

Chesapeake Bay Program Objectives

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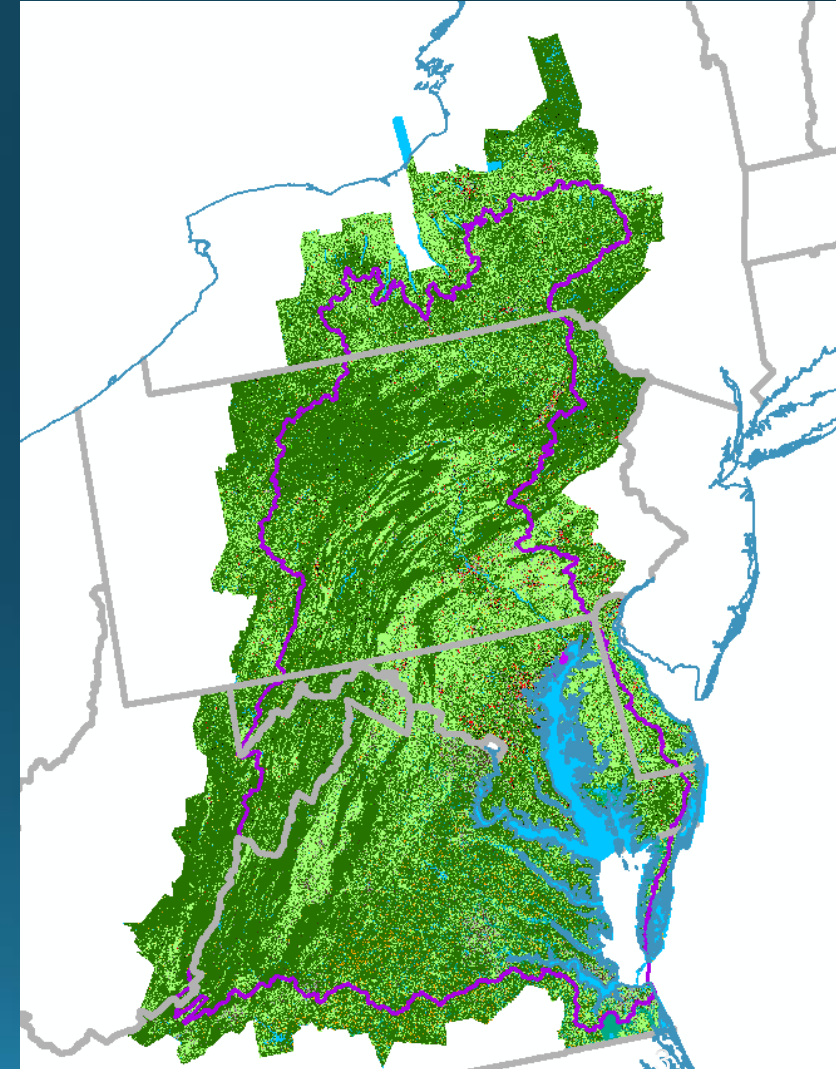
Precision Conservation



*“Getting the right practices, in the right places,
at the right scale, and
making sure they are working”*

Chesapeake Bay Program Cooperative Agreement

- 6-year geospatial support to CBP
- Creating and delivering new high-resolution data for the Chesapeake Bay watershed.
- Creating streamlined platform for project identification/prioritization, tracking, and reporting.



CBP Proposal

Objective 1: Land Cover and Land Use

- Partnering with University of Vermont

Objective 2: Hydrology & Ditches

- Partnering with UMBC

Objective 3: BMP Mapping & Tracking

- Partnering with Chesapeake Commons and Drexel University

Objective 4: General Geospatial Support



University of Vermont
Spatial Analysis Lab



Objective 1: Land Cover and Land Use

Partnering with University of Vermont Spatial Analysis Laboratory

Main Goal: Create high-resolution land cover and land use maps for the entire Chesapeake Bay watershed for **2017/18**, and for **2021/22**.

