# STUMP SOUND WATERSHED PROTECTION PLAN

**May 27, 2021**

**Jonathan Hinkle, PE**
*jhinkle@ldsi-inc.com*

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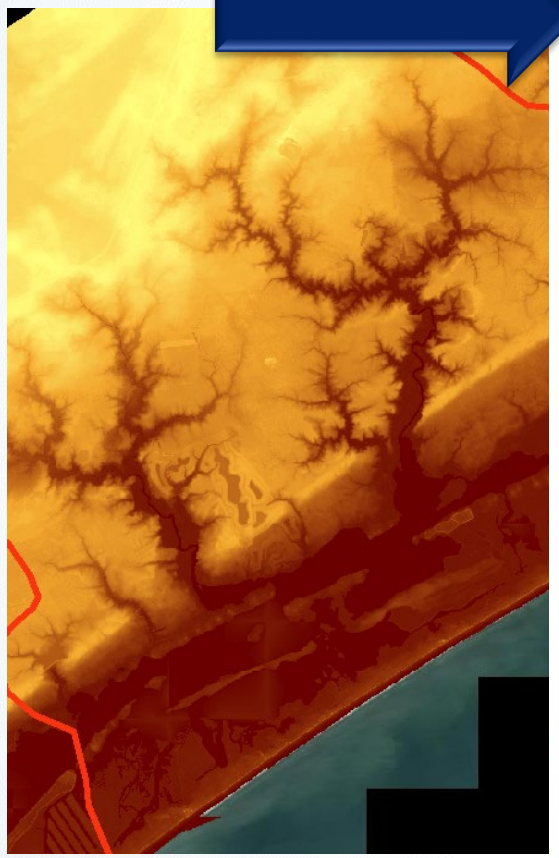
# OUTLINE



| | |
|---|---|
| a. | • Identify causes and sources of pollution |
| b. | • Estimate load reductions expected |
| c. | • Describe management measures and targeted critical areas |
| d. | • Estimate technical and financial assistance needed |
| e. | • Develop an information and education component |
| f. | • Develop a project schedule |
| g. | • Describe interim, measurable milestones |
| h. | • Identify indicators to measure progress |
| i. | • Develop a monitoring component |

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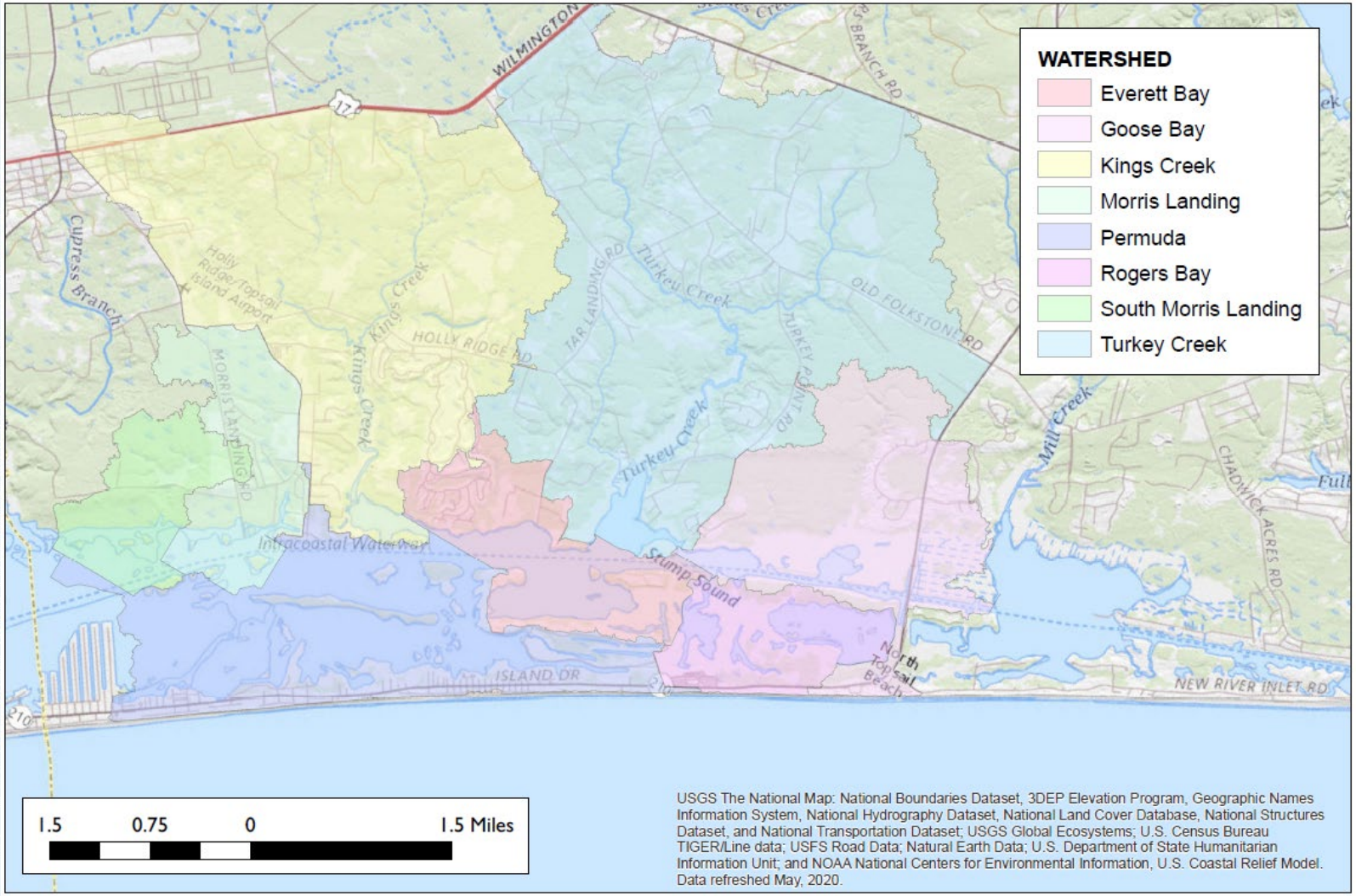


Date: 5/24/2021

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WATERSHED MAP

STUMP SOUND, NC

1:60,000

# WATERSHEDS

- Kings Creek
- Morris Landing
- Permuda
- Everett Bay
- Turkey Creek
- Goose Bay
- Rogers Bay

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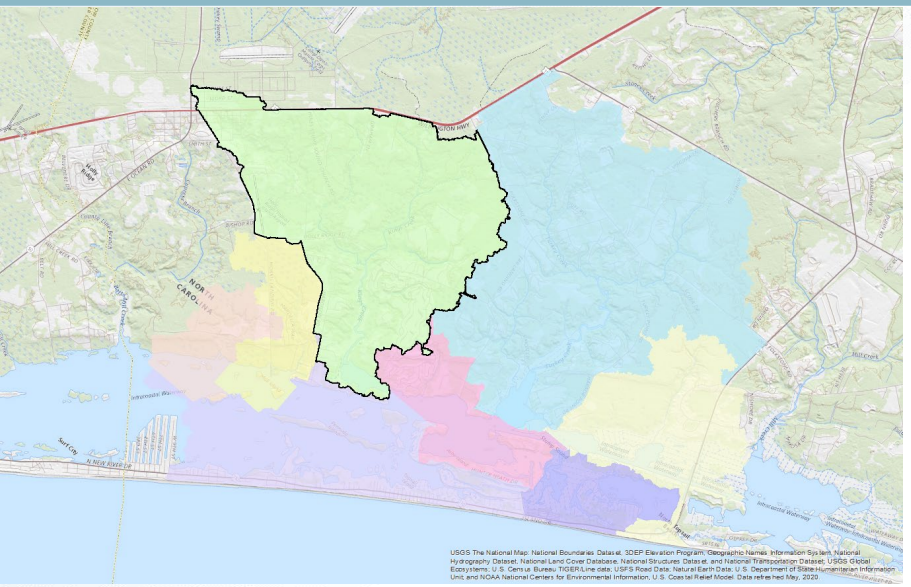
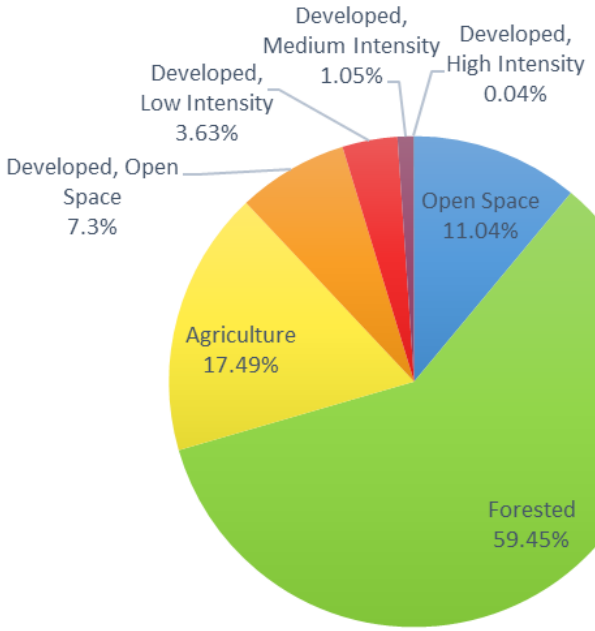


# KINGS CREEK

| | |
|---|---|
| **Total Area** | **4,321.5** acres |
| **Estimated Impervious Area (2011)** | **55.35** acres |




