

Choptank Restorative Operation Plan

(CROP)

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Table of Contents

Mission Statement	1
The Choptank River Watershed	1
Problems	2
P.1 Non-point Source Pollution	2
P.2 Erosion	3
P.3 Wetland Degradation	4
Goals	5
G.1 Reducing Non-point Source Pollution	5
G.2 Reduce Erosion & Sediment Transfer	5
G.3 Wetland Restoration	6
Regulations and Ordinances	7
GIS Watershed Inventory	9
Land Use/Land Cover	9
National Riparian Areas Map	10
Alternative Analysis	11
Conclusions and Recommendations	12
References	13

Mission Statement

CROP's goal is to mitigate the problems of pollution, erosion, and wetland degradation. CROP aims to provide recommendations to protect, restore, and maintain the Choptank River Basin to fishable and swimmable standards to better the environment of its tributaries in the year 2050.

The Choptank River Watershed

The Choptank River is a major tributary of the Chesapeake Bay and is located on the Delmarva Peninsula. It is also the largest river on the Delmarva Peninsula running for 71 miles beginning in Kent County Delaware and flowing southwest until it eventually ends in the Chesapeake Bay separating Talbot County, Caroline County, and Dorchester County in Maryland.



The name "Choptank" comes from an Algonquin tribe and is thought to mean "The river that runs backward." This Native American tribe occupied the area along the southern portion of the basin, near the mouth of the river.

The Choptank River Watershed is approximately 1,000 square miles and crosses both Delaware and Maryland. The river is tidal for much of its length and is home to a delicate estuarine ecosystem. The watershed consists of 58 percent agricultural land

(cropland and extensive poultry production), 33 percent forested land, and 9 percent urban land. The soils in this region are poorly drained and the topography is especially flat, which has been favorable for farmers to utilize a network of drainage ditches to facilitate the movement of water into streams. Ditching has been used for crop production in this area for over 400 years, which has led to high amounts to runoff of sediments and pollutants. Portions of the Choptank River have been identified as “impaired waters” according to the Clean Water Act due to high levels of nutrients and sediments, so it is a very important river to focus on.

Problems

P.1 Non-point Source Pollution

The Choptank River Basin is a major tributary of the Chesapeake Bay. According to (Guzmán et al, 2012), approximately 60 percent of the land area in the basin is dedicated to agricultural land: corn, soybeans, and wheat. 26 percent is Forested, and 5 percent is developed. Agricultural lands are crucial to the economy and life of the residents within the watershed as most of these crops are grown to support small and medium-sized animal feeding operations (AFOs) within the watershed, which are primarily poultry production facilities with some dairy and horse husbandry. Unfortunately, the growing of the crops themselves and AFOs produce pollutants throughout the watershed. These pollutants runoff into ditches, streams, estuaries, and into the Choptank River, and eventually into the Chesapeake Bay. The potential pollutants from crops, animal products, and husbandry are nutrients, arsenic, and non-indigenous microorganisms. There are also nitrogen and phosphorus runoffs. Although nitrogen and phosphorus are nutrients that are essential to cell functions, an excess can have adverse effects such as population booms of aquatic plants (eutrophication) and algae blooms which can lead to the killing of fish and wildlife. The pollutant runoff leads to the waterways and ecosystems being highly impacted. According to the EPA nitrogen and phosphorus excess is primarily caused by fertilizers used on agricultural lands, AFOs, wastewater treatment plant discharge, and septic

system leaks. Another complexity of this problem is that these are non-point source pollutants, meaning they are much harder to treat as opposed to pollutants simply leaving a pipe. Phosphorus can travel in surface runoff and the area has extensive ditch drains due to the crop fields, which allow for the rapid movement of agricultural nutrients to sensitive waterways. Nitrogen, however, can flow into the ground and travel into groundwater. Solutions to these complex problems consist of best practices to reduce the amount of pollutants and contain them on the site they are used rather than treating them downstream as seen in G.1 Reducing Non-point Source Pollution.

