A stylized illustration of a river with a boat and a black cat in a box. The river is depicted with light blue water and green banks. In the upper left, a group of people in a wooden boat are navigating the river. In the lower right, a black cat is sitting inside a brown cardboard box. The background features abstract shapes and colors, including light blue and green, suggesting a natural environment.

PLAN FOR THE APPOQUINIMINK WATERSHED

Bobby Leary, Mansi Shukla, Leia Clendaniel, Mikayla Rypkema,
Scott DePope, Md Jawadul Gani

OUTLINE

- MISSION STATEMENT
- HISTORY AND BACKGROUND
- POLICY
- PROBLEM 1: INVASIVE SPECIES
- PROBLEM 2: WETLAND LOSS
- PROBLEM 3: WATER LEVEL RISE AND FLOODING
- RECOMMENDATIONS AND CONCLUSIONS



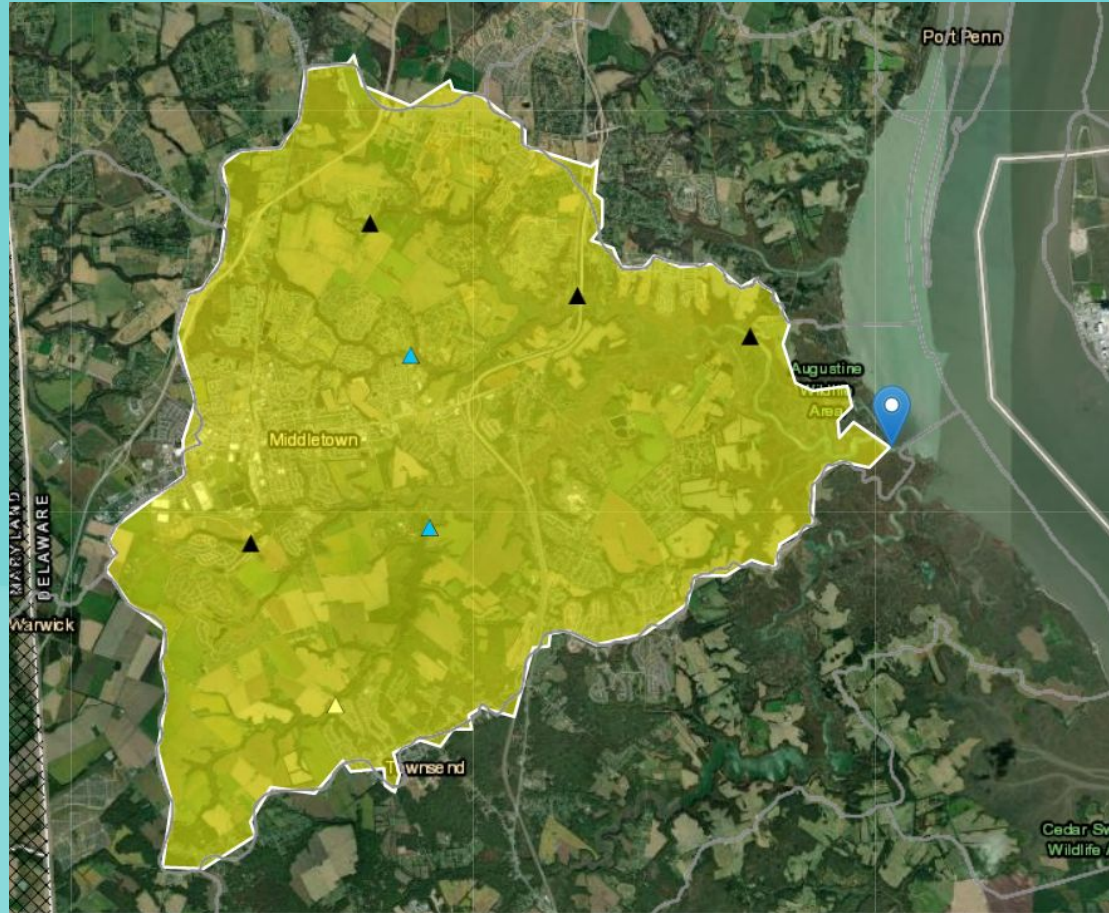
American Shad

MISSION STATEMENT

PAWS MISSION IS TO ASSESS THE APPOQUINIMINK RIVER BASIN OF CENTRAL DELAWARE AND PROVIDE RECOMMENDATIONS TO ATTAIN WATER QUALITY STANDARDS, AS WELL AS RESTORE WETLANDS AND REDUCE INVASIVE SPECIES BY 20%. OUR GOAL IS TO IDENTIFY SOLUTIONS, GENERATE FEDERAL AND STATE FUNDING TO BEGIN IMPLEMENTATION BY MAY 30, 2033.

