**NASA DEVELOP National Program**

**Fall 2015 Project Proposal**

**Mobile County Health Department**

**Natchez Trace Ecological Forecasting & Water Resources**

Utilizing NASA Earth Observations to Assess Current and Historic Wetland Condition and Extent along the Natchez Trace Parkway

**Objective:**

To map current and historic wetland extents along the Natchez Trace Parkway for beaver management planning as the beaver dams alter the wetlands and affect the parkway’s roads.

**Community Concern:**

The Natchez Trace Parkway, a national park stretching 444 miles through northern Mississippi, Alabama, and Tennessee, provides a scenic route among other attractions to visitors, as well as habitat for numerous plant and animal species. However, these functions of the parkway are sometimes at odds. The parkway’s beaver population is constructing dams in the waterways of the park, expanding the extent of the area’s wetlands. The retention of water from beaver dams is impacting the maintenance of the parkway’s roads. Thus, the parkway faces a complex management situation balancing beaver habitat, wetland preservation, and park maintenance needs. According to Deanna Boensch, a Natural Resource Specialist for the parkway, “This project will help to provide past history and present baseline data before we develop a beaver management plan and implement new strategies for management.”

**Partner Organizations:**

Natchez Trace Parkway (US NPS) (End-User, POC: Deanna Boensch, Natural Resource Specialist)

Contact with the partner began through email with the Natchez Trace Parkway asking if there was interest in collaboration on a project. The partnership has developed through email and teleconferences discussing the project since December 2014 with Deanna Boensch. As the partners are relatively close to MCHD, an in-person hand-off of the decision support tools is anticipated. If that proves to be unfeasible, a virtual presentation will be conducted and the end products emailed to the partners. The proposed end products will provide a baseline analysis of current and historic wetland extent within the park and will be utilized in creating a management plan for the park’s beaver population. Overall, this will provide insight into where the parkway will focus on preserving wetland habitat for beavers versus roadway maintenance in areas where these two management goals conflict. This project will also help managers understand the impacts of decades of past management practices on beaver habitat.

**Letters of Support:** Natchez Trace Parkway, Deanna Boensch, Natural Resource Specialist

**Decision Making Process:**

The parkway management team wants to maintain wetland areas, beaver habitat, and access to the parkway. The team is currently working toward creating an environmental assessment that considers how to balance these wildlife habitat needs with parkway maintenance. They are considering four options: recurring removal of the beaver dams, installation of levelers, removal of the beavers and dams, or taking no action. The parkway management team uses the National Wetland Inventory to gain an overview look at the wetlands in the parkway, but does not currently utilize spaceborne remote sensing data in creating their management plans. The managers also want to examine historic wetland extent in comparison to present extent to see what changes have occurred. GPS beaver dam locations will be provided by the project partners to the DEVELOP team for analysis.

**Earth Observations:**

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| --- | --- | --- |
| **Platform** | **Sensor** | **Geophysical Parameter** |
| **Landsat 5** | TM | Land Use/ Land Cover |
| **Landsat 7** | ETM+ | Land Use/ Land Cover |
| **Landsat 8** | OLI | Land Use/ Land Cover |
| **Terra** | ASTER | Land Use/ Land Cover |

**NASA Earth Observations Highlighted:**

This project will focus on creating a Land Use Land Cover (LULC) time series that will enable the parkway managers to assess wetland extent within the parkway over the last several decades. Beaver dam construction occurs on a relatively short time scale (as quick as a few hours), but can have long lasting effects, potentially creating permanent habitat changes. Thus, there is need for both long-term and short interval data analysis. To accomplish this, Landsat 5 TM, Landsat 7 ETM+, and Landsat 8 OLI data will all be utilized to conduct land classifications. Terra ASTER data will also be analyzed for potential use. Depending on data comparability between sensors, a time series will be constructed.

**Ancillary Datasets:**

* Natchez Trace Parkway – In-situ data of beaver dam locations
* USGS – National Land Cover Dataset (NLCD)

**Models:**

TerrSet Land Change Modeler for ArcGIS/IDRIS Land Change Modeler (POC: Dr. James Toledano, Clark Labs)

**Decision Support Tools & Analyses:**

|  |  |  |
| --- | --- | --- |
| **Proposed End Products** | **Decision to be Impacted** | **Current Partner Tool/Method** |
| Land Use Land Cover Maps | Where the parkway will address beaver dam construction that is altering wetlands and roads | National Wetland Inventory shapefiles and field surveys |
| Wetland Extent Prediction Maps | Where the parkway will address beaver dam construction that is altering wetlands and roads | National Wetland Inventory shapefiles and field surveys |

*Land Use Land Cover Maps* – LULC maps illustrating present and historic wetland extent derived from Landsat 5 TM, Landsat 7 ETM, and Landsat 8 OLI data

*Wetland Extent Prediction Maps* – Maps forecasting future wetland extent using the created LULC maps as model inputs

**Project Details:**

**National Application Areas Addressed:** Ecological Forecasting, Water Resources

**Source of Project Idea:** MCHD emailed the Natchez Trace Parkway introducing the DEVELOP program and asking if there were any remote sensing projects that the park would be interested in partnering with DEVELOP to conduct. A Natural Resource Specialist responded with a request to analyze current and historic wetland extent within the parkway as it relates to beaver dam construction.

**Study Location:** Natchez Trace Parkway, Mississippi, Alabama, and Tennessee

**Period being Studied:** January1987 to June 2015

**Advisors:** Joe Spruce (NASA Stennis Space Center), James “Doc” Smoot (NASA Stennis Space Center)

**Participants Requested:** 3-4

**Project Timeline:** 1 Term: 2015 Fall

**Previous Related DEVELOP Work:**

Fall 2014(LaRC) - Great Lakes Climate: Monitoring the Impacts of Climate Change and Decreasing Water Levels on Wetlands in the Great Lakes Region of North America

**Software & Scripting Requested:**

* ERDAS IMAGINE - Land cover classification of Landsat 5,7, and 8, and Terra Aster imagery
* ArcGIS - Raster manipulation/analysis and LULC map creation
* TerrSet - land modeling and forecasting of wetlands