Land Cover, 2011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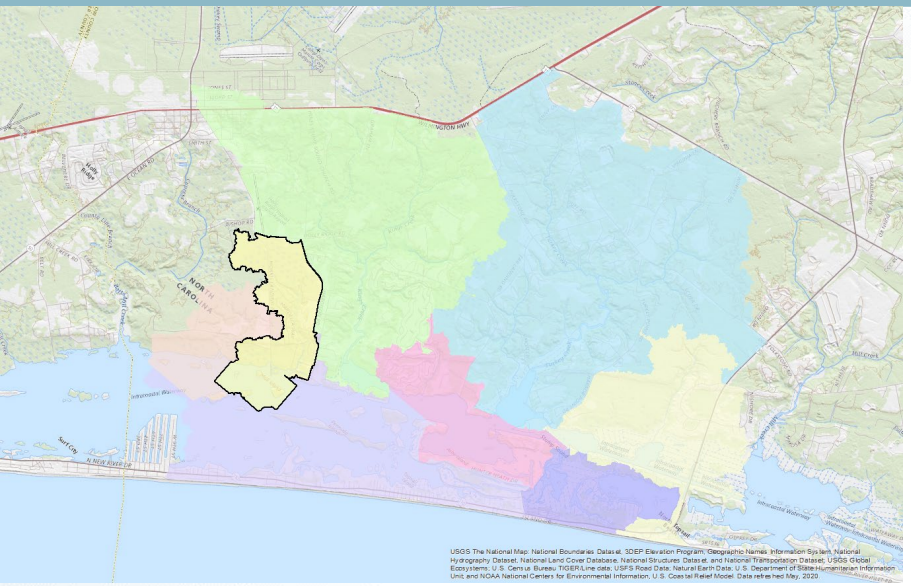
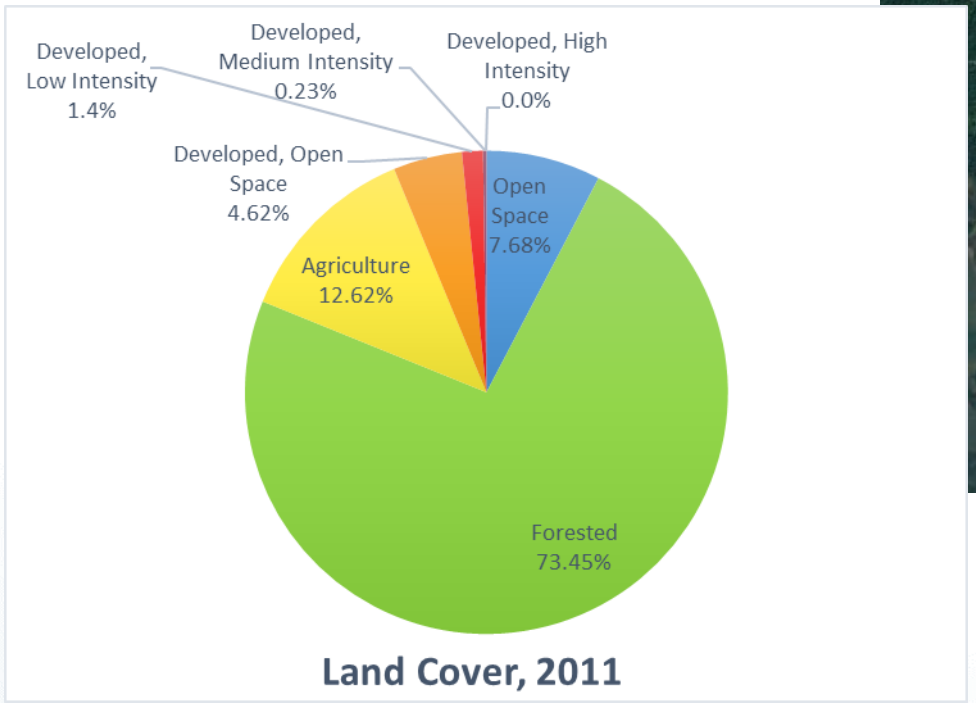



# MORRIS LANDING

| | |
|---|---|
| **Total Area** | **901.8** acres |
| **Estimated Impervious Area (2011)** | **3.23** acres |

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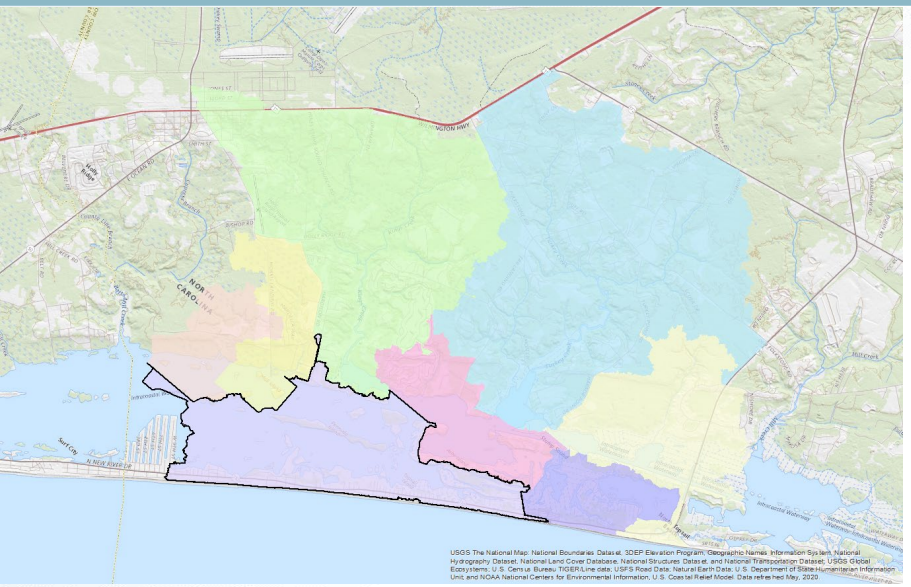
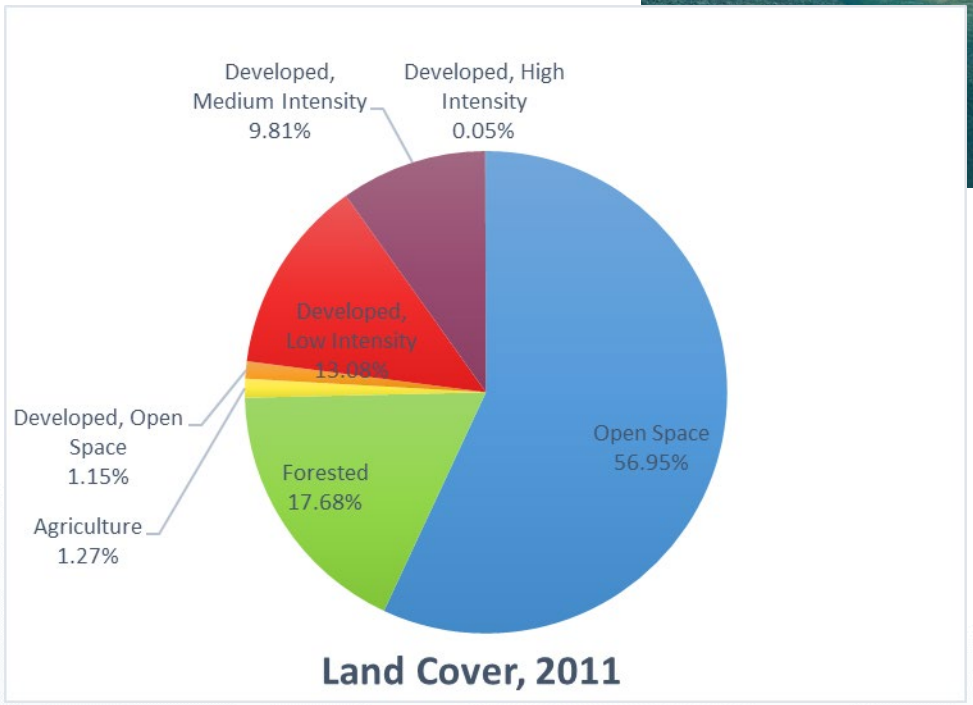



# PERMUDA

| | |
|---|---|
| Total Area | **2,329.1** acres |
| Estimated Impervious Area (2011) | **82.02** acres |