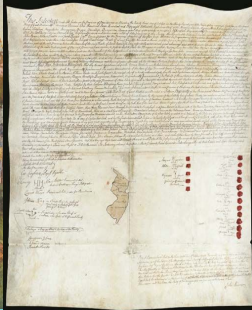


OVERVIEW



DELINEATION OF APPOQUINIMINK WATERSHED

- 15.3 MILES LONG
- 43 SQ. MI.
- LOCATED IN CENTRAL DELAWARE
- FLOWS INTO DELAWARE BAY



BEFORE THE 1600'S

1620'S - 1664'S

1758

1804

1993

NOW

Native Americans

The Lenni Lenape tribe inhabited the Appoquinimink watershed. They made sure to take care of the soils.

- Slash and burn agriculture
- Companion plant growing
- Crop/ plot rotations

Colonialism

The Dutch were the first colonist to settle down in the Appoquinimink. Reasons...

- Great farming potential
- Easy trading with Maryland
- Stake their claim

The British took over in the end.

The Treaty of Easton

This treaty forced Native Americans Westward. The Lenape tribe was forced to move and they resettled in Ohio.

First Ag. Committee

The first agricultural society was formed in order to combat the problem of soil nutrient depletion.

Nutrient Loading

The TMDL for [DO] was too low. The TMDL of phosphorus in the water was too high and created phytoplankton overgrowth which led to eutrophication. Cause by point source pollution of wastewater treatment plant.

Problems of Today

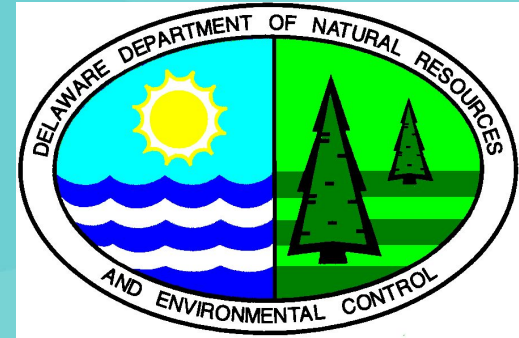
Today we are seeing problems arise in the Appoquinimink due to fast development of land and wetland loss.

POLICIES

- **CLEAN WATER ACT**
 - Created TMDLs
- **DELAWARE WETLANDS ACT**
 - Stops the destruction of wetlands in Delaware that are 400 or more contiguous acres large.
- **SUBAQUEOUS LANDS ACT/REGULATIONS GOVERNING THE USE OF SUBAQUEOUS LANDS**
 - Protects waters from being imared by new construction
- **NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**
 - Regulates/ Permits pollutant discharges and from industries
- **GUIDANCE AND REGULATIONS GOVERNING THE LAND TREATMENT OF WASTES**
 - Minimizes groundwater contamination

GOVERNANCE STRUCTURES

- **STEERING COMMITTEE**
 - **DNREC**
 - **MUNICIPALITIES IN THE WATERSHED**
 - **NEW CASTLE COUNTY CONSERVATION DISTRICT**
 - **APPOQUINIMINK RIVER ASSOCIATION**
 - **DELAWARE DEPARTMENT OF TRANSPORTATION**
 - **OTHER INTERESTED PARTIES**



INVASIVE SPECIES

DESCRIPTION

- MOST WETLANDS IN THE WATERSHED HAVE INVASIVE PLANT SPECIES
- THESE SPECIES SPREAD QUICKLY AND ARE HARD TO REMOVE
- INVASIVE PLANTS OUTCOMPETE NATIVE SPECIES IMPACTING BIODIVERSITY



*Japanese
Honeysuckle*

REDUCE SPREAD OF INVASIVE SPECIES



Narrow-Leaved Cattail

REDUCE SPREAD OF INVASIVE SPECIES

- MOST WETLANDS ARE PRIVATELY OWNED
- GIVE HOMEOWNERS ACCESS TO STATE RESOURCES BY EXPANDING PHRAGMITES CONTROL PROGRAM
- EDUCATE THE PUBLIC ABOUT IDENTIFYING AND CONTROLLING INVASIVE SPECIES

VEGETATED WETLAND LOSS

DESCRIPTION

- THE MAJORITY OF WETLANDS IN THE APPO WATERSHED ARE UNDER STRESS
- LOSING WATER QUALITY BENEFITS, WILDLIFE HABITATS, AND FLOOD CONTROL
- LESS FLOOD CONTROL LEADS TO MORE INFRASTRUCTURE DAMAGE AND SALTWATER INTRUSION

