

The White Clay Creek Action Plan (WCCAP)



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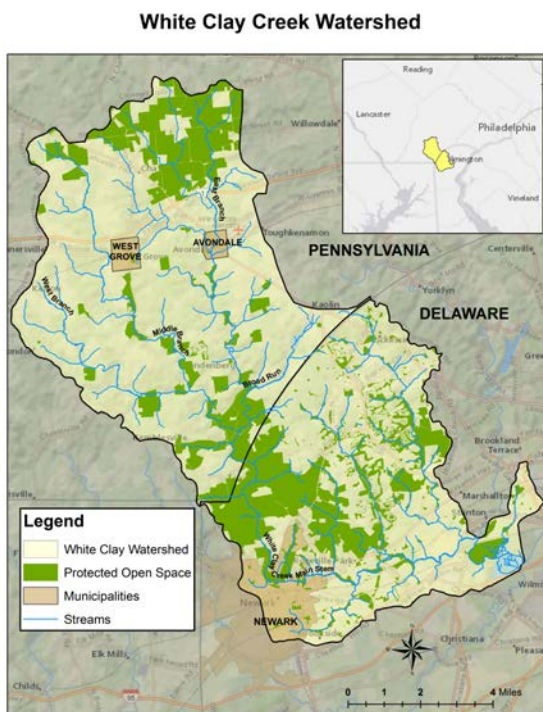
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Mission Statement

The White Clay Creek Action Plan (WCCAP) aims to preserve the watershed's unique and valuable natural resources (such as biodiversity of both vegetation and animal life and its use as a quality drinking water source) from human development, making actionable progress by 2030.

Background and History



The White Clay Creek watershed encompasses areas in Pennsylvania and Delaware, from Chester County, PA at its northernmost point to Newark, DE at its southernmost.

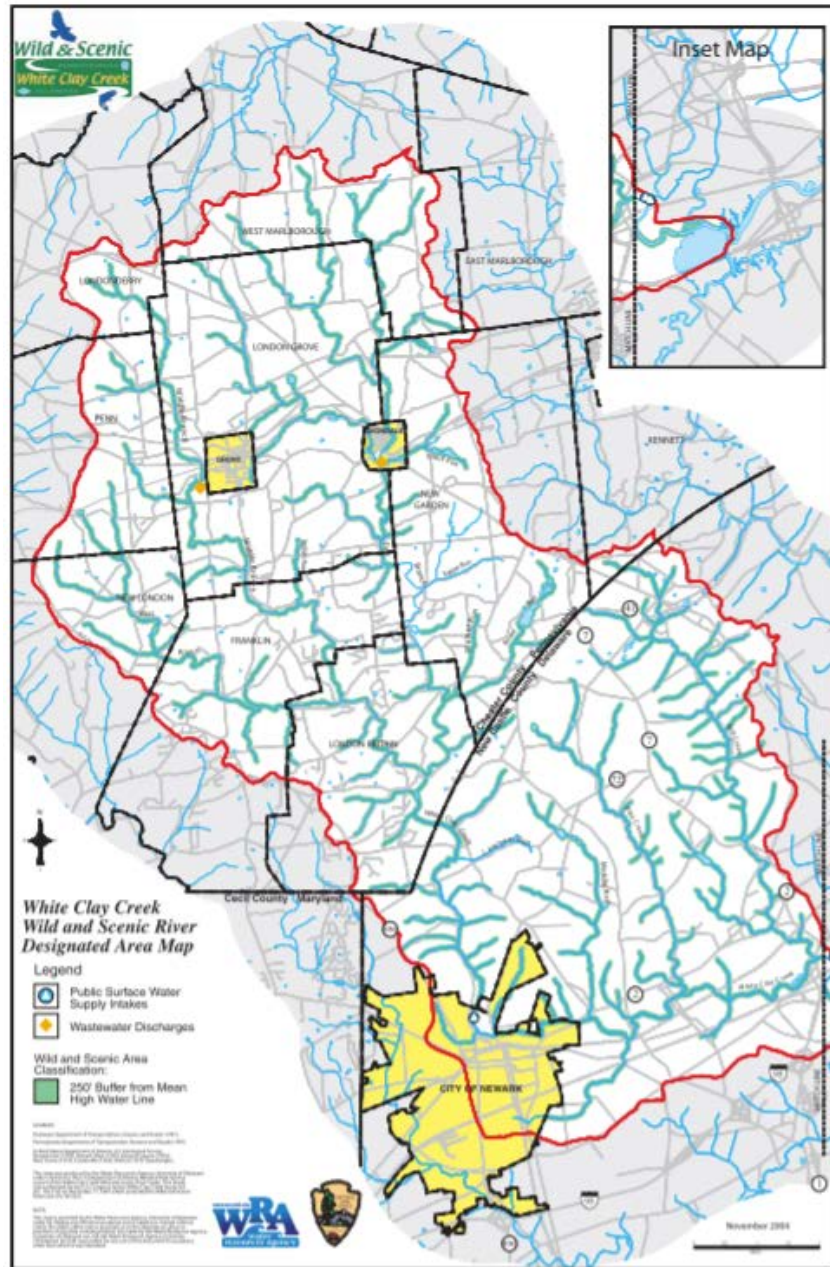
According to the White Clay Watershed Association, approximately 95,000 people live within the watershed boundaries. It has served the community in many ways for generations as a valuable resource. It has historical significance as a place where pioneers set up water mills. It is renowned for natural beauty

