NORTH ATLANTIC LANDSCAPE CONSERVATION COOPERATIVE GRANT 2014 PROGRESS REPORT

Quarter: (circle one) (2014 1st) 2014 2nd 2014 3rd 2014 4th

Grant Number and Title: **NALCC 2012-07 Revisions to the Northeast Aquatic Habitat Classification.**

Grant Receipt/Organization: The Nature Conservancy

Grant Project Leader: Dr. Mark Anderson

Were planned goals/objectives achieved last quarter? We applied and received and extension on this grant to develop a lake classification. The extension was approved and the grant extended to 6/30/14

NALCC Conservation Need Addressed: Supporting a Standardization of Terrestrial and Wetland Habitat Classification and Mapping that Includes Characterization of Climate Sensitive Systems.

Progress Achieved: (For each Goal/Objective, list Planned and Actual Accomplishments)

Jan: Team Formation
Sent invitation to 25 people and successfully recruited 14 team members representing 10 states + federal agency (EPA)

Feb 25: Call 1: Provided an introduction to the project goal, products, timeline, and role of Steering Committee. We also reviewed potential classification attributes such as water chemistry, physiography, stratification, temperature, groundwater linkage, morphometry, genesis, trophic state, connectivity to streams, retention time, color, and clarity. We took 15 existing lake classifications or lake assessment which used stratification of some sort (NAHCS, ME, NH, MA (2), VT, NY, CT (2), PA, VA, NJ (2),and the NLA) and put them into a table to record which variables they each used. These classifications and the round-robin discussion highlighted the variables that the majority of states currently use and that would be most useful to pursue for a standardized regional classification. These included ANC or pH:, depth, temperature, trophic state, size, impounded status, and basic measures of human alteration. Additionally, we created a mock habitat guide page for use in the lake classification call with the team. And we acquired the NE dam dataset from Erik Martin, and began to attribute lakes with the identifier and number of dams on that lake

March
Call 2 March 20: For the top recommended 4 variables, we discussed what the variable was getting at biologically or ecologically, what classes and thresholds within the variable correspond to biological changes, and what data are available for the region. The team agreed on focusing our efforts on the following four key variables and related measures for our assessment

1. **Pond/Lake:** Split into pond vs. a lake class based on light penetration zone using max depth as a proxy for this zone. Max depth is available from some states as sampled data and can be obtained for other waterbodies from a model by EPA (Jeff Hollister). Thresholds in light penetration are not totally independent of trophic state; we will likely use thresholds such as max depth of 30ft for oligotrophic systems, 20ft for mesotrophic systems, 10ft for eutrophic systems to define the pond/lake split.

2. **Trophic State:** Separate oligotrophic, mesotrophic, eutrophic, and hypereutrophic based on National Lake Assessment breaks in Chlorophyll-a. Chlorophyll-a is available from some states as sample data and for other waterbodies in the Atlantic drainages (USGS drainage 1 and 2) it is available from an EPA SPARROW model. Chlorophyll-a was preferred over total nitrogen or phosphorous measures by the team. For non-sampled waterbodies in the Great Lakes and Ohio/Mississipian drainages, we are looking into other sources of modeled trophic state and/or will need to model this ourselves.
3. **Buffering Capacity:** The team preferred to measure this based on alkalinity or ANC (depending on what is available from the states), rather than measures of pH which can fluctuate during the day in lakes. We will try to define a low, moderate and high buffering capacity class; likely high > 1000 ANC µeq/L or 50 alkalinity mg/L, moderate 250-1000ANC or 12.5-50 alkalinity mg/L, low <250 ANC µeq/L or 12.5 mg/L based pm recommendations by VT and NY. ANC and/or alkalinity is available as sample data from some states and will need to be modeled for other waterbodies; likely from our bedrock geology layer.
4. **Cold or Very Cold Habitat present:** The team is interested in which lakes support enough cold water habitat for brook trout to reproduce and survive throughout the summer. Some members of the team are also interested in an additional very cold water habitat where lake trout can reproduce and survive throughout the summer. The team felt we could identify lakes with this habitat based on query of temp and dissolved oxygen profile data OR based on flags using fisheries provided information on hold over/reproduction of brook trout and lake trout.

<u>Data Development:</u>
Set up base ArcGIS lake project, worked to populated it with the following key data
Lake waterbodies from NHD Version 2: merged separate shapefiles files for different drainages sent by Jeff Hollister to make single shapefile of all lakes and ponds (32, 654) and selected those in the northeast 13 states

Basic Attributes for lake waterbodies: merged separate drainage .csv attribute tables of predicted max depths and a few other attributes from EPA using R, used R to add new field and populate it with potential surface area size classes, joined resultant table to regional lake polygon shapefile, created lake centroids and added fields for state, elevation, geology of the lake centroids back into the master lake polygon dataset

Relationship to V1 lakes and cumulative statistics: located our V1 lake and pond dataset, located table which I had created in 2008 that had a field holding the lake outlet stream COMID; this will allow us to join over cumulative geology or impervious surface attributes to the lakes now that we know the COMID of the reach whose "upstream watershed" represents that of the lake. I did a spatial join of the V1 to V2 lakes to we could relate this information to our new base V2 lake polygons. Alex will qc this and clean up/investigate the few instances where a V1 and V2 lake were mismatched/missing.

National Lake Assessment: Created points for the National Lake Assessment, queried index samples out of the various related tables, joined over the ANC, pH, trophic state, max depth. Made a new depth field to hold known max depth from NLA and for all other waterbodies the modeled lake depths. Studied depth/DO profile data from NLA and made queries/pivot tables of the temperature and dissolved oxygen profiles to run a query to identify all lakes with >.5m of habitat that was <21C and >4 mg/L DO. Can

Basic Maps: made basic maps for Call 2 showing our data for max depth, size, alkalinity, pH, trophic status, and cold query. Explored relationship between ph and ANC.