2013/2014 Land Cover and Land Use

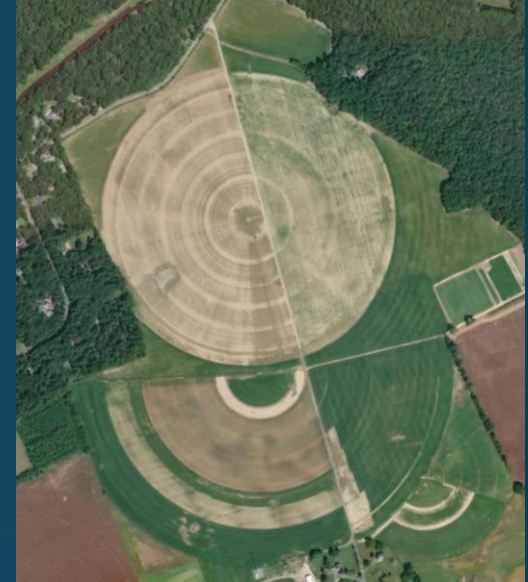
Creating:

- 2017/2018 products
- 2021/2022 products



Potential Secondary Classes

- Timber harvests/silviculture
- Vegetation Height
- Deciduous vs. Evergreen
- Cover crops
- Crop vs. pasture
- Center-pivot irrigation
- Vineyards, nurseries, greenhouses, and orchards
- Solar fields
- Animal operations: chicken
- Non-tidal/forested wetlands



Objective 2: High-resolution hydrography

Partnering with University of Maryland Baltimore County,
Department of Geography and Environmental Systems

Main Goal: Create high-resolution maps of stream channels, roadside ditches, and agricultural ditches from LiDAR elevation data across the Chesapeake Bay watershed

Previously available data



High-resolution data





Objective 3: BMP Mapping & Tracking

Partnering with Chesapeake Commons and Drexel University

Main Goal: To create a BMP opportunity data blueprint for the entire Chesapeake Bay watershed and a streamlined platform for project identification, prioritization, tracking, and standardized reporting.

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Chesapeake BMPs



Water and Sediment Control Basins

Grassed Waterways



Contour Buffer Strips



BMP Identification and Mapping with ACPF: Agricultural Conservation Planning Framework (USDA)

acpf_V3_Pro.tbx

- ▶ 1. DEM Preparation
- ▶ 2. Develop Stream Network and Catchments
- ▶ 3. Field Characterization
 - a. By-Field Slope Statistics
 - b. Tile-Drainage Classification
 - c. D8 Distance To Stream
 - d. Runoff Risk Assessment
- ▶ 4. Precision Conservation Practice Siting
 - a. Depression Identification
 - b. Depression Drainage Area
 - c. Drainage Water Management
 - d. Moore Terrain Derivatives
 - e. Grassed Waterways - SPIThreshold
 - f. Contour Buffer Strips
 - g. Edge-of-field Bioreactors
- ▶ 5. Impoundment Siting
- ▶ 6. Riparian Assessment
- ▶ Utilities

Process for conservation planning to improve water quality in agricultural watersheds using precision technologies

DATA REQUIRED: 1 & 2 high-resolution digital elevation model, Soils survey, Field boundaries, Land use