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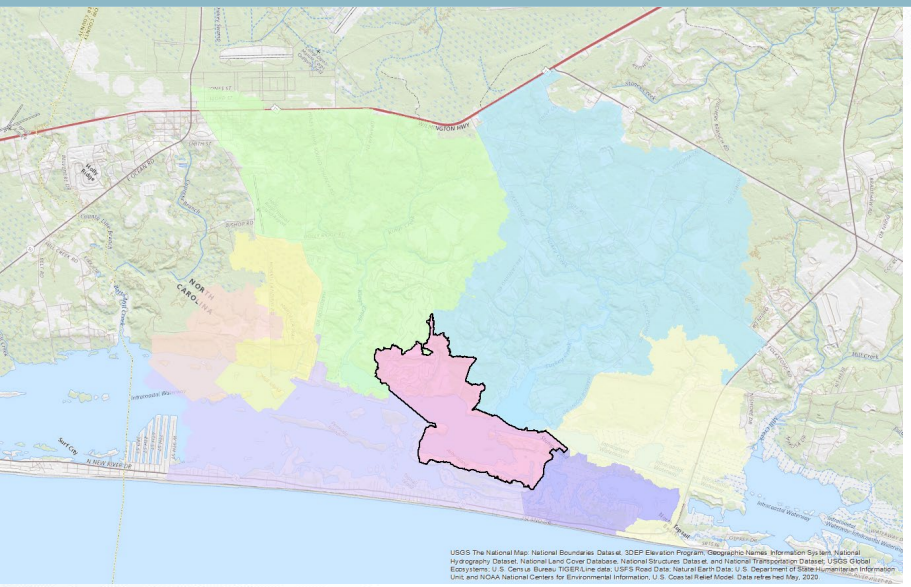
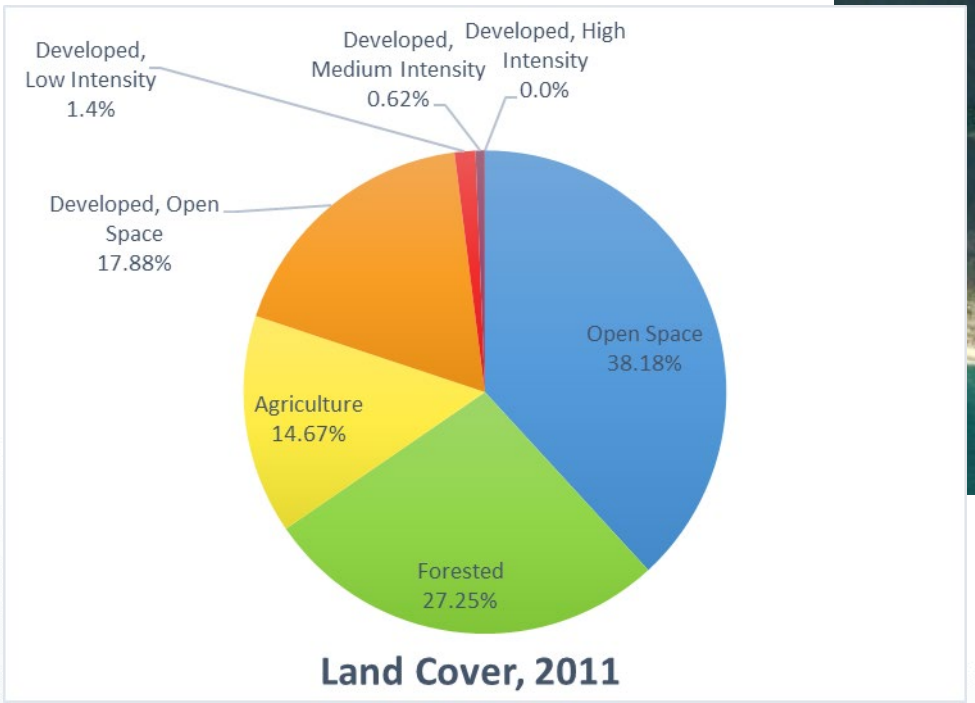



# EVERETT BAY

| | |
|---|---|
| Total Area | **1,082.9** acres |
| Estimated Impervious Area (2011) | **3.75** acres |

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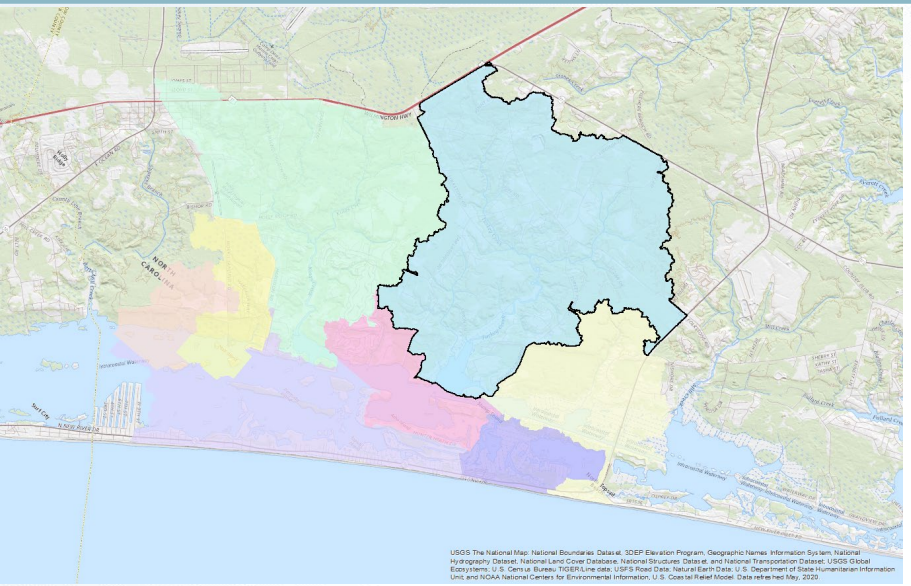
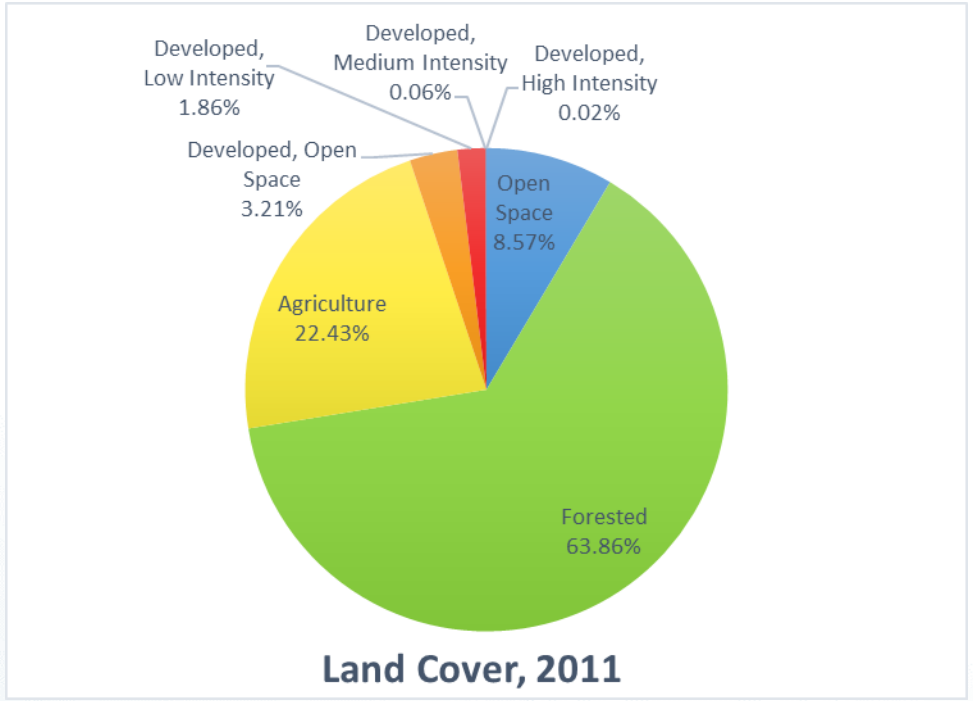
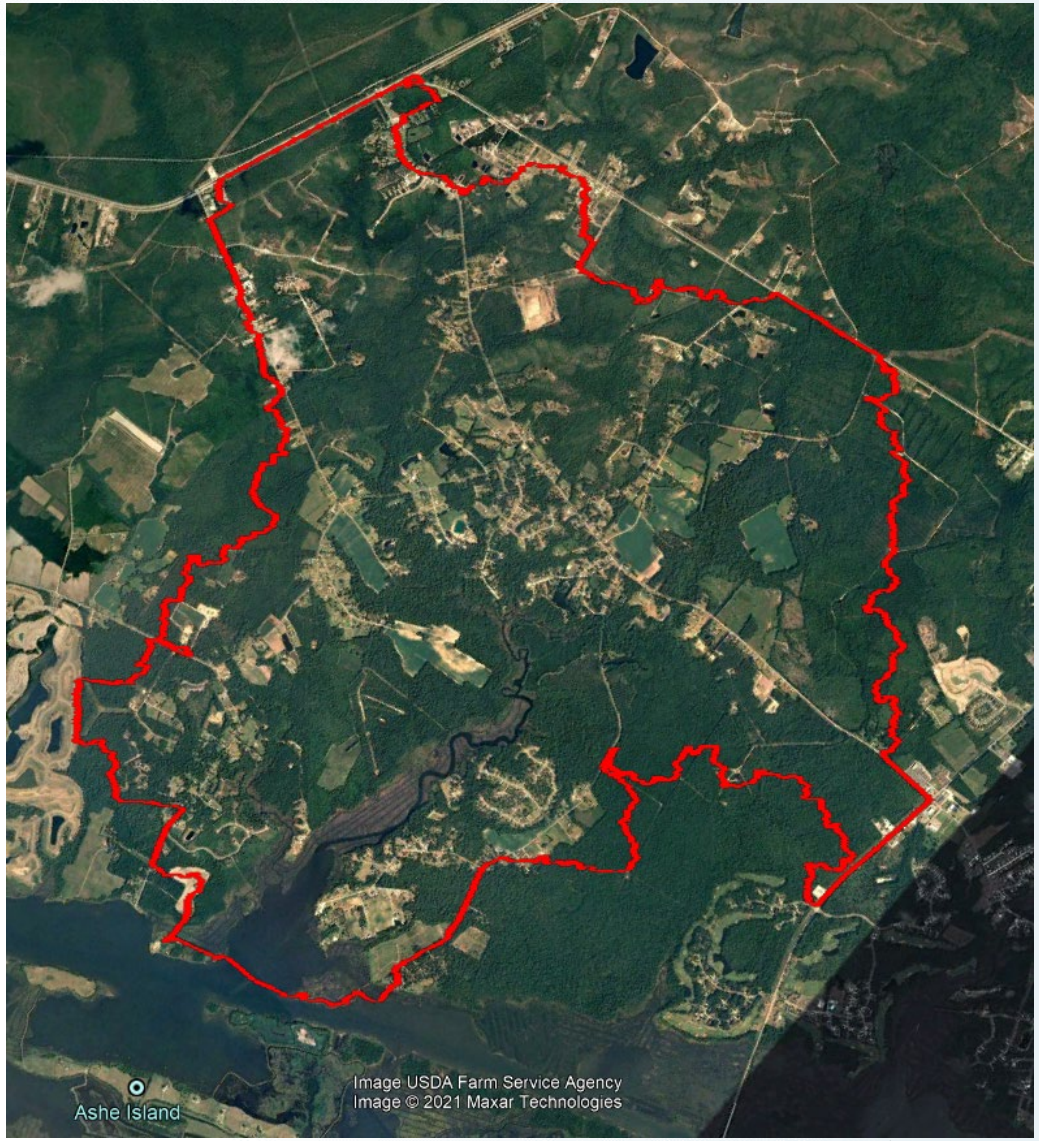