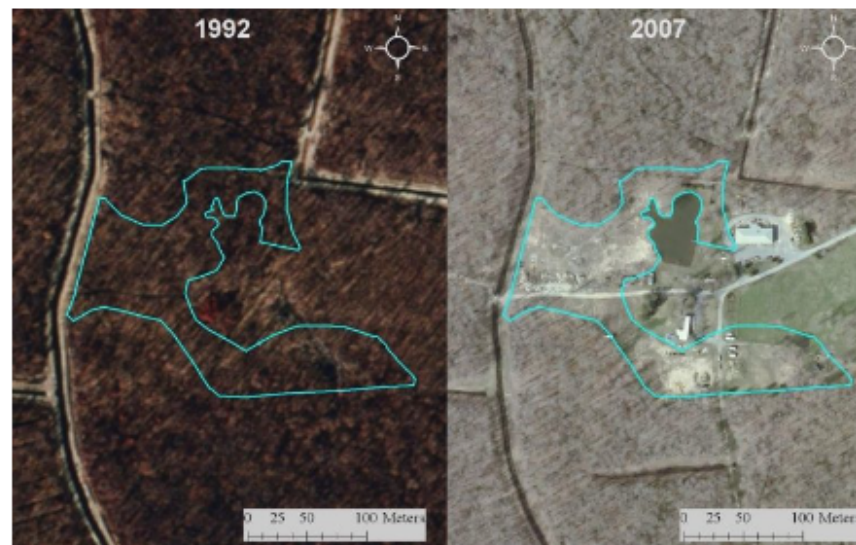
P.2 Erosion



Erosion of shorelines can contribute significant amounts of nutrients (mostly phosphorus) and sediment (water column turbidity, habitat loss.) Most unpolluted streams and tidal waters naturally have limited amounts of sediment moving “suspended” in the water. Excessive amounts of suspended sediment in waterways are considered pollution because they can inhibit light penetration, prevent plant growth, smother fish eggs, clog fish gills, etc. Sediment in streams tends to arise from the stream bed and bank erosion and from land that is poorly vegetated or disturbed. Suspended sediment pollution may arise from construction sites, cropland, bare ground,

and exposed soil. The amount of sediment conveyed to a stream varies greatly from site to site depending upon stream stability, hydrology, management controls, and other factors.

P.3 Wetland Degradation



A non-tidal wetland, outlined in light blue, lost to rural development between 1992 and 2007.

[Chesapeake Adventures: Exploring Wetland Condition in the Chester-Choptank Watershed - WMAP Blog - State of Delaware](#)

Nearly 50 percent of the wetlands that once dominated the landscape of the Choptank River Basin have been drained to make way for crop production during 400 years of ditch drainage history. Wetlands serve important environmental functions such as providing habitat and nursery areas for many organisms, facilitating nutrient uptake and recycling, and providing erosion control. This loss due to draining, filling, etc. have led to habitat loss and negative water quality impacts in streams and the Chesapeake Bay.

Goals

G.1 Reducing Non-point Source Pollution

One of the first things CROP would like to accomplish is to establish data collection of nutrients, and pollutants. CROP plans to build upon partnerships established with scientists, extension agents, conservation specialists, and local farmers to explore the most beneficial conservation practices. This goal is intended to give data and research capabilities to future problems within the watershed that could arise.

In order to meet non-point source water quality regulations, we recommend the use of conservation practices that are proven to be most effective based on the research and the recommendations of the Maryland Department of the Environment (MDE). The management practices that we aim to more widely and efficiently implement include cover crops, crop residue management, nutrient management, ditch drainage management, field borders, filter strips, riparian forest buffers, streambank and shoreline protection, tree, and shrub establishment, wetland management and restoration (Maryland-Choptank). A key component of CROP is to monitor and collect data on these BMPs to enlarge our database, determine the most effective BMPs, and determine the amount of maintenance required to run them optimally.