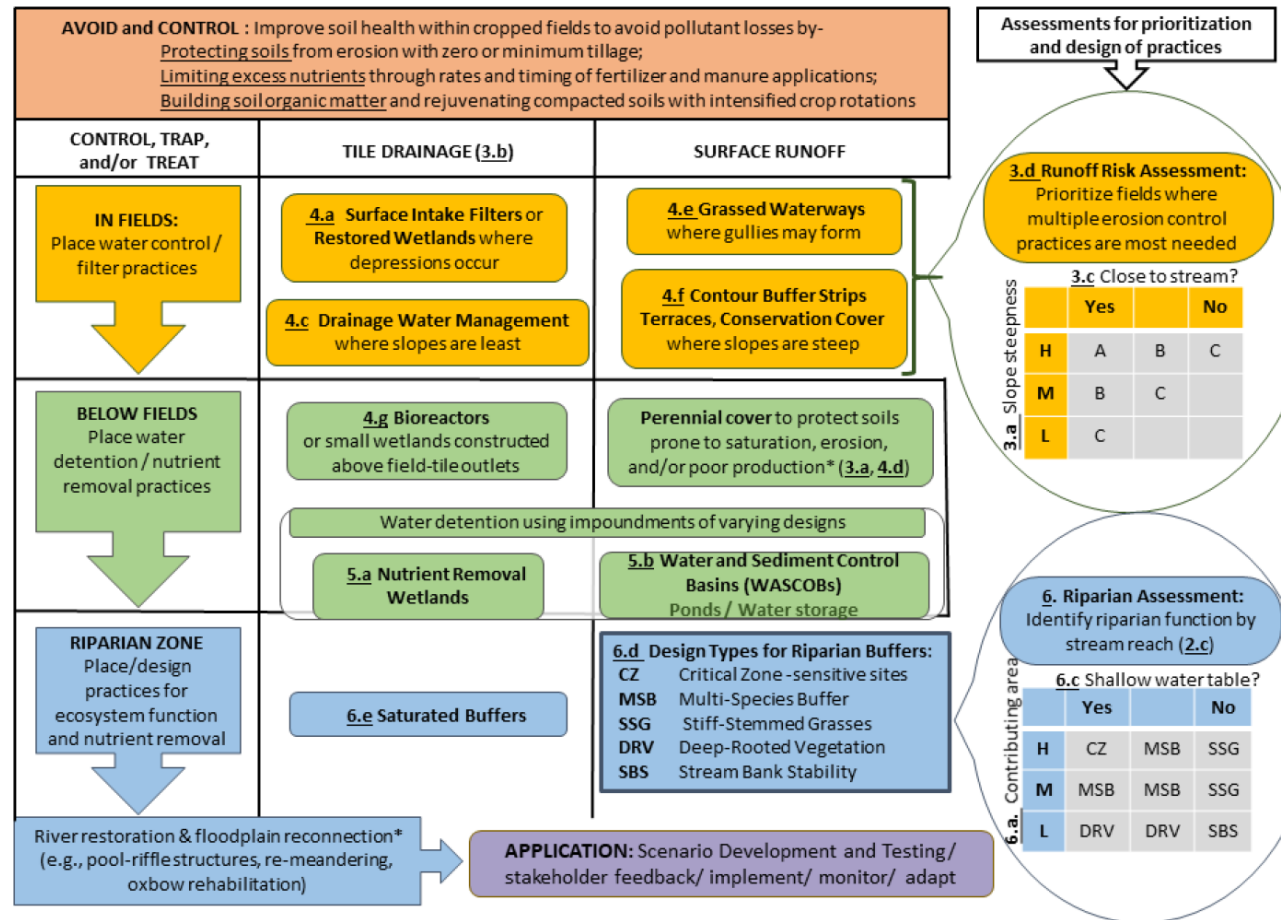


Figure 1. Conceptual diagram for the Agricultural Conservation Planning Framework (Tomer et al., 2013), with section numbers in this manual identified where appropriate. * indicates planning options where use of additional data sources, modeling tools, and/or novel site-specific designs are suggested.

Troubleshooting errors

Current Session

- f. Contour Buffer Strips [132902_04232018]
- Output Contour Buffer Strips (polygon): <empty>
- Inputs
- Environments
- Messages

Executing: f.ContourBufferStrips clu_public_a_pa071_withinbnd Slopelic121_a_pa071b SlopeTablelic121_a_pa071b

Start Time: Mon Apr 23 13:23:38 2018

Running script f.ContourBufferStrips...