# TURKEY CREEK

| | |
|---|---|
| Total Area | **5,920.2** acres |
| Estimated Impervious Area (2011) | **28.98** acres |

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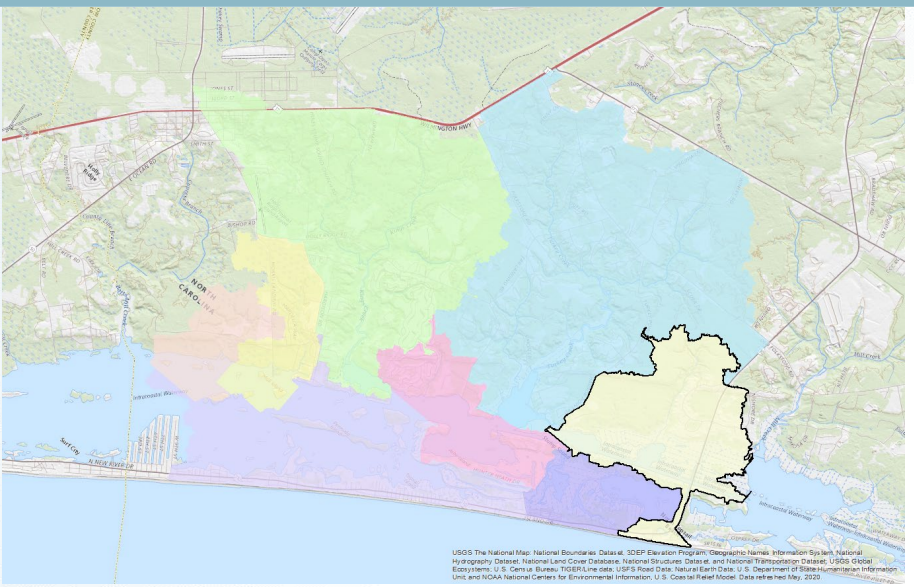
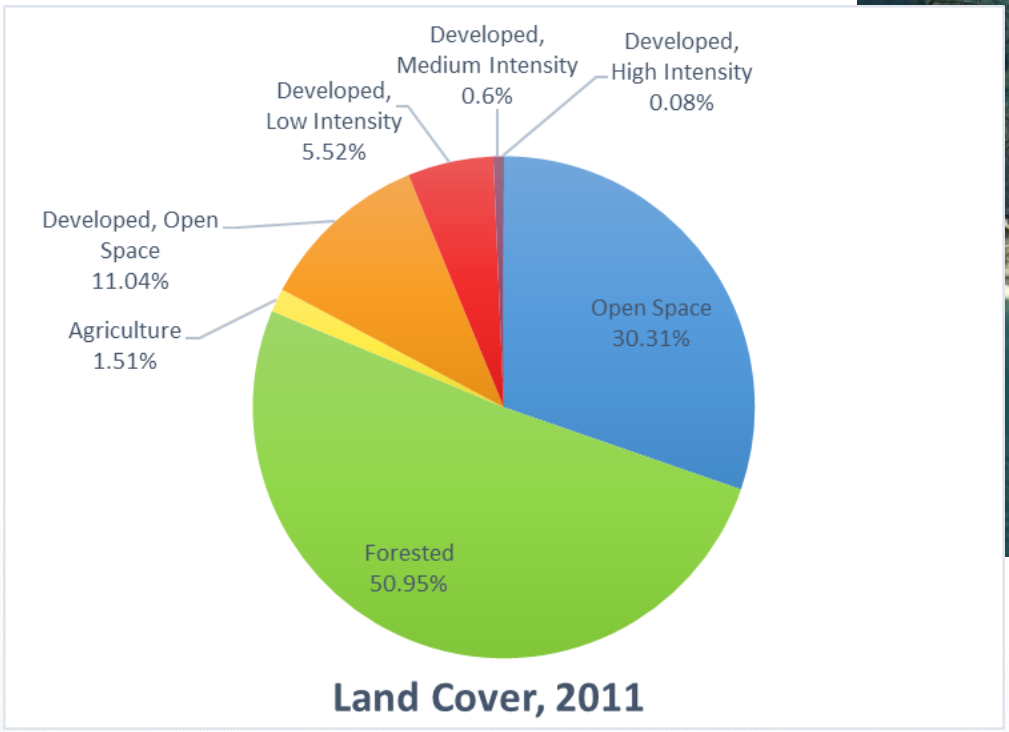



# GOOSE BAY

| | |
|---|---|
| Total Area | **1,859.9** acres |
| Estimated Impervious Area (2011) | **27.65** acres |

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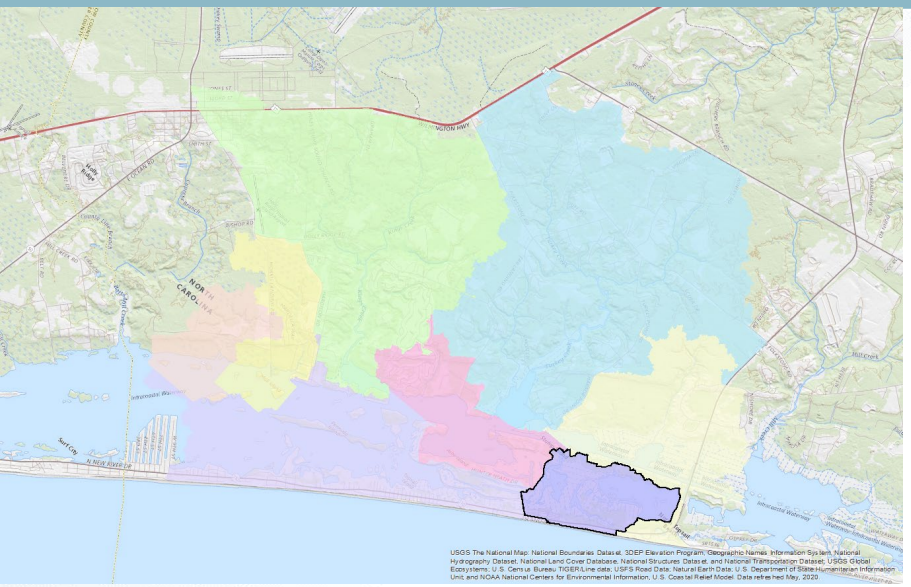
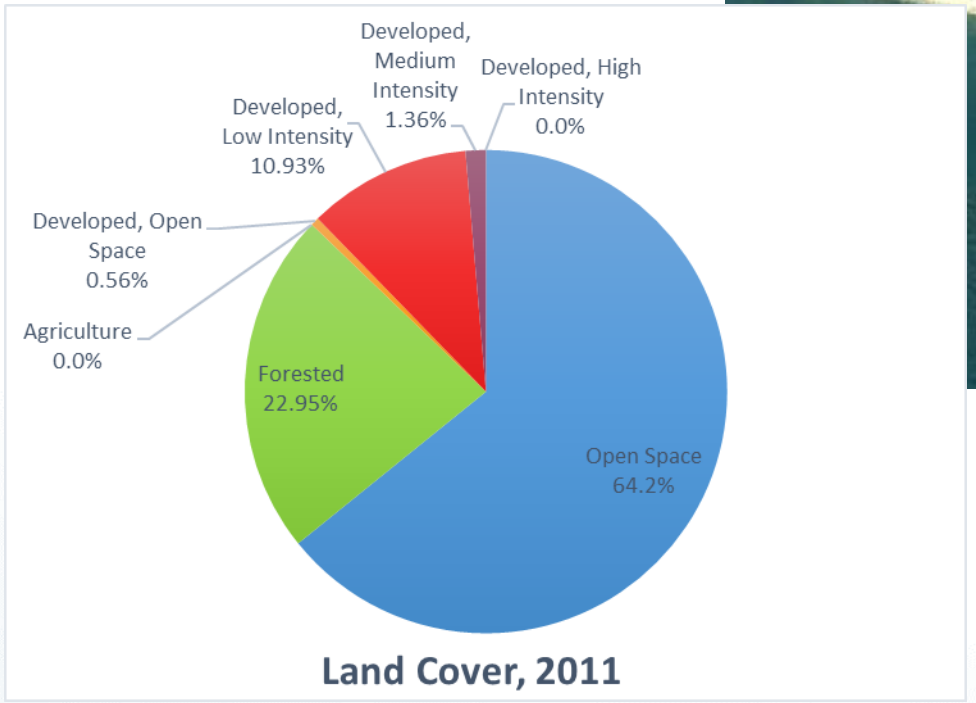



# ROGERS BAY

| | |
|---|---|
| Total Area | **714.3** acres |
| Estimated Impervious Area (2011) | **14.56** acres |

