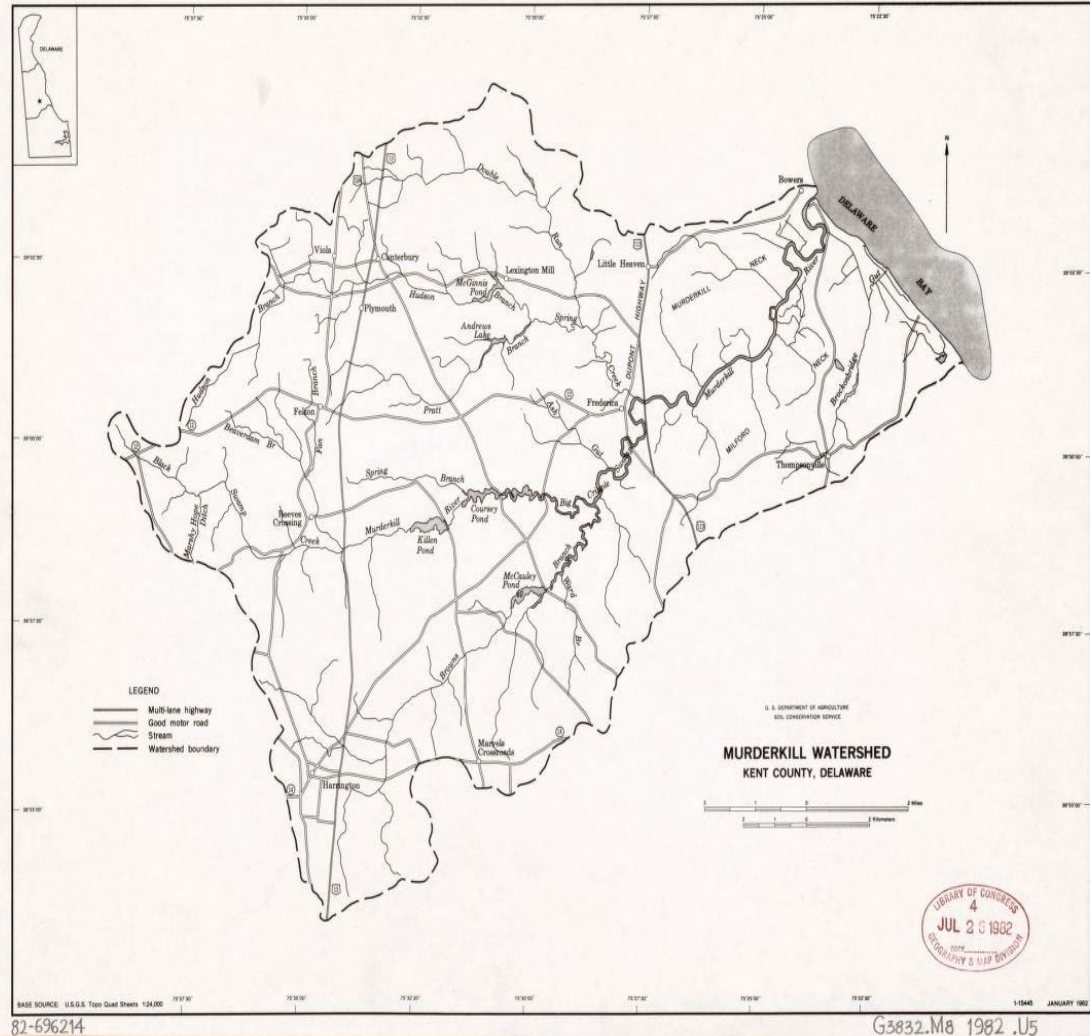


Murderkill Integrated Sustainability Tactics
(MIST)
Murderkill River Basin



Watershed Map

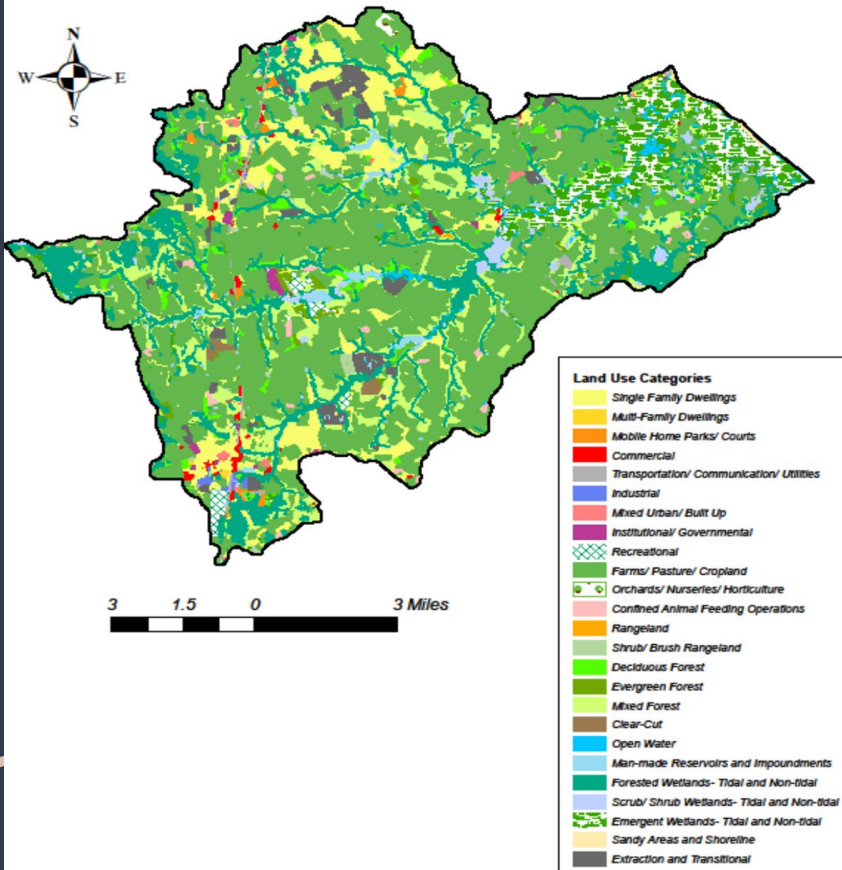


Background and History

- Location: Kent County Delaware
- Murderkill River Length: 21.7 mi
- Drainage Area: 106 sq mi
- Name Origin: “Moeder Kille”
- Murderkill River is a navigable waterway for its lower 10 miles according to the US Army Corps of Engineers



2007 Land Use Map- Murderkill Watershed



Land Use

In 2007, the land use in the Murderkill watershed was predominantly:

- agricultural (56%)
- urban/built-up areas (16%)
- forests (11%)
- wetlands (17%)
- water bodies (2%)

Since 1997 there was a decrease of 4% in agricultural land to accommodate a 3.7% increase in urban areas. There was also a decrease in undisturbed forest land and protected wetlands.

Policies and Mandates

- Pollution Control Strategy
 - Explore new BMPs to achieve TMDLs
- Agricultural Restrictions
 - Permits
 - Nutrient Management Plans
 - Stormwater BMPs
- Spill Event Study
 - Fredrica wastewater plant



Mission Statement



The goal of MIST is to safeguard the health and vitality of the Murderkill Watershed. This will be achieved by reducing nutrients levels and shoaling which contribute to habitat degradation. Ideally, federal funding and plan implementation will be completed by 2045. Through engaging stakeholders and the community as a whole we hope to ensure long term resiliency in the Murderkill watershed.

Problem 1: Shoaling

- Shoaling occurs when surface waves enter shallow water which causes a change in wave height
- A shoal leads to a submerged build up of sediment and makes it difficult to navigate around them (especially concerning for larger vessels)
 - Can lead to restricted access as the inlet channel reduces in width and depth
- Shoaling also creates a more turbulent environment especially during tidal changes and storms
 - Poses a safety risk to both commercial and recreational boaters using the inlet
 - Sweeps away species that live along the shore - changes species biodiversity along coasts
- Shoaling ultimately creates an imbalance in natural sediment transport processes

Proposed Solution 1: Coastal Restoration/Protection

- Work with US Army Corps of Engineers to create a consistent dredging and beach nourishment schedule
- Proper maintenance of the existing jetties
 - Helps control the movement of sediment along the shore
 - Slows down the shoaling process
- Plant indigenous vegetative stabilization buffers along the shoreline
 - Helps to prevent sediments from entering the inlet
 - Further supports the health of the ecosystem



Problem 2: Increase in Nutrients

- Multiple tributaries and ponds in Murderkill Watershed are impaired due to low dissolved oxygen and high nutrient levels