G.2 Reduce Erosion & Sediment Transfer

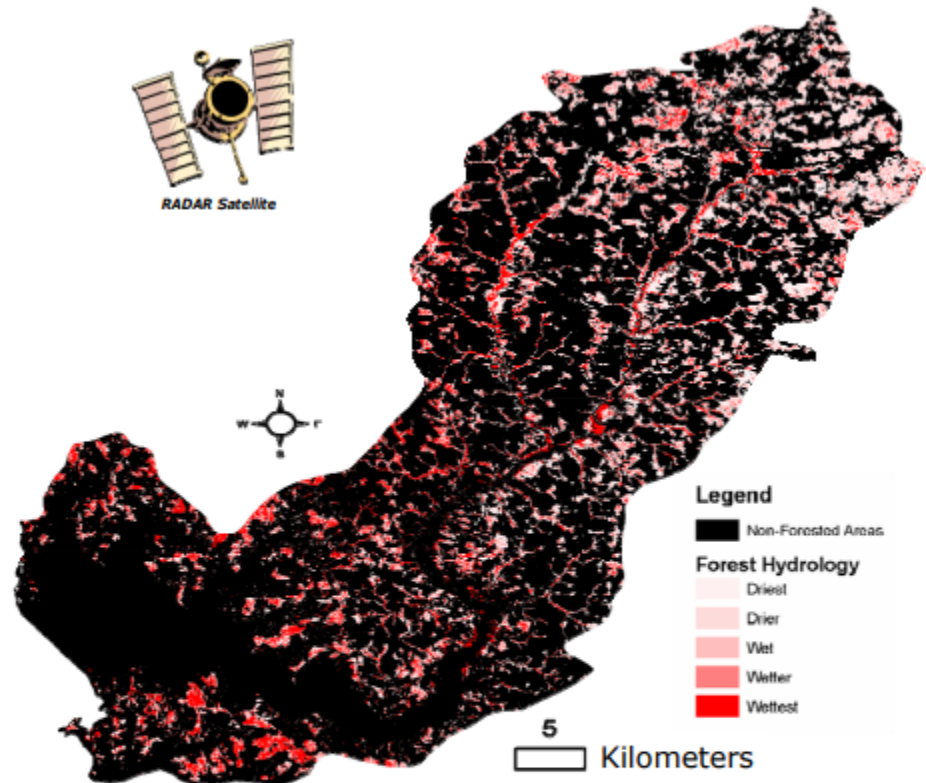
Again, one of CROP's first steps to making the Choptank River fishable and swimmable by the year 2050 is to establish data collection, monitoring, and partnering with scientists, extension agencies, farmers, and developers to effectively solve problems and to have an understanding of the future of the Choptank. CROP aims to work in conjunction with those listed above to implement the best practices and develop new ones. In order to reduce the erosion that occurs in the Choptank River Basin, many solutions can be implemented to reduce settlement transfers. For areas with light erosion problems, replanting with vegetation and covering with mulch are

good solutions. For heavy erosion in areas of concentrated flow, the most effective solutions are to check dams or terraces. Ideally, this would be done following the Maryland Department of Environment's regulations and Buffer Management Plan (BMP).

G.3 Wetland Restoration

Limiting or reversing the historic trend of wetland degradation is an important goal of wetland restoration. Finding candidate wetland restoration sites involves identifying "historic" wetland areas, and restoring them in the context of the Wetland Restoration Action Strategy (WRAS). The WRAS initiative is a component of the Cumulative and Secondary Impacts section of the Maryland Coastal Zone Management Program Section 309 Strategy (2000-2005). Watershed strategies are defined as comprehensive plans that will identify areas of concern, monitoring strategies, gaps in information, mitigation options, and restoration and protection opportunities.

CROP plans to help restore the wetlands in the Choptank Watershed by first developing more data, more monitoring, more mapping, and methods of identifying the health and connectivity of existing wetlands. Lidar plays a huge role in wetland mapping. However, most of the wetlands within the Choptank are forested wetlands, where aerial data collection becomes further limited. CHOP aims to work alongside conservation specialists, extension agents, scientists, and surveyors to develop accurate mapping and monitoring strategies for



existing forested wetlands. Whether this is done through traditional means such as surveys, or being flexible and adapting to new methods of revealing and monitoring wetlands such as the synthetic aperture radar (www.nrcs.usda.gov) shown above.

Regulations and Ordinances

The Choptank River Watershed is a multi-state watershed. Because of this, both Maryland and Delaware are in control of their respective areas of the watershed. However, both states do collaborate together to protect and promote the Choptank River Watershed. Both states have their own departments and agencies that determine specific laws and regulations that are to be followed in their respective area. Some of the state agencies that deal with the Choptank River Watershed are shown in the table below.

