Improving the Surface Water Quality of Coastal Basins with Resilient Land Cover Scenarios

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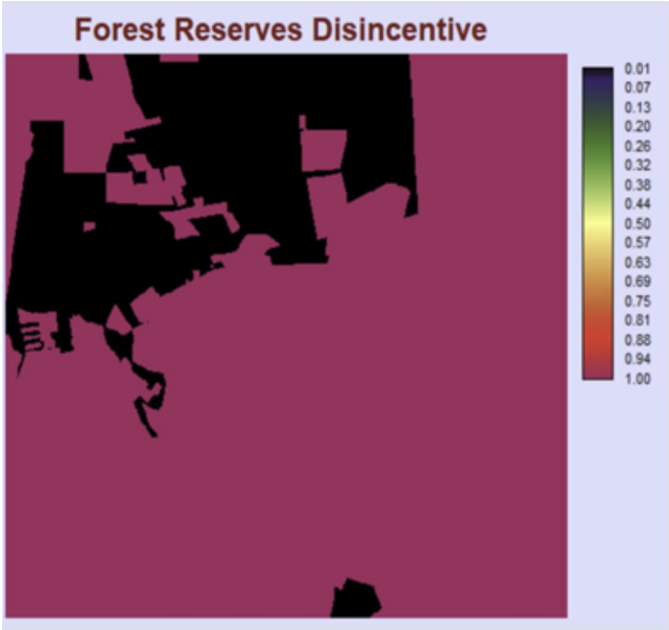
Threats to Delaware's Coastal Water Quality

Prime Hook National Wildlife Refuge, DE

- Two Major Water Basins
  - Delaware Bay & Estuary
  - Inlands Bay
- Historical Threats
  - Industrial, Agricultural, & Urban Development
    - Increased Run-Off
    - Non-Point Source Pollution
  - Wetland Conversion
- Future Wetland Degradation
  - Coastal Squeeze
    - Sea Level Rise
    - Urban & Agricultural Expansion

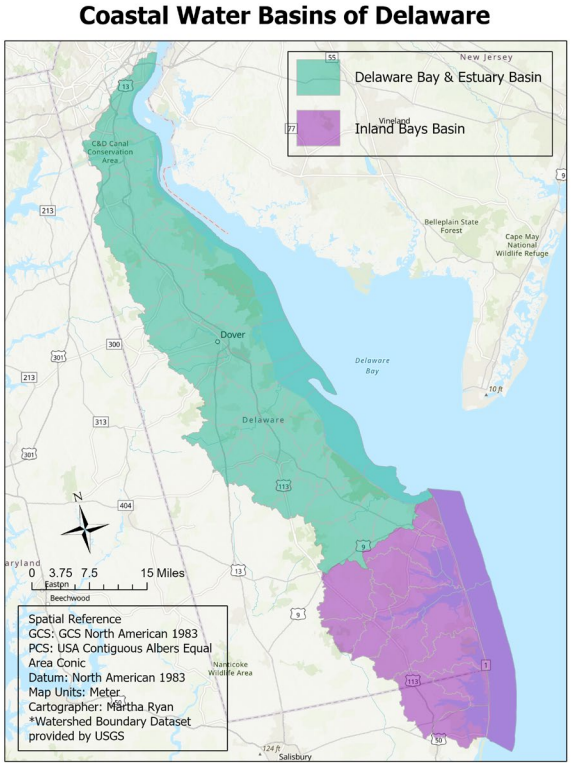
Intervention Modeling



Disincentive map of a forest reserve. Eastman, J. R. (2015). TerrSet manual. Accessed in TerrSet version, 18(1).