- Nutrient over-enrichment (particularly N and P) has led to eutrophic environments
- Ecological impacts
 - Frequent phytoplankton blooms
 - Decreased water clarity
 - Altered species composition, dead zones/ fish kills
- Human health impacts
 - Blue Baby Syndrome
 - Stomach and respiratory illness



Proposed Solution 2: Optimizing Fertilizer Application and Planting Buffers

- The Four R's of Fertilizer Application!
 1. Right Source - using the correct type of fertilizer for specific crops
 2. Right Rate - using the correct amount of fertilizer per area of land - account for soil type
 3. Right Time - using fertilizer during correct time of year (no need to apply during winter)
 4. Right Place - using fertilizer in areas that have under-enriched soils
- Legislation helps to limit fertilizer application when not necessary (ex: seasonal prohibitions)
 - Applies to both agricultural sources and suburban/urban areas - lawn care, septic tank maintenance, and WWTP leaks are high contributors as well
- Testing helps to identify which tributaries are in high nutrient excess - can help to identify source
- Plant buffer zones to intercept nutrient flow into streams and tributaries

Problem 3: Habitat Degradation

- Murderkill is home to a large recreational fishing community (species include bass, toadfish, seabass, and perch)
- Major contributing factors to habitat degradation include:
 - Introduction of invasive species (ex: phragmites)
 - Tax ditching designed to drain upland agriculture areas
 - Chemical contamination from agricultural processes
 - development within the corridor including marinas, dredging, housing and industrial expansion

Overall, there is a lack of protected wetland status along shoreline that has led to over-development and habitat



Proposed Solution 3: Wetland Protection

- Creating and implementing policies/regulations that prevent overcrowding of indigenous species
 - Can also control the spread of invasive species using mechanical and chemical control methods
- Reducing impervious surfaces and development near the wetlands
 - Designate wetland protection areas to limit this spread
 - Increase legislation protecting these areas from disturbance
- Promote the growth of the river to its true size along with the spread of native flora and fauna species
 - Limit hunting of native animals such as waterfowl that are currently over-hunted in these areas

Conclusions

- Through our methods stated previously we hope to reduce the shoaling, increase in nutrients and habitat degradation that occurs in the region
- We also will strive to continuously improve our method so that we can constantly improve and keep adapting to the ever changing issues
- We hope that these steps will allow for the Murder Kill to return to its original glory

Questions?