and its recreational potential. It has ecological significance as the home to threatened and endangered species, such as the critically endangered bog turtle. Additionally, it has incredible value as a natural resource - it is used as a major source of drinking water for

residents of the area. With all of this considered, the White Clay Creek watershed is a resource of great importance, and measures must be taken to preserve its health and quality (White Clay Creek Wild & Scenic River).

In the year 2000, White Clay Creek and its tributaries were initiated as part of the National Wild and Scenic Rivers System (NWSRS). It currently has a total mileage of about 199 miles. According to the NWSRS, 25.6 miles of the watershed have been designated as “Scenic” and 173.4 miles have been designated as “Recreational” (NWSRS).

Area Designated By NWSRS



Policies and Mandates

As alluded to in the previous section, the White Clay Creek is currently overseen by various organizations such as the White Clay Watershed Association and the National Wild and Scenic Rivers System, as well as the National Park Service of Philadelphia. Currently, these organizations work alongside each other to monitor various landscape, water quality, and ecological indicators, such as adjacent population, dissolved oxygen concentrations, and even freshwater mussel populations. These monitoring activities have the goal of preserving and improving the watershed quality broadly (NWSRS). The most recent State of the Watershed report was published in 2016, and reported various imminent problems with the watershed, including:

- 1.) Threats toward open spaces with great preservation potential and increased erosion due to increase in population and human development,
- 2.) Indicators of habitat damage, such as an addition of 67 miles of stream now designated impaired, and insufficient sampling and research into the health of the habitat (3 out of the 8 habitat indicators were unable to be evaluated due to no data available),
- 3.) Unsatisfactory water quality due to high nitrogen concentrations and high total suspended solids.

With these threats in mind, the WCCAP aims to address these concerns and provide actionable recommendations to improve environmental, water quality, and ecological concerns.

Problems and Goals

Overview:

Problem	Description	Causes
P1: Eroding Stream Banks	<p>Flow of water transports particles from bank</p> <p>Results in land loss, increased sediments downstream, loss of structure, increased TSS (total suspended solids) and increases contaminants</p>	<p>Direct human activities-- damaged vegetation, increase in impervious surfaces or channel realignment</p> <p>Forces of water exceed the forces of vegetation/other bank materials</p> <p>Natural disturbances or land use changes</p> <p>Weakening conditions are caused by bank soils drying, cracks in the surface, floodwaters, pressure increase, temperature changes</p>
P2: Decreasing Biodiversity	The number of endangered, threatened and rare species within the White Clay Creek watershed is increasing	The destruction of natural habitat for housing and other developments
P3: Nonpoint pollution	A combination of sources is causing excess nutrients and pollution to gather in the White clay creek.	<p>Suburban sprawl covers a large portion of the watershed</p> <p>Agricultural practices</p> <p>Impervious surfaces leads to runoff directly in the creek</p>

Goals:

Goal 1: Decrease the erosion rates at the White Clay Creek in order to prevent more serious long term effects.