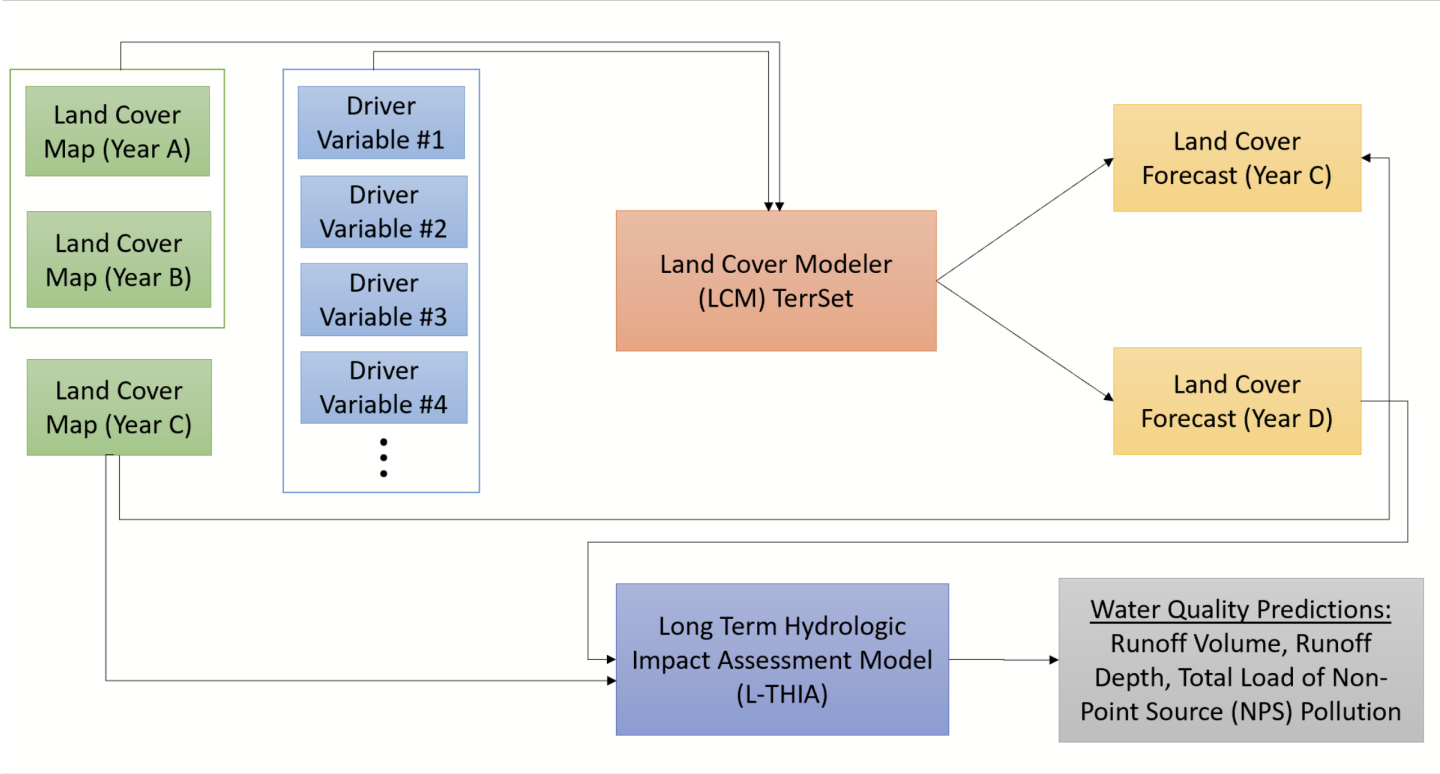
- Land Use/Land Cover Prediction
  - Previous LULC Maps
  - Driver Variables
- Ecosystem Service (ES) Impacts
  - Surface water quality
- Sustainable Interventions
  - Altered LULC → ES Changes
  - Policy Interventions