Identifying agricultural fields...excluding pasture

Identifying regions between 4 and 15% slope within agricultural fields

Generating contours at different intervals based on slope class

slope class 1: 12 - 15%...recommended spacing of 150 feet

480 fields identified

slope class 2: 8 - 12%...recommended spacing of 200 feet

267 fields identified

slope class 2: 4 - 8%...recommended spacing of 250 feet

246 fields identified

merging contours from different sources

smoothing

buffering contours by 15 feet

Failed script f.ContourBufferStrips

Traceback (most recent call last):

File "C:\ACPF_V2_2\Scripts\GenerateContours\OutS...
File "C:\ACPF_V2_2\Scripts\field_lyr = arcpy.MakeFe...
File "c:\program files (x86)\arcpy\arcpy\sa\Functions.py", line 2289, in Fill
z_limit)

ExecuteError: ERROR 0003: Failed to execute (MakeFeatureClass)

Failed to execute (f.ContourBufferStrips)

Failed at Mon Apr 23 13:23:38 2018 (Elapsed Time: 39 minutes 13 seconds)

DEM: Pit Fill / Hole Punch

Executing: PitFillHolePunch DEM_2m_020503060804 F:\Test_obj3_20190207\Lancaster_020503060804.gdb\DEM_2m_p020503060804

20

Start Time: Thu Feb 7 15:03:46 2019

Running script PitFillHolePunch...

Hole-punching: DEM_2m_020503060804

Find Pits...

Fill everything else...

Current maximum depth: 3169.0

Punch holes...

Total holes punched: 87990263.0

Current maximum depth: 358.0

Punch holes...

Total holes punched: 87995620.0

Current maximum depth: 301.0

Punch holes...

Total holes punched: 87996187.0

Current maximum depth: 186.0

Punch holes...

Total holes punched: 87996603.0

Current maximum depth: 108.0

Punch holes...

Total holes punched: 87996725.0

Failed script PitFillHolePunch...

Traceback (most recent call last):

File "J:\Obj3_CBP\ACPF_V3_ArcMap\ACPF_V3\Scripts\PitFillHolePunch.py", line 224, in <module>
NewDEMwithHoles = fill_toDepth(inDEM, minBndDpth)

File "J:\Obj3_CBP\ACPF_V3_ArcMap\ACPF_V3\Scripts\PitFillHolePunch.py", line 163, in fill_toDepth
rDepth, MaxDepth = findMaxDepth(inDEM)

File "J:\Obj3_CBP\ACPF_V3_ArcMap\ACPF_V3\Scripts\PitFillHolePunch.py", line 83, in findMaxDepth
rFill = Fill(inDEM)

File "c:\program files (x86)\arcpy\arcpy\sa\Functions.py", line 2289, in Fill
z_limit)

File "c:\program files (x86)\arcpy\arcpy\sa\Utils.py", line 53, in swapper
result = wrapper(*args, **kwargs)

File "c:\program files (x86)\arcpy\arcpy\sa\Functions.py", line 2285, in Wrapper
z_limit)

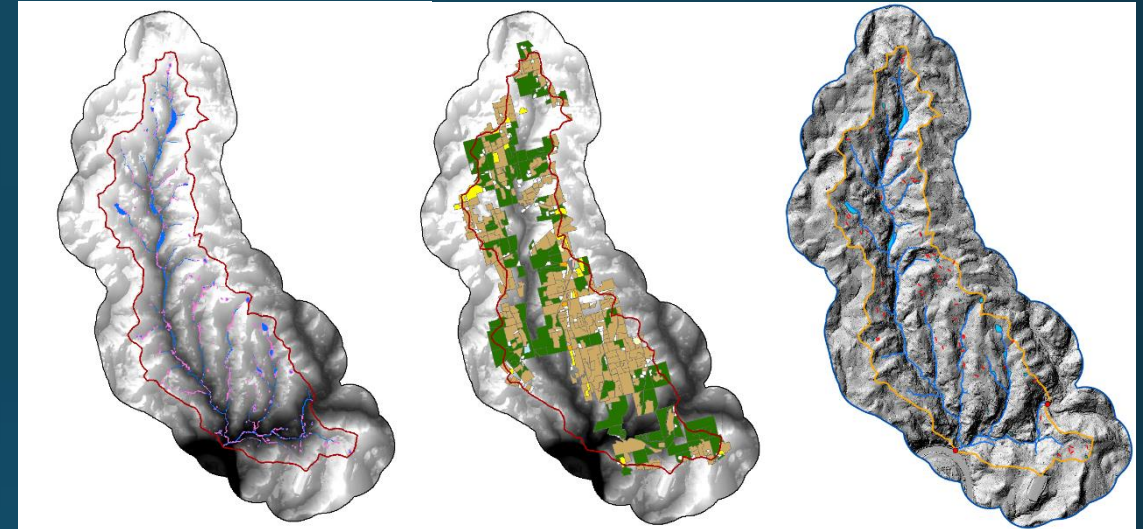
File "c:\program files (x86)\arcpy\arcpy\geoprocessing_base.py", line 510, in <lambda>
return lambda *args: val(*gp_fixargs(args, True))

ExecuteError: ERROR 999999: Error executing function.

