower portion of James watershed
County	County that contains the parcel
Soil and Water Conservation District	Soil and Water Conservation District that contains the parcel
HUC 10 Name	HUC 10 that contains the parcel
HUC 12 Name	HUC 12 that contains the parcel

* Land cover categories considered vegetated: Forest, Tree Canopy, Forest under Wetlands, Scrub/Shrub

** Land cover categories considered restorable: Barren, Harvested/Disturbed, Turf, Turf under Wetlands, Pasture, Cropland

*** Land cover categories considered unrestorable: Roads, Hydro, Hydro under Wetlands, Extracted Impervious, External Impervious

“Tree Canopy over x” classes were treated as “x”

Descriptions of land cover classes can be found in the ‘Virginia Statewide Land Cover Metadata’ PDF at <http://chesapeakeconservancy.org/vee-web-viewer/>

Data Sources

Data	Source	Link
Boundary Layers		
Conservation Lands	Ducks Unlimited- National Conservation Easement Database; Virginia Department of Conservation and Recreation- Virginia Conservation Lands Database	https://www.conservationeasement.us/interactivemap/ ; http://www.dcr.virginia.gov/natural-heritage/clinfo#use
Sub-Watersheds with Local Implementation Plan	Virginia Department of Environmental Quality (DEQ)	http://www.deq.virginia.gov/ConnectWithDEQ/VEGIS/VEGISDatasets.aspx
APE	Virginia Environmental Endowment	www.vee.org
No Lidar in Middle James	Chesapeake Conservancy	Contact Chesapeake Conservancy
Upper Middle Lower James Watershed	Chesapeake Conservancy and Virginia Environmental Endowment	Contact Chesapeake Conservancy
Soil and Water Conservation Districts	Virginia's Soil and Water Conservation Districts	http://vaswcd.org/map-of-districts
Counties	Virginia Geographic Information Network (VGIN)	https://gismaps.vita.virginia.gov/arcgis/rest/services/VA_Base_layers/VA_Admin_Boundaries/MapServer/1
HUC 10s	National Hydrography Dataset, Water Boundary Dataset	https://nhd.usgs.gov/data.html
HUC 12s	National Hydrography Dataset, Water Boundary Dataset	https://nhd.usgs.gov/data.html
Ecological Layers		
Impaired Waters Rivers Reservoirs Estuaries	Virginia Department of Environmental Quality (DEQ) 2014 Integrated Water Quality Report	http://www.deq.virginia.gov/ConnectWithDEQ/VEGIS/VEGISDatasets.aspx
VIMS Shoreline	Virginia Institute of Marine Science (VIMS) Virginia Shoreline Inventory	http://www.vims.edu/ccrm/research/inventory/virginia/index.php
VIMS Tidal Marsh	Virginia Institute of Marine Science (VIMS) Virginia Tidal Marsh Inventory	http://www.vims.edu/ccrm/research/inventory/virginia/index.php
NWI Non-Tidal Wetlands	National Wetlands Inventory (NWI)	https://www.fws.gov/wetlands/data/Mappper.html
Prioritization Layers		
HUC 12s Total Restoration Opportunity Areas	Chesapeake Conservancy	Contact Chesapeake Conservancy
Water Network	Chesapeake Conservancy	Contact Chesapeake Conservancy

Lower James		
Restoration Opportunity Areas 35'	Chesapeake Conservancy	Contact Chesapeake Conservancy
Restoration Opportunity Areas 100'	Chesapeake Conservancy	Contact Chesapeake Conservancy
Parcels	Loveland Technologies; select counties	https://makeloveland.com/
Middle James		
Restoration Opportunity Areas 35'	Chesapeake Conservancy	Contact Chesapeake Conservancy
Restoration Opportunity Areas 100'	Chesapeake Conservancy	Contact Chesapeake Conservancy
Parcels	Loveland Technologies; select counties	https://makeloveland.com/
Additional Layers		
County Nitrogen Reduction Goal by Subsources (lbs/yr)	Chesapeake Bay Program Model Local Loading Reduction Goals	Contact Virginia DEQ
County Phosphorus Reduction Goal by Subsources (lbs/yr)	Chesapeake Bay Program Model Local Loading Reduction Goals	Contact Virginia DEQ
County Sediment Reduction Goal by Subsources (lbs/yr)	Chesapeake Bay Program Model Local Loading Reduction Goals	Contact Virginia DEQ
Estimated Soil Loss (tons/year) using Revised Universal Soil Loss Equation (RUSLE)	Chesapeake Conservancy	Contact Chesapeake Conservancy
VA High-Resolution Land Cover	Virginia Geographic Information Network (VGIN); Worldview Solutions	http://vgin.maps.arcgis.com/apps/View/index.html?appid=d3d51bb5431a4d26a313f586c7c2c848

Contact information

Chesapeake Conservancy: emills@chesapeakeconservancy.org

Virginia Environmental Endowment: jrwquip@vee.org

Data Limitations

The restoration opportunity area (ROA) and parcel prioritizations are inherently constrained by the limitations of the foundational datasets on which they are based. While the enhanced flow path dataset provides greater detail than other publicly available datasets, its accuracy decreases in headwater streams and heavily developed urban areas, possibly affecting accuracy of the identified ROAs in those areas. Errors in the Virginia Statewide Land Cover dataset may also propagate through to the prioritization analysis. For example, decisions made about the land cover classes included in the definition of a 'Restoration Opportunity Area' (see 'Definitions and Attribute Tables' section) likely resulted in an overestimation of actual restorable areas in wetlands due to errors such as misclassified turf over wetlands class, etc. The Virginia Statewide Land Cover dataset is also based on 2013 aerial imagery, which may not reflect current on-the-ground conditions. The prioritization analysis can be updated as more recent land cover data becomes available. For these reasons, on-the-ground knowledge must be used to appropriately apply the results of this analysis to the restoration planning process.

Disclaimer/Use Limitation

Results from the Chesapeake Conservancy's analysis for the James River watershed provide an inventory of restoration opportunity areas, with prioritized opportunity areas for riparian buffer projects and prioritized parcels for restoration practices not limited to riparian buffer projects. This tool is intended to assist Virginia Environmental Endowment and applicants to their James River Water Quality Improvement Program. The Restoration Planner allows users to explore and leverage high-resolution data to inform restoration project planning and maximize water quality benefits of restoration activities in the James River watershed. Results should be ground-truthed using local knowledge through stakeholder and landowner participation, as the data is not intended to provide site-specific engineering/project design. Virginia Environmental Endowment and Chesapeake Conservancy do not guarantee the accuracy of suggested practice locations. Local knowledge and planning expertise is required to apply the results of this analysis in an appropriate manner that ensures restoration project planning will result in tangible water quality benefits on-the-ground. The re-distribution of the prioritization datasets for profit is prohibited.