Project Overview

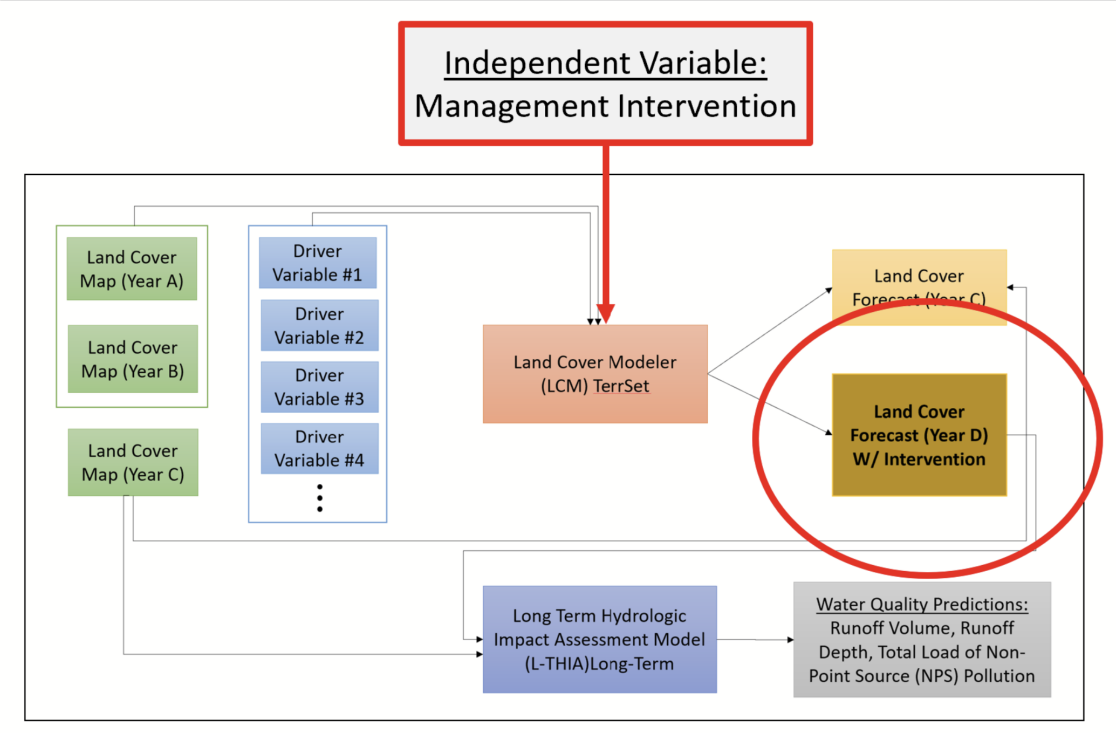


- RQ: "What management interventions should be used to improve the surface water quality of the Delaware and Inland Bay water basins?"
- Specific Aims
  - Identify drivers of future land cover change
  - Estimate predicted land cover changes
  - Quantify change impacts on surface water quality
  - Test the impact of physical & policy interventions

Part 1: Model Development & Calibration



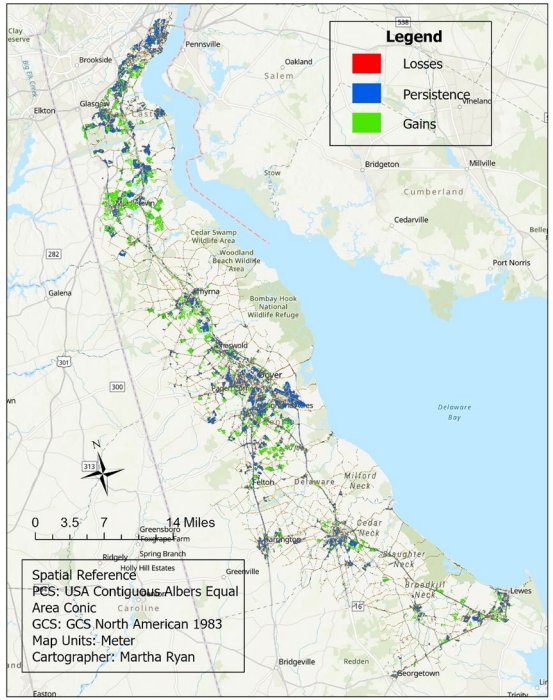
Part 2: Management Intervention



Results: Historic Land Cover Trends

- Delaware Bay & Estuary Water Basin
  - Grasslands & Agriculture → Low-Intensity & Open Development
  - Estuarine Emergent Wetland → Estuarine Scrub/Shrub Wetland
  - Estuarine Forest Wetland → Agriculture & Palustrine Emergent Wetland