Delaware State Agencies	Maryland State Agencies
Department of Agriculture	Department of Agriculture
Department of Natural Resources and Environmental Control	Department of Environment
	Department of Natural Resources

Not only do Delaware and Maryland have regulations for their respective areas of the Choptank River Basin, but the federal government also has its own laws and regulations that the states must follow. Below is a list of the laws and executive orders from the United States Environmental Protection Agency and the United States Department of Agriculture of which the Choptank River Watershed is of concern:

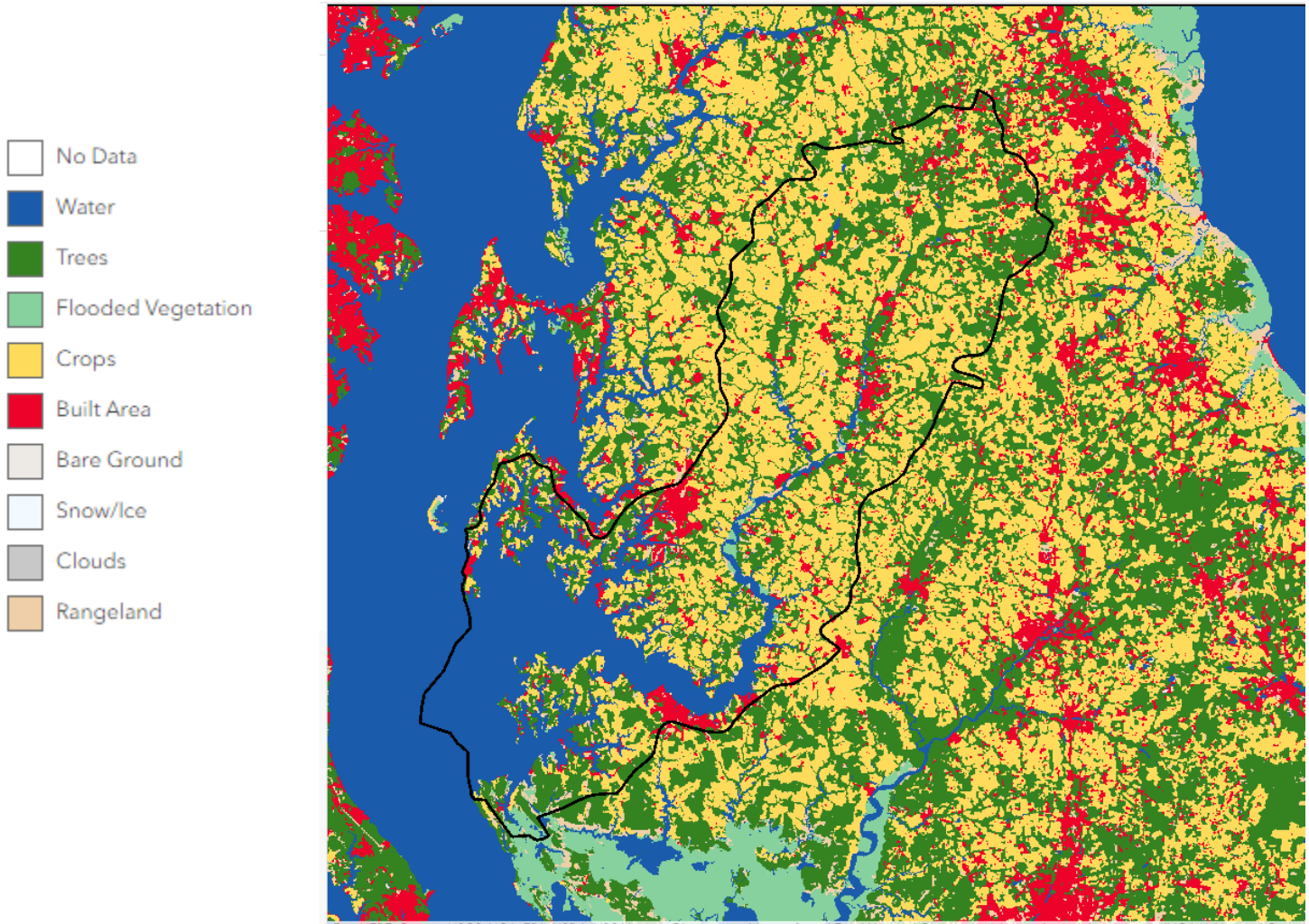
- Clean Water Act: A federal standard that regulates discharges of pollutants into the waters of the United States and regulates quality standards for surface waters.