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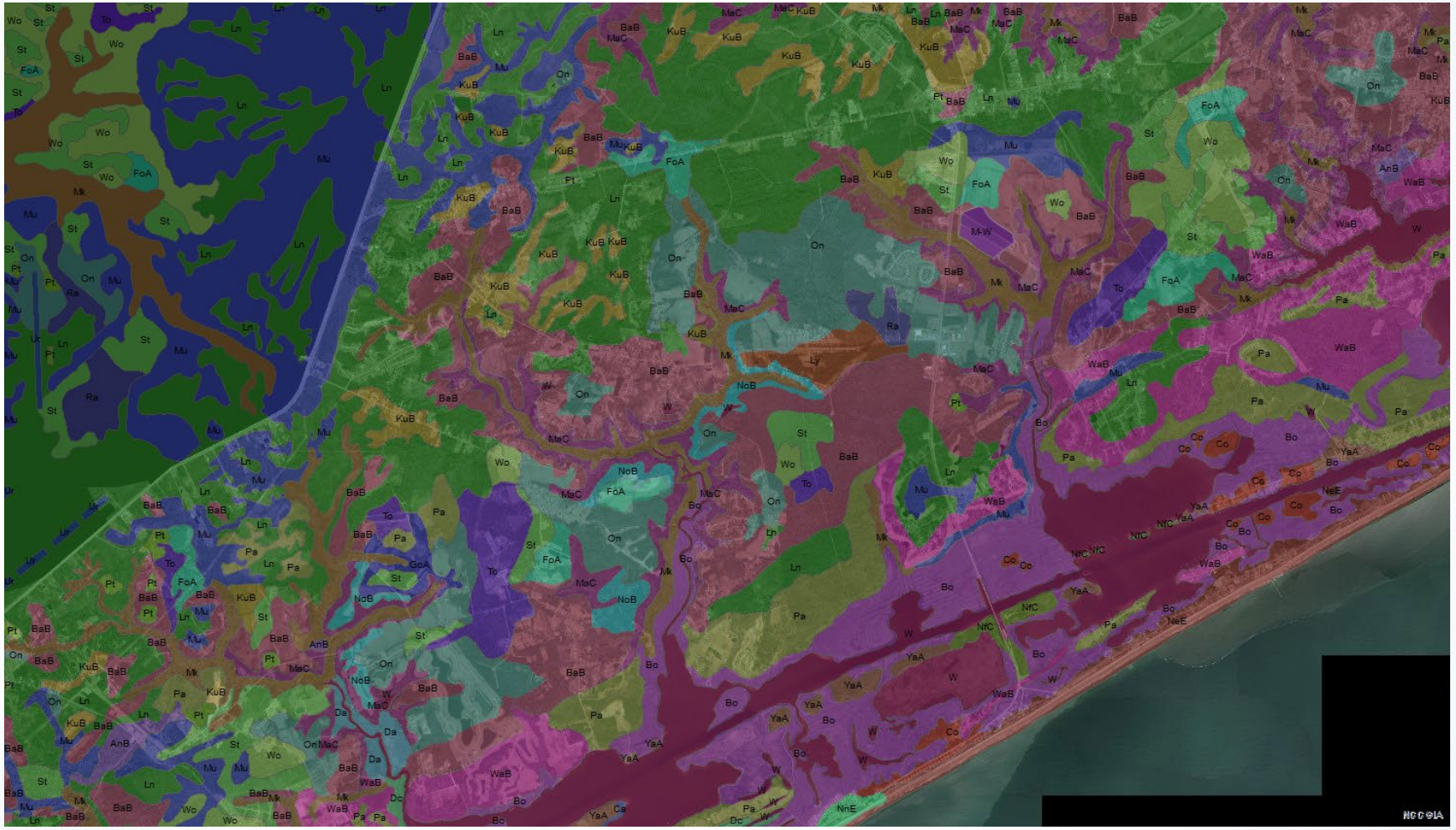
# WATERSHED SOILS

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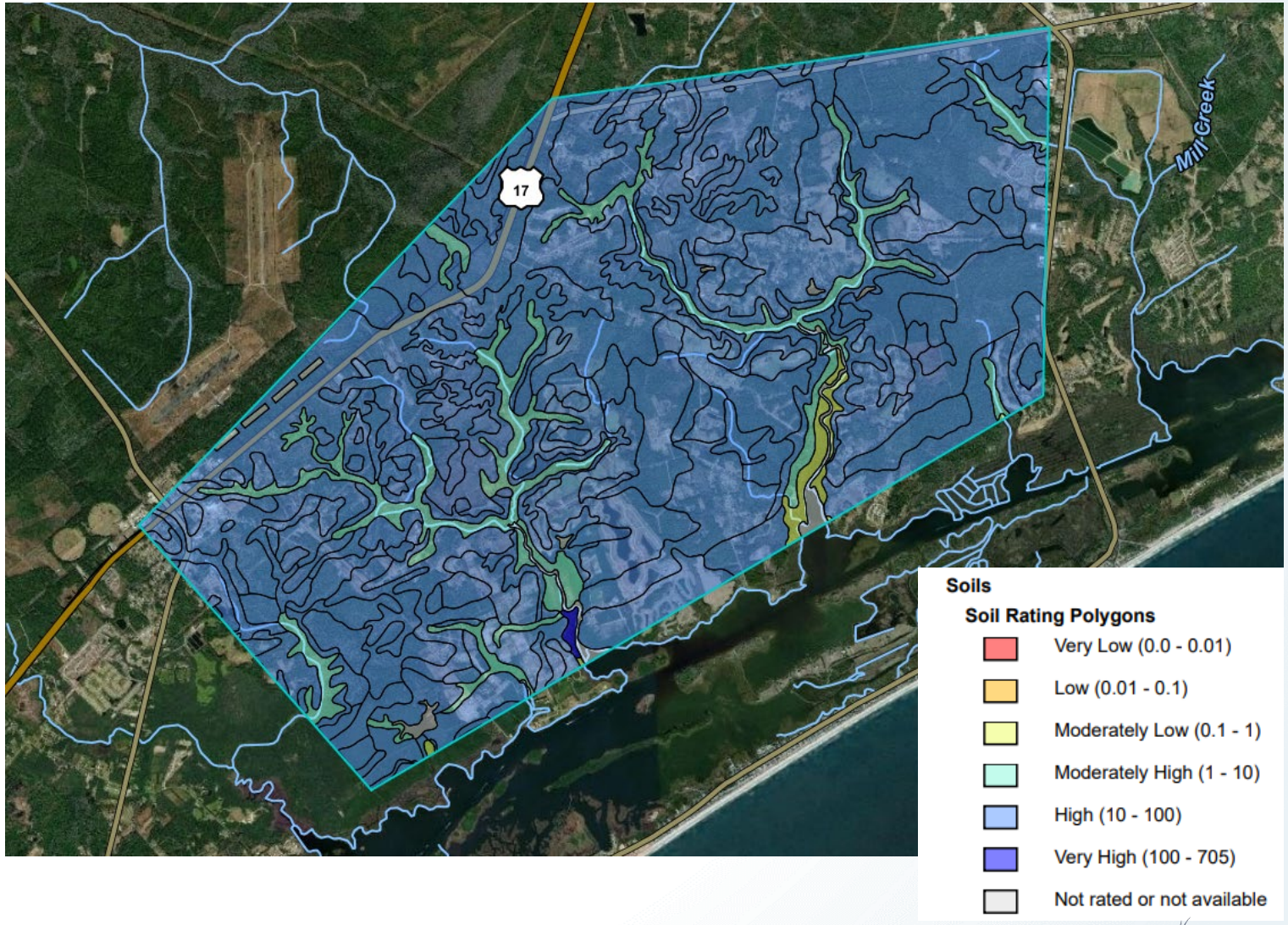
# SOIL INFILTRATION

- > 12 in/hr
- Alpin
- Baymeade
- Duckston
- Kureb
- Leon
- Murville
- Onslow
- Pits
- Wando
- Woodington

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# Land Use 1970s

# Land Use 1980s

# Land Use 1990s

# Land Use 2000s

# Land Use 2010s

# MEASURING CHANGES IN LAND USE

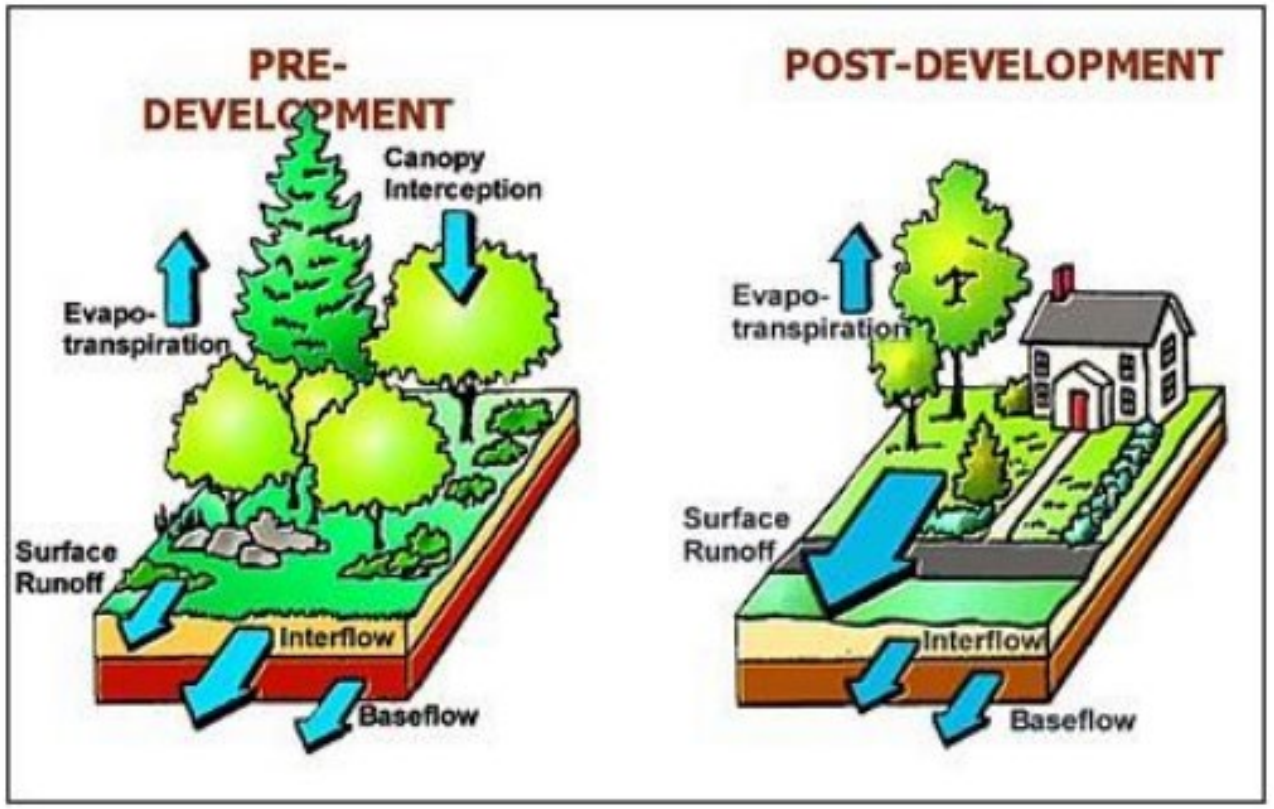


*Figure 1-1.* Surface runoff increases with intensifying land use (courtesy of the State of Maryland's StormwaterPrint).