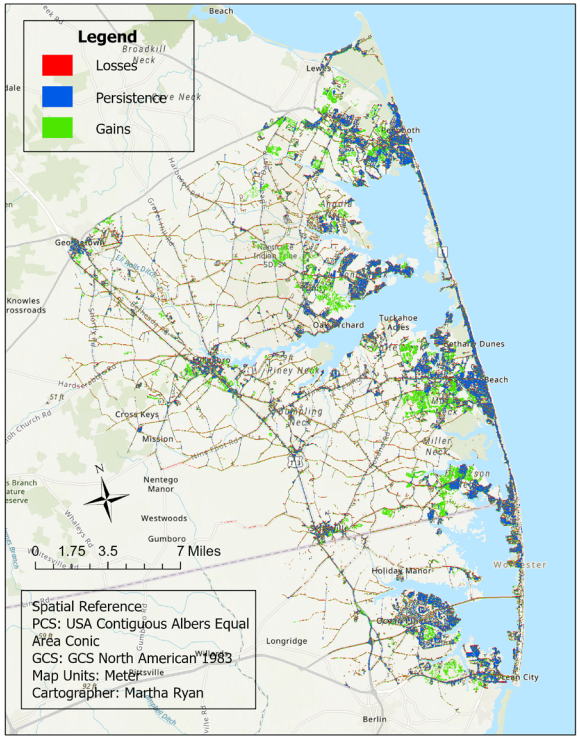
Changes in Low-Intensity and Open Development in the Delaware Bay & Estuary Water Basins Between 1992 and 2016



Results: Historic Land Cover Trends

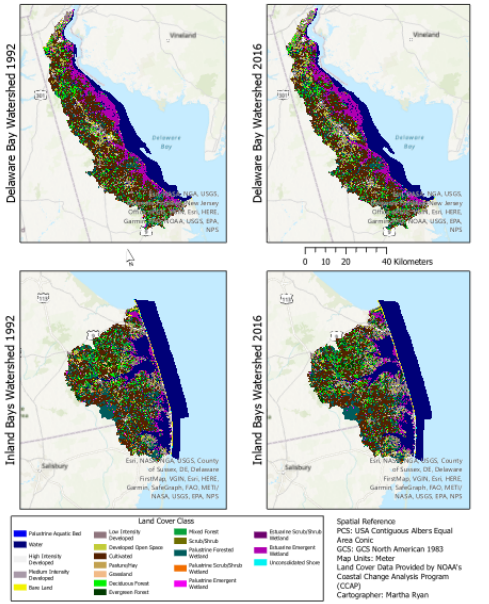
- Inlands Bay
  - Agriculture, Palustrine Forested Wetland, & Deciduous Forest → Medium & Low-Intensity Development
  - Scrub/Shrub, Grasslands, & Palustrine Forested Wetland → Evergreen Forest
  - Estuarine Forested Wetland → Estuarine Emergent Wetland

Changes in Medium and Low-Intensity in the Inlands Bay Water Basins Between 1992 and 2016



Next Steps

Figure 4: Historical Land Cover Maps of the Delaware Bay and Inland Bays Watershed from 1992 and 2016



- Historical Water Quality Assessment
  - Test Water Quality Model
  - Compare Future Results
- Land Cover Prediction
  - Two Periods
    - 2001-2011 → 2016
    - 2011-2019 → 2021 & 2035
  - Land Cover & Driver Maps
    - NLCD
    - DEM, Slope, Transportation Lines, Demographics, Climate, & Sea Level Rise

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