- National Environmental Policy Act: Requires that all branches of government give proper consideration to the environment before undertaking any major federal action that significantly affects the environment.
- Endangered Species Act: A law to protect species and their habitats that are threatened by extinction.

Both the state and federal laws and regulations ultimately determine what the Choptank River Watershed looks like, how it functions, how it is protected, etc. Laws and regulations are always changing, so there can still be many more changes to come to the watershed. However, because the watershed spans two states means there needs to be a constant collaboration between the two to ensure that the Choptank River Watershed is protected and cared for the same way across both states. This is a lot easier said than done as both states' representatives could have different political opinions and intentions.

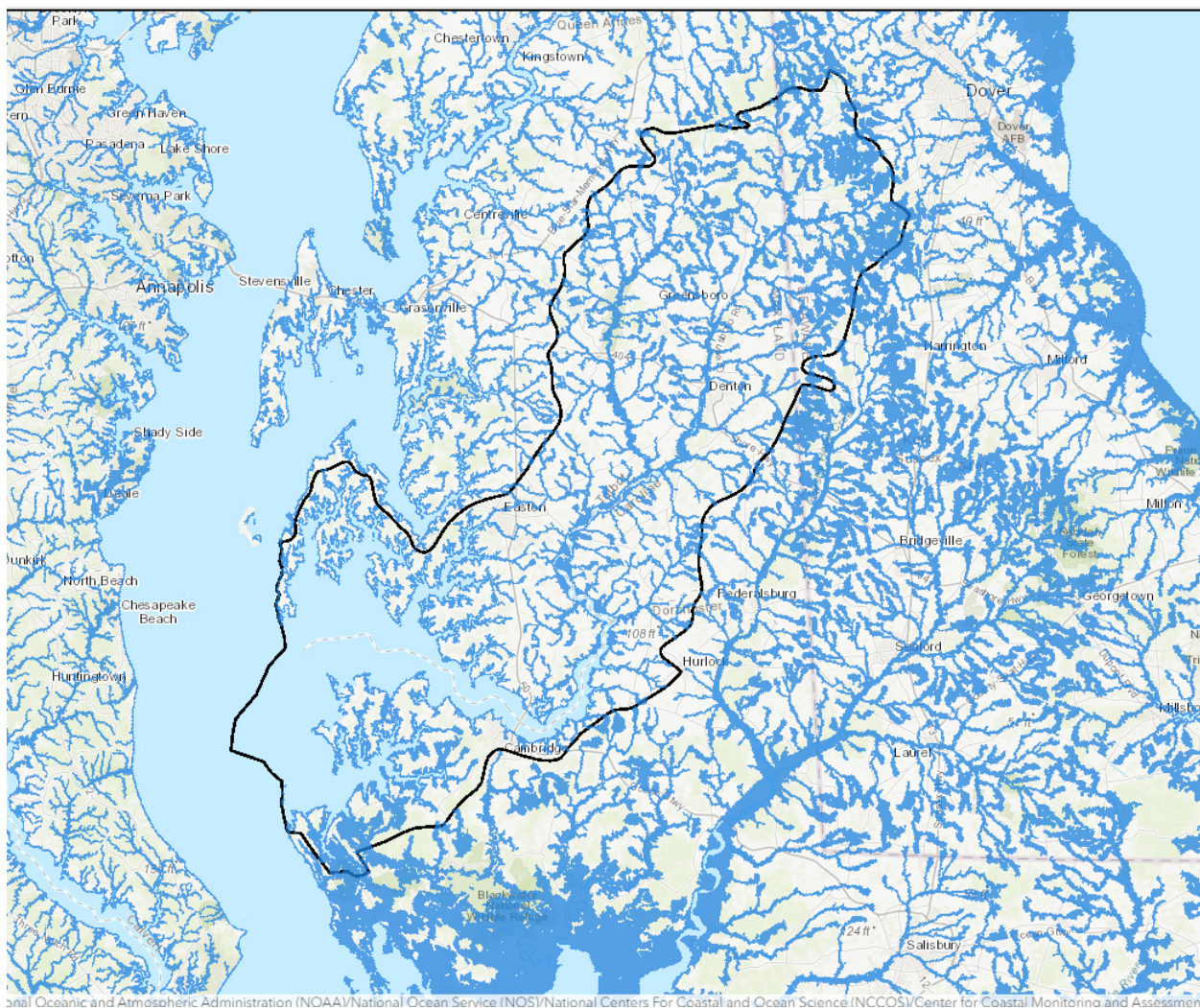
GIS Watershed Inventory

Land Use/Land Cover



This map shows the various land uses/land cover that exist in the Choptank River Watershed. It is clear from this map that crop (yellow) is the dominant land use in this area and that there is a very little urban area (red). Understanding which land uses/land covers are present in a watershed helps to calculate the runoff qualities and quantities. This is a crucial piece of data when determining what is need to be done and where for managing the runoff qualities and quantities.

National Riparian Areas Map



This map shows the riparian areas that exist within the Choptank River Watershed. This map is helpful because it highlights all of the in-land tributaries that exist within the Choptank River Watershed. The northern portion of the watershed has a heavy concentration of smaller tributaries that eventually feed down into the Choptank River. These smaller tributaries are located in rural Kent County, Delaware, where there is a good mix of cropland and forested area. Following downstream of the Choptank River, the tributaries are more spread out and cover a good portion of the watershed.

Alternative Analysis

Accomplishing our stated goals to restore the Choptank River watershed has a large variety of solutions and while we have already stated are primary courses of action to achieve fishable and swimming standards in the Choptank Basin, we have researched some possible secondary solutions that can be implemented in the future.

To assist in reducing erosion along the streambanks of the watershed we stated the use of replanting vegetation or constructing dams whichever is appropriate for the level of erosion. A secondary method we suggest is stream restoration projects in areas where erosion is both heavy and restoration is possible. What entails in these restoration projects varies depending on the severity of erosion but some common methods are mending sharp bends in the stream, constructing veins to maximize to naturally redistribute flow to the natural channel, and other bio-retention facilities to keep the flow docile and clean. While this is certainly an effective method it's an expensive solution that can't be implemented in every area with large amounts of erosion as construction can simply be too difficult to effectively work in. Hence it's a solution best used in optimal streams in the watershed.