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# MEASURING CHANGES IN LAND USE

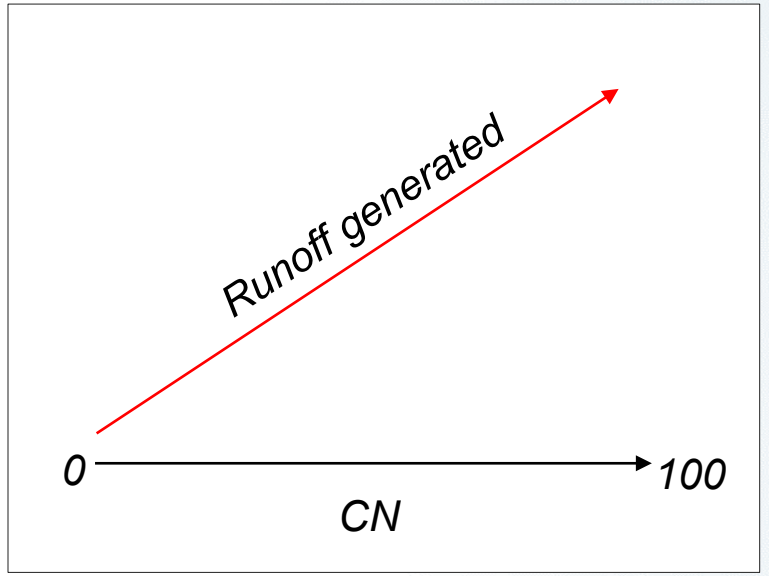
**Land Cover**

(ex: forested, agriculture, residential, commercial)

+

**Hydrologic Soil Group** (A, B, C, D)

*Infiltration capacity*




**CURVE NUMBER (CN)**

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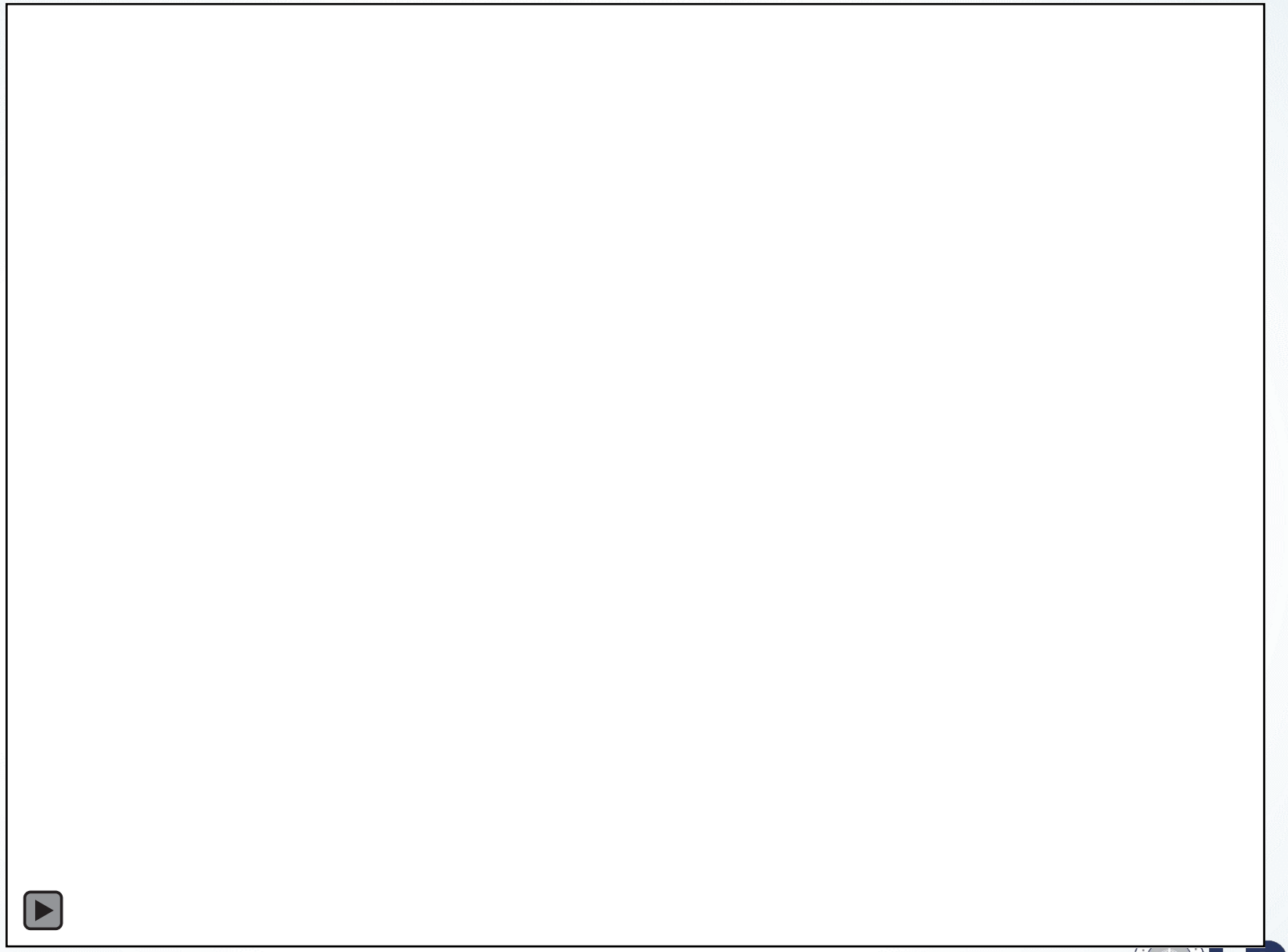

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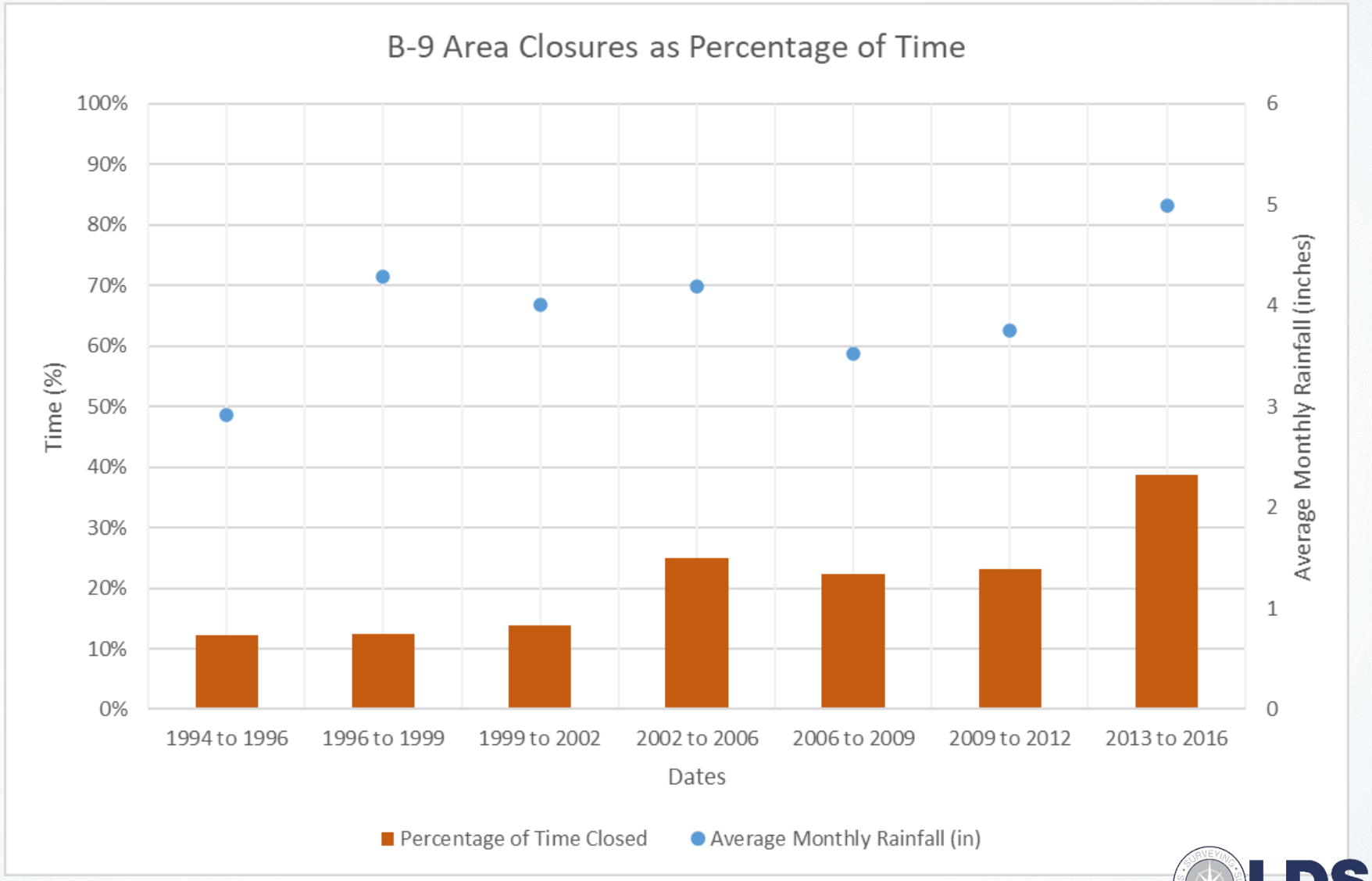