Goal 2: Establish a management plan for the remaining habitat to preserve it from clearing, and establish connections between existing habitat patches.

Goal 3: Implement necessary actions such as redirection and treatment of runoff, keeping livestock away from water sources, and regulate future impervious cover to reduce nonpoint pollution.

Problem 1: Eroding Stream Banks

Bank erosion is the decaying process of the surface by natural events, such as: water flow and wind. Bank erosion has proven to be present in the White Clay Creek (WCC) as documentation of erosion in the stream banks has been recorded. Bank erosion can be caused by direct human activities (increased impervious cover,



channel realignment, damaged vegetation), forces of water exceeding the opposite forces of the vegetation, and natural disturbances and processes (pressure and temperature changes, drying bank soils, surface cracks, floodwater). Eroding Stream Banks can lead to land loss, increased TSS, degrading structure, and increased contaminants. Specifically in the WCC, a large increase in sediment could cause the shape and characteristics of the river to change drastically. An increase in bedrock sediment could lead to abrasion, and increased TSS could lead to water quality issues. A study of erosion levels was conducted at WCC, which showed that banks with trees have low erosion rates of 12.5 cm/yr, while banks without trees have erosion rates of 9.9 cm/yr to 36.1 cm/yr. The erosion rate values in mass convert to 856-163705 kg/year at the WCC. (McCarthy, 2018) With more cover, the stream exhibits lower erosion rates, overall. Simple measures can be taken to decrease

these rates by planting more trees to create more cover. (Hartup, 2015) Furthermore, planting native species provides extra support to the bank through their expansive roots.

Goal 1: Decrease the erosion rates at the White Clay Creek in order to prevent more serious long term effects by planting more trees and native species. The overall goal is to decrease the erosion rates by 25% by 2030 by utilizing simple methods.

Problem 2: Decreasing Biodiversity

The White Clay Creek watershed provides some of the only remaining habitat for imperiled species in Delaware and Pennsylvania, so its protection is vital (Resource Management and Protection Issues — White Clay Creek Wild & Scenic River,



2021). In the 1980s and 1990s Newark saw a large growth in its suburban communities.

There was a building boom and a large number of communities were built to meet the varying needs of the growing community (History of Newark | Newark, DE - Official Website, 2021). The building did provide vital housing, but it also required the clearing of land.

According to the NWSRS and WCWA, efforts to understand and improve biodiversity within the White Clay Creek Watershed have been dampened by a lack of funding and initiative for sampling and research endeavors. Despite having established 8

points of concern within watershed habitats, only 5 could be assessed as sampling and outreach efforts have been insufficient. A particular population of species of concern is the freshwater mussel. Mussels have a secondary benefit within the ecosystem as an indicator of good water quality and can even filter bacteria, algae, and some contaminants. The Partnership for Delaware Estuary launched the Freshwater Mussel Recovery Program, but, according to the NWSRS, there is a severe lack of research and funding into this initiative. In general, biodiversity is both an indicator and consequence of water quality concerns, and therefore any attempts to improve and preserve the White Clay Creek Watershed must address biodiversity.

Goal 2: Continue efforts to preserve natural and undeveloped lands (particularly forests and streams) that serve as homes for native organisms. Support and fund efforts for regular sampling and research into wildlife populations and their preservation.