Our primary method to reduce nonpoint source pollution was monitoring and collecting data on the pollutants entering the basin. While this plan focuses on the reduction of pollution entering the watershed there's still the issue of the present pollution in our streams that isn't going away. Therefore to keep the water clean a secondary solution is working with companies to clean the current pollutants that sit in our water. Increasing the water quality as we reduce the pollutants entering our streams. Working with these companies is an expensive solution and is best used when suspended pollutants cannot naturally be removed through our primary methods.

Lastly, another secondary course of action we can take is to work with the neighboring community to get involved with restoring the watershed to a swimmable and fishable condition. While all of the methods and solutions we've suggested here in

the report are important if the community doesn't care these new solutions won't be properly maintained and eventually down the line we'll be in the situation we are in now. Getting the community to enact system-wide change to protect the rivers and streams on the local, state, and federal level is best to maintain the health of the Choptop River basin.

Conclusions and Recommendations

The Choptank River is one of the main tributaries of the Chesapeake Bay and its watershed greatly affects what happens to the Chesapeake Bay. The watershed spans an area of approximately 1,000 square miles across both Delaware and Maryland. The majority of the land is used for agricultural purposes, with some forested areas and little urban space. The main problems that CROP plan to focus on are non-point source pollutants, erosion, and wetland degradation. All of these problems are mainly due to the high amount of agricultural areas that create high runoff quantities and pollutants which are a side effect of the extensive amount of drainage ditches, a constant movement of soil and chemicals for farming, and little to no natural protection of the smaller tributaries. In order to address these problems, CROP recommends goals to reduce runoff pollution, erosion and sediment transfers, and restore natural wetland areas. For these goals to be achieved, CROP will work with both state and federal government departments and agencies as well as private institutions to ensure the needs of the watershed are met and provided for. The life of the Choptank River Watershed is CROP's main priority, and with our recommendations, the team believes that the life can be restored efficiently and effectively.

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