*Temporary closures are in addition to the permanent closures shown before.*

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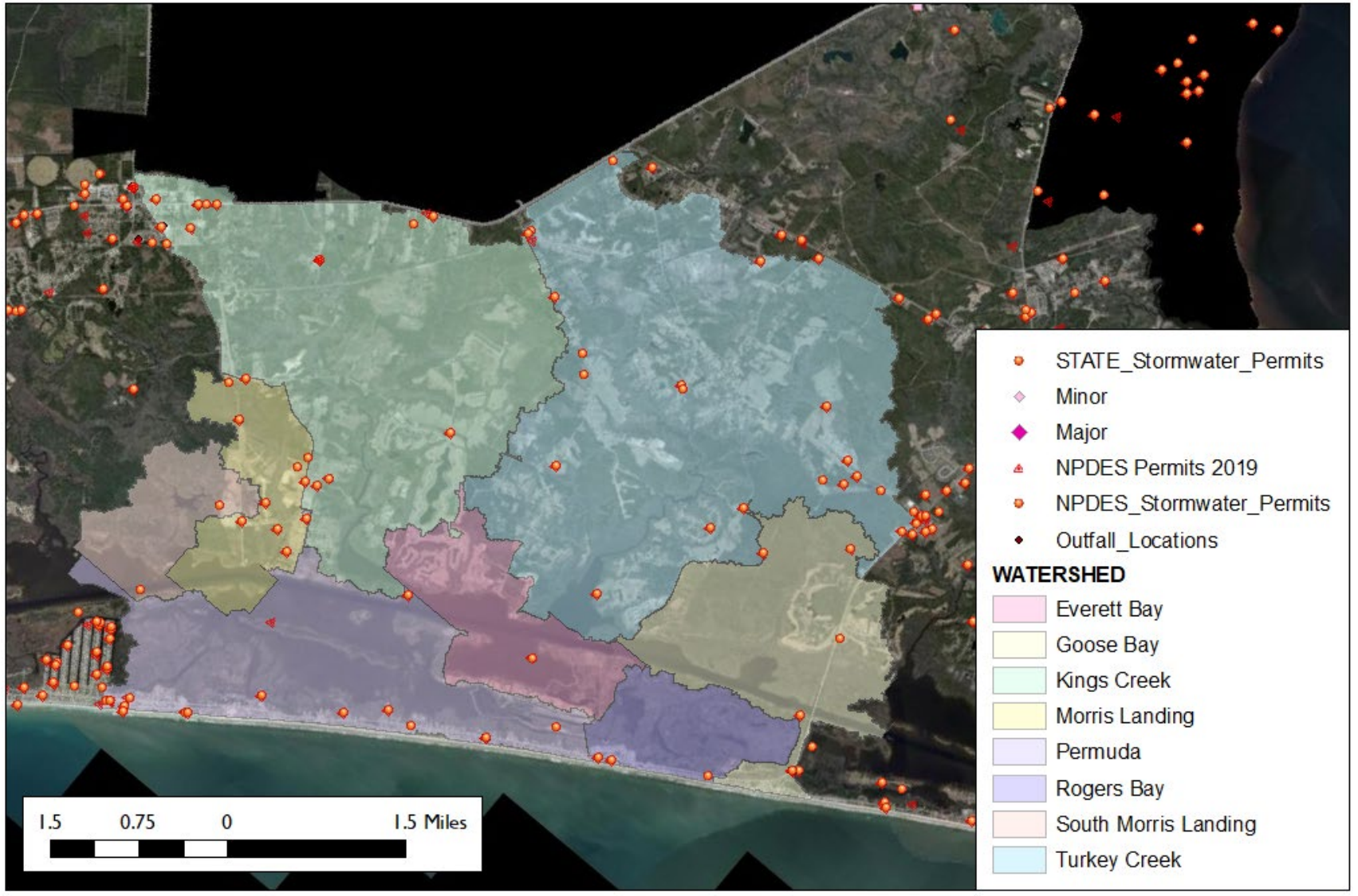
# STORMWATER PERMITS

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PERMITS MAP

STUMP SOUND, NC

1:67,787

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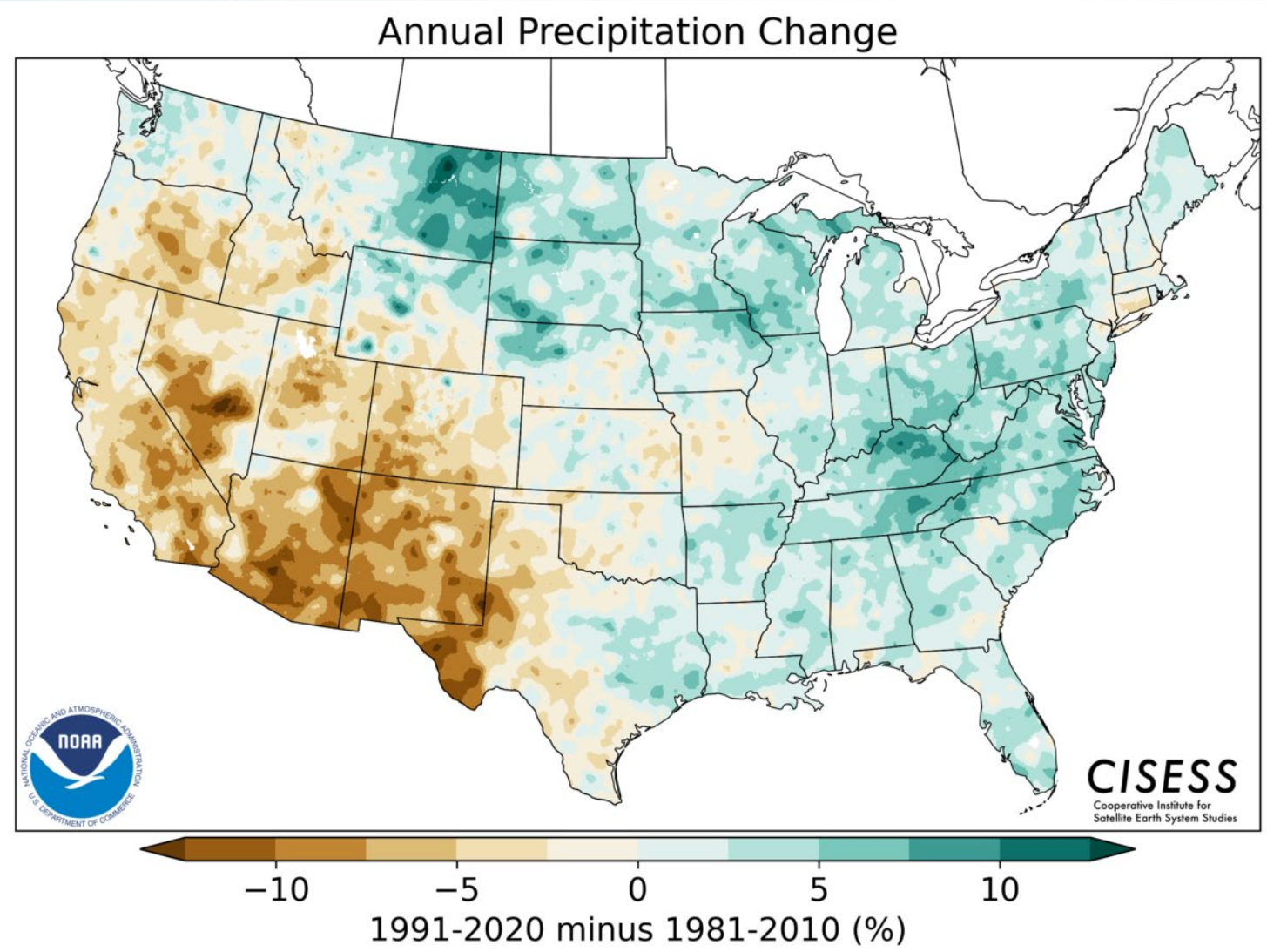


# LOOKING AHEAD

Increasing amounts of precipitation in North Carolina

Increasing number of flashy or extreme precipitation events

*Normals data released May 2021 by NOAA. Map courtesy of Cooperative Institute for Satellite Earth System Studies.*