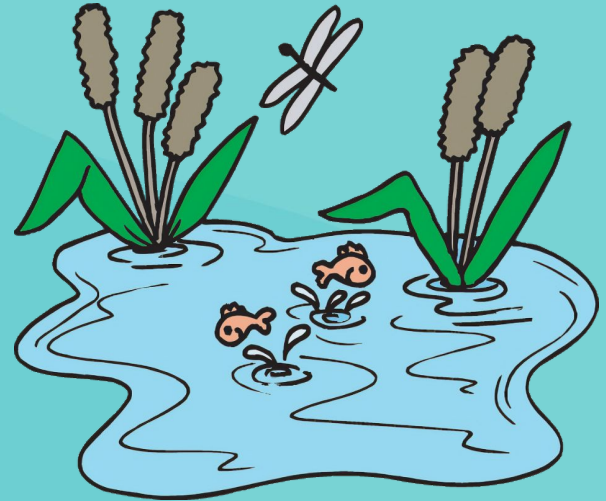
CAUSES

- SEA LEVEL RISE/EROSION
- LAND DEVELOPMENT
- AGRICULTURE



GREATER PROTECTIONS FOR WETLANDS

- WE ARE PUSHING FOR ALL WETLANDS, NO MATTER THE CONTIGUOUS AREA, TO BE PROTECTED FROM BEING USED FOR AGRICULTURE OR DEVELOPMENT
- WE ALSO INTEND TO INCREASE WETLAND RESTORATION EFFORTS TO BRING CHANGE IN WETLAND AREA TO A NET POSITIVE



WATER LEVEL RISE / FLOODING

DESCRIPTION

- DE WATER LEVEL RISE
 - WATERSHED SUBMERSION
- FLOODING SEVERITY AND FREQUENCY INCREASE
 - SHORELINE EROSION

ACCOUNTS FOR MOST OF COASTAL WETLAND ACREAGE LOSS

- ¼ ESTUARINE WETLANDS CONTAIN IMPERVIOUS STRUCTURES
- OTHER NEARBY IMPERVIOUS SURFACES

POLLUTANT RUNOFF



OLD CORBITT ROAD

IMPLEMENT LIVING SHORELINES

- NATURAL BARRIERS
- INCREASE SHORELINE RESILIENCE



- ADAPTABLE TO FLOODS
- FILTER POLLUTANT RUNOFF



BEFORE AND AFTER IMAGES OF BLACKBIRD CREEK (WINTER 2014 -> SUMMER 2015)

- FUNDING FROM DNREC DIVISION OF WATERSHED STEWARDSHIP'S LSCSP
- DELAWARE LIVING SHORELINE COMMITTEE
- COMMUNITY EDUCATION OUTREACH

RECOMMENDATIONS

- EMPOWER LOCAL COMMUNITIES FOR CONSERVATION OF NATIVE FLORA AND FAUNA
- EXPAND PHRAGMITES CONTROL PROGRAM TO INCLUDE OTHER INVASIVE SPECIES
- ADOPT TRADITIONAL LENAPE PRACTICES SUCH AS CONTROLLED BURNING FOR RESTORATION
- PROTECT WETLANDS OF ALL SIZES FOR CRITICAL ECOSYSTEM PRESERVATION
- ADDRESS STRESSORS ON WETLANDS, INCENTIVIZE SUSTAINABLE AGRICULTURE
- IMPLEMENT BUYOUT PROGRAM FUNDED BY FEMA FOR WETLAND RESTORATION
- ACHIEVE NET POSITIVE CHANGE IN WETLAND AREA BY 2033
- INTRODUCE LIVING SHORELINES AS NATURAL BARRIERS FOR FLOODING AND EROSION
- ENCOURAGE PRIVATE LANDOWNERS TO ADOPT LIVING SHORELINES
- DEVELOP FUNDED INCENTIVE PROGRAM TO INCREASE ADOPTION RATES OF LIVING SHORELINES



CONCLUSION

- **INVASIVE SPECIES, WETLAND DEGRADATION, AND FLOODING THREATEN THE APPOQUINIMINK RIVER BASIN ECOSYSTEM HEALTH.**
- **PAWS PROPOSES SOLUTIONS TO THESE CHALLENGES, INCLUDING WETLAND RESTORATION, INVASIVE SPECIES CONTROL, AND LIVING SHORELINES.**
- **TO ACHIEVE THESE SOLUTIONS, LOCAL COMMUNITIES MUST BE EMPOWERED THROUGH EDUCATION AND TRADITIONAL PRACTICES, AND SUSTAINABLE AGRICULTURE INCENTIVIZED**
- **A STATE OR FEDERAL BUYOUT PROGRAM, FUNDED BY FEMA, CAN FREE UP WETLANDS FOR RESTORATION.**
- **THESE EFFORTS CAN RESULT IN A NET POSITIVE CHANGE BY 2033, ENSURING A HEALTHY AND SUSTAINABLE FUTURE FOR THE APPOQUINIMINK RIVER BASIN AND ITS INHABITANTS.**

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