Problem 3: Nonpoint Pollution



<https://www.3lakes.com/non-point-source-pollution/>

Nonpoint pollution is the culmination of pollutants from many different sources running off into the White Clay Creek. This type of pollution poses the most danger to the health of the creek because it is much harder to identify and control the source compared to point pollution. Many factors lead to nonpoint pollution but the three that we will focus on are suburban sprawl, impervious surfaces and agricultural runoff. These factors are leading to an increase in turbidity in the White Clay. High levels of turbidity can be detrimental to aquatic life since it blocks out a large portion of light from entering the creek. Continually, agricultural runoff can lead to excess nutrients such as nitrogen and phosphorus entering the creek. These excess nutrients can lead to harmful algal blooms that strip the water of oxygen which results in illness and death in aquatic life. Lastly, suburban sprawl and impervious surfaces are causing stormwater to collect pollutants and run straight into the creek instead of being filtered through the soil. Nonpoint pollution poses a huge risk for the health of the White Clay Creek and should be addressed to ensure high water quality in the future.

Goal 3: Implement necessary actions such as redirection and treatment of runoff, keeping livestock and agriculture away from water sources, and regulate future impervious cover to reduce nonpoint pollution.

Recommendations

Problem	Goal	Action
Erosion & TSS	<ul style="list-style-type: none"> - Decrease erosion by preserving land and reversing damage done - Decrease TSS to acceptable standards 	<ul style="list-style-type: none"> - Continue working with organizations such as the White Clay Creek Wild and Scenic Management Committee to preserve valuable lands vulnerable to development - Decrease erosion rates by 25% by continuing and advancing tree planting initiatives (According to NWSRS, only 34 acres of trees have been planted and White Clay forests are “under-protected”) - Delaware does not have an official standard for TSS in surface waters, so use the general advisory of 20mg/L - Continue sampling to find possible sites of sediment dumping
Decreasing Biodiversity	<ul style="list-style-type: none"> - Decrease habitat loss by preserving land (particularly forests) - Increase sampling and research efforts - Continue researching and implementing initiatives to restore threatened and endangered native species (such as the 	<ul style="list-style-type: none"> - Continue working with organizations such as the White Clay Creek Wild and Scenic Management Committee to preserve valuable lands vulnerable to development - As noted by WCWA, sampling efforts in the past have been insufficient for stakeholders to understand ecological issues, and 3 out of 8 habitat standards could not be assessed. Continue efforts to raise funds for more research into habitat concerns (ex. Trout stamps being sold to raise funds for and assess public interest in trout fishing; maybe a similar program could fund research and educational opportunities) - By 2030, establish strong expectations and standards for monitoring ecological concerns - for example, impose a yearly aquaculture

	freshwater mussel)	assessment and/or fish abundance assessment, possibly integrating these sampling efforts with pre-existing ones - Continue working with the Partnership for the Delaware Estuary on the Freshwater Mussel Recovery Program
Nonpoint Pollution	<ul style="list-style-type: none"> - Limit suburban sprawl and impervious surfaces - Ensure agriculture is not near water sources 	<ul style="list-style-type: none"> - For future planning efforts (such as the NCC 2050 plan) limit suburban sprawl and plan for more multi-use spaces - Public land and county buildings can have more natural landscaping to prevent stormwater runoff and instead have natural filtering (partner with programs such as Catch the Rain) - Encourage better agricultural practices like plowing with the contours of the land and planting cover crops on fallow land - Enact overarching regulations to reconcile inconsistent municipal regulations

Summary/Conclusions

Overall, the White Clay Creek does have some identifiable problems that should be addressed in order to improve and preserve the creek. There are a number of solutions that can be carried out to minimize the problems. Simply planting more trees and native plant species could lead to decreased erosion rates. Prioritizing research into local ecological and animal populations can help monitor and improve biodiversity. Redirection and treatment of runoff, keeping livestock away from water sources, and regulating future impervious cover can decrease nonpoint pollution. The White Clay Creek Watershed is a natural resource of great significance and plays a big role in the

health and happiness of its inhabitants (as both a source of natural beauty and of drinking water), so taking steps to understand, preserve, and improve the watershed is imperative.

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