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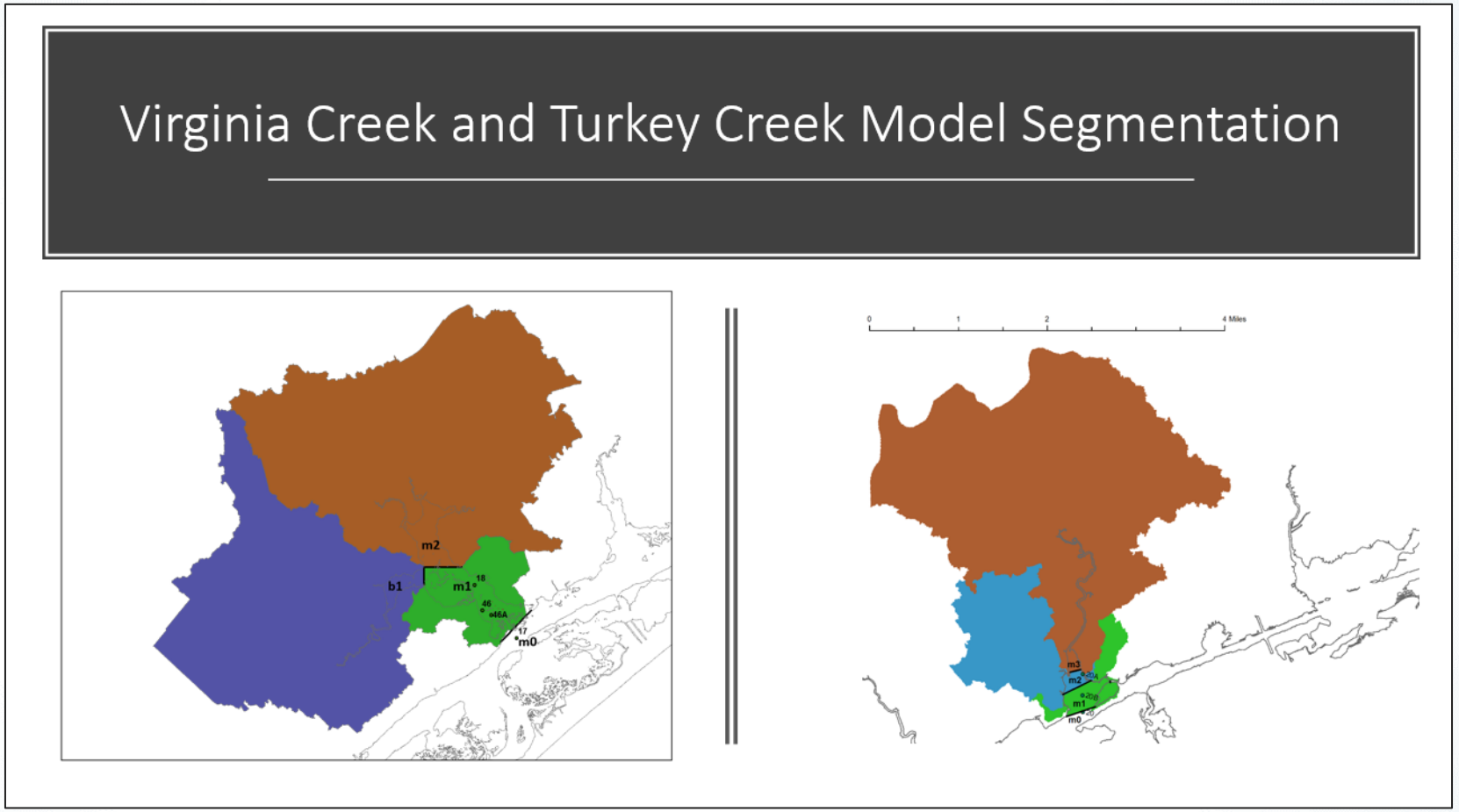
# TIDAL PRISM MODEL




*Modeling and Assessment Branch of NC Division of Water Resources, April 2021*

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# NEXT STEPS

- Continue watershed characterization
- Research local stormwater ordinances
- Identify stormwater “hot spots”
- Develop stormwater projects to improve water quality
- Present findings
- Finalize plan

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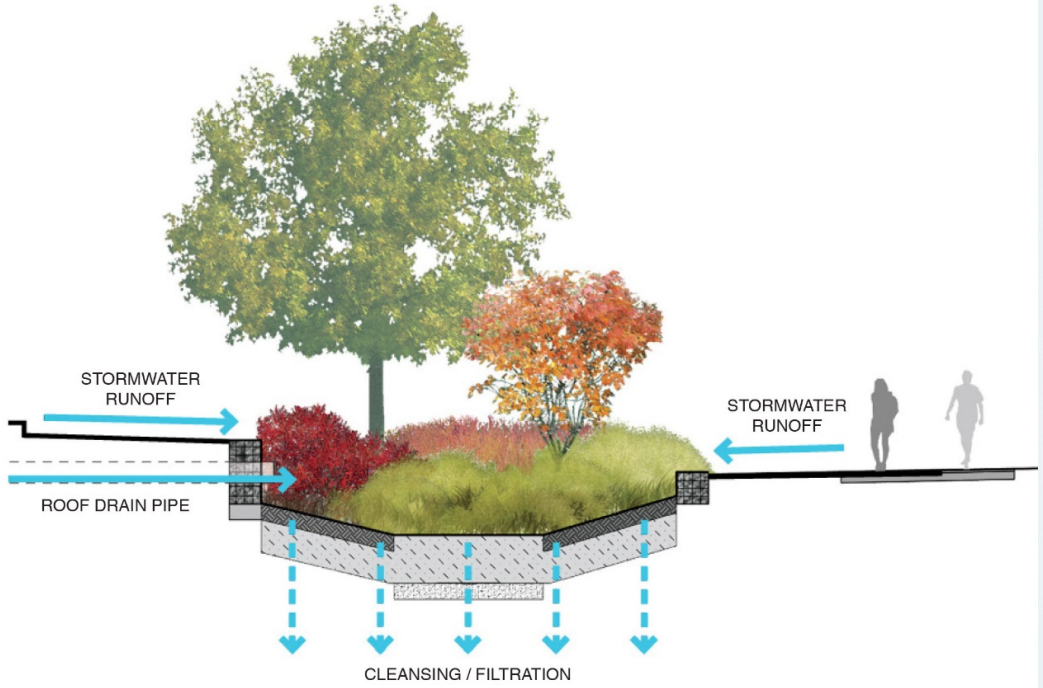
# Potential Projects

- Focus on cost-effective, easy to implement strategies
  - Bioswales
  - Permeable pavement
  - Bioretention cells
  - Infiltration
- Conservation Easements
- Conversion to Nature Based Solutions of Existing BMPs/SCMs
- Stormwater Maintenance
- Encourage Existing/Historic Landuses
- **MIMIC NATURAL HYDROLOGY**



Bioswale cross-section

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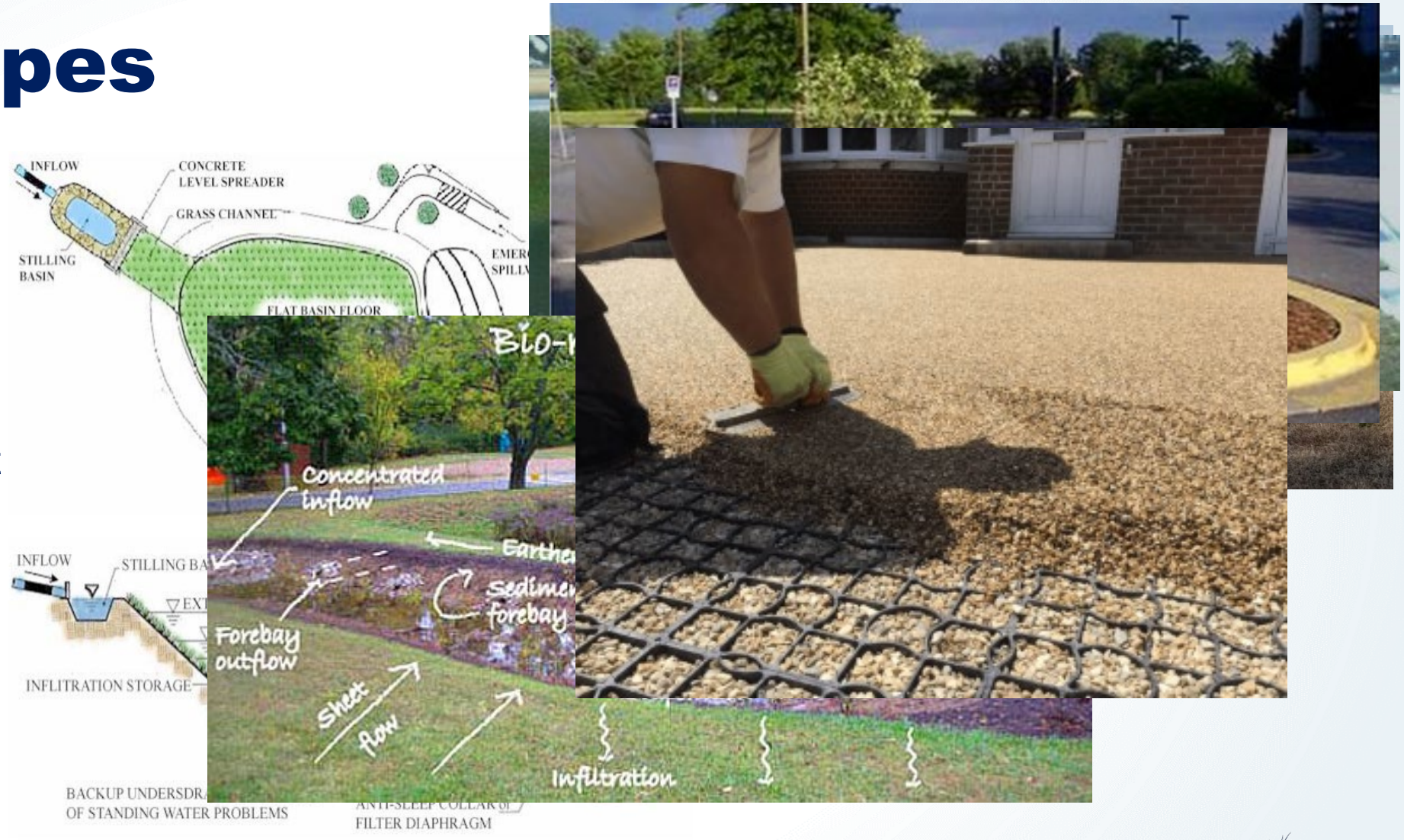
# Project Types

- Bioswales
- Infiltration Basin
- Bioretention
- Permeable Pavement

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# We want input

- Hot Spot Locations
- High Water Quality Areas
- Poor Water Quality Areas
- Willing Landowners
- Data
- Photos of water quality impairments
- Potential lands for conservation
- Research and monitoring needs

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# Questions

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