Prepared powerpoint for call 2m, gathered additional reports/information such as related to lake trout, list of potential cold water species, definitions of cold water in various states, corresponded with Jeff Hollister regarding data available from EPA on trophic statusIn

Made zoom-in maps of the lake buffers, showing how the landuse grid looks at a 100m buffer and a 500m buffer, as well as updating a map showing the distributions of different lake depths across the region. Created polygon buffers around the lakes. Looked up the coldwater fish species to determine if they were restricted to rivers or lakes.

Difficulties Encountered:
None, this project is moving along fast.

Activities Anticipated Next Quarter:
Goals for the upcoming Quarter include:
- Continue compiling data on the size, depth, pH, geology, elevation of lakes in the Northeast and Mid-Atlantic.
- Continue hosting steering committee calls: five planned

April	Geology, Elevation, PH
May	Temperature, Integration of variable
June	Final review

-Begin the modeling of lakes using the variables and thresholds determined by the team.
-Show results to the team and get feedback.

Expected End Date:
June 30, 2014

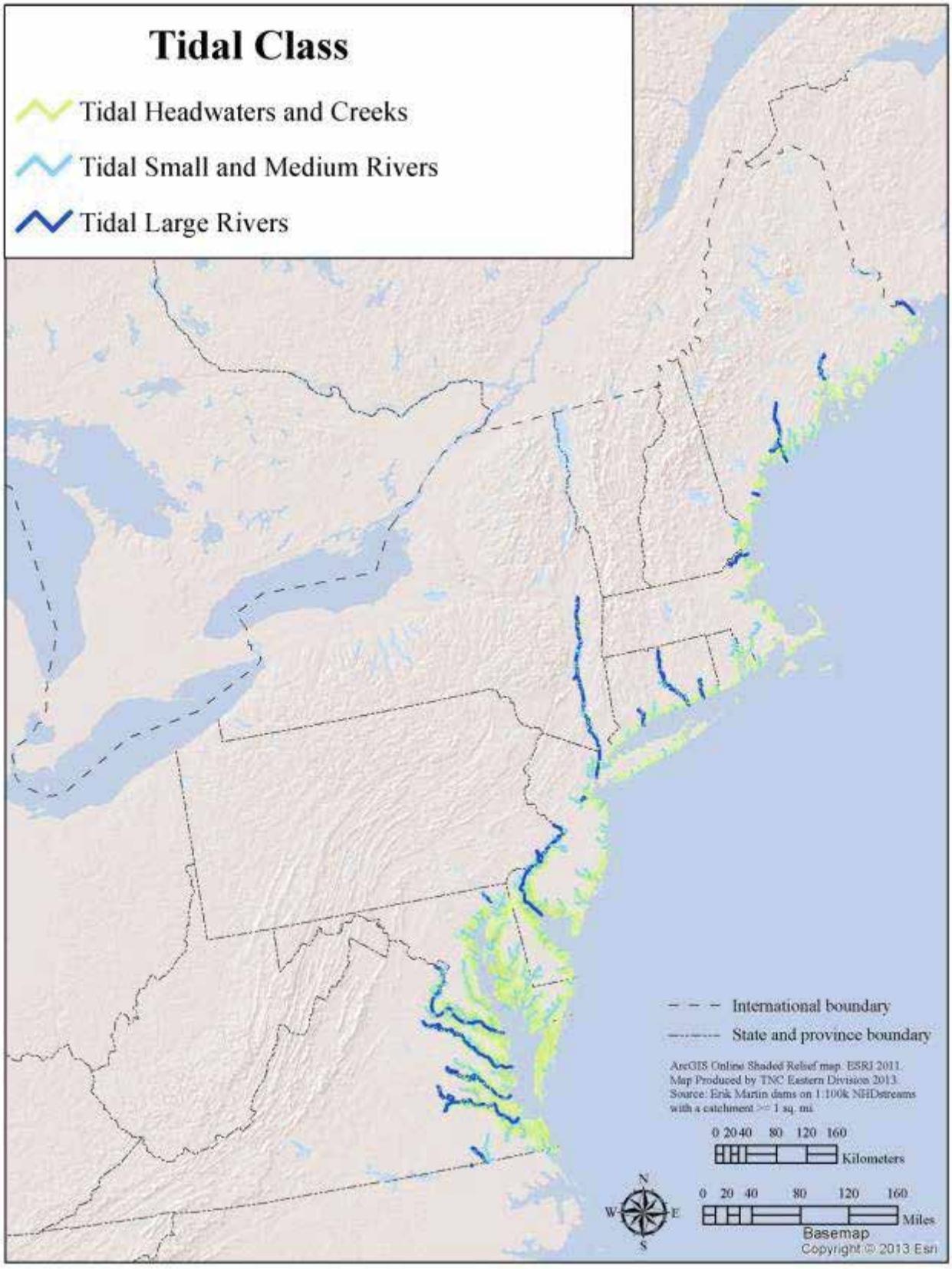
Costs:

Funds Expended Previous to this Report: $393.10
Amount of NALCC Funds Requested within this Report: $5,273.02
Total Approved Budgeted NALCC Funds: $25,252
Are you within the approved budget plan? Yes
Are you within approved budget categories? Yes

Signature:

Mark Anderson
Director of Conservation Science
The Nature Conservancy, Eastern Division

Date: April 25, 2014


Tidal Class
Tidal Headwaters and Creeks
Tidal Small and Medium Rivers
Tidal Large Rivers
International boundary
State and province boundary
ArcGIS Online Shaded