Failed to execute (Fill).

Failed to execute (PitFillHolePunch).

Failed at Thu Feb 7 15:42:59 2019 (Elapsed Time: 39 minutes 13 seconds)



d. Runoff Risk Assessment Failed

Failed script d. Runoff Risk Assessment...

Traceback (most recent call last):

File "J:\Obj3_CBP\ACPF_V3_Pro\Scripts\RunoffRiskAssessment.py", line 318, in <module>
RunoffRiskAssessment(FBIn, SlopeTable, DistanceToStream)

File "J:\Obj3_CBP\ACPF_V3_Pro\Scripts\RunoffRiskAssessment.py", line 168, in RunoffRiskAssessment

if row[0] >= Slope20Value:

TypeError: '>=' not supported between instances of 'NoneType' and 'float'

Failed to execute (RunoffRiskAssessment).

Failed at Monday, December 17, 2018 10:07:57 AM (Elapsed Time: 39 minutes 13 seconds)

4.27 acres

59.7 acres

| | |
|-------------------|-------|
| Gap Area | 1.16 |
| Drainage Area | 59.70 |
| Acres Agriculture | 53.62 |
| Acres Turf | 5 |
| Acres Impervious | 0 |

Urban BMP Mapping

- Looking for data that can help improve our efforts in mapping water flow and opportunities for BMP implementation.
 - Culverts
 - Stormwater infrastructure where available
 - Current BMP locations for validation
- Seeking guidance on how best to work with urban municipalities.

culvert



https://commons.wikimedia.org/wiki/File:Prefabricated_culverts_under_country_road_in_Rocklea,_Queensland,_Australia.jpg

bioswale

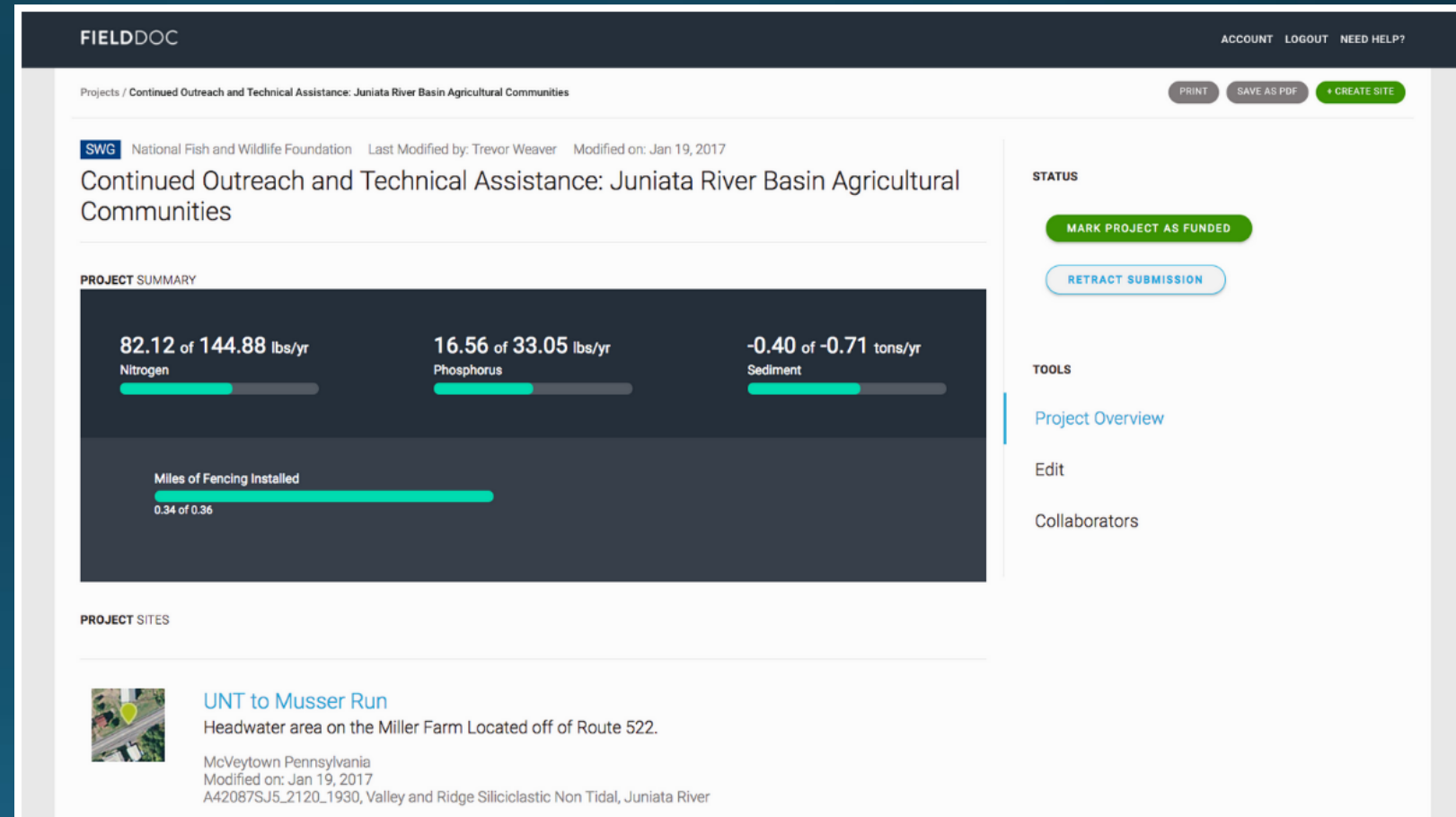


<https://www.flickr.com/photos/taestell/15013858234>

Streamlined platform for WIP Planning and Reporting: FieldDoc



- Standardizing nutrient and sediment load reductions
- Integration with CBP CAST Model (Chesapeake Assessment Scenario Tool)
- Data dashboards
- Project Tracking and Reporting



Basic Timeline:

| | Land use/Land cover | Hydrology | BMP blueprint | Tracking & reporting |
|------------|--|--|--|---|
| Product | <ul style="list-style-type: none"> 2 time series: 2017/18 and 2021/22 imagery 1 m x 1 m resolution land cover raster 1 m x 1 m resolution land use raster Change detection | <ul style="list-style-type: none"> Channel delineation raster Channel delineation polyline Ditches raster Others TBD | <ul style="list-style-type: none"> BMP opportunity outputs Tools to calculate site-specific NSP reductions | <ul style="list-style-type: none"> FieldDoc enhancements, including dashboards, improved planning and modeling functionalities |
| Timeline | <ul style="list-style-type: none"> 2017/18 land cover/land use: Summer 2020/Winter 2021 2021/22 land cover/land use: Summer 2023/ Winter 2024 | <ul style="list-style-type: none"> 2018-20 delivery | <ul style="list-style-type: none"> 2018-20 PA pilot 2020-22 Scale to VA 2024 Bay-wide products | <ul style="list-style-type: none"> Fall 2019 increased functionality 2024 incorporates BMP & load mapping |
| Engagement | <ul style="list-style-type: none"> 2017/18 Local planimetric data collected Local QAQC 2020/2023 | <ul style="list-style-type: none"> End of 2019 Bay-wide technical advisory group | <ul style="list-style-type: none"> End of 2019 Bay-wide technical advisory group 2020-22 In-depth PA/VA engagement 2024 complete engagement | <ul style="list-style-type: none"> User feedback collected throughout |

More Information

- Conservation Innovation Center
conservationinnovationcenter.org
- Chesapeake Bay Land Cover
conservationinnovationcenter.org/land-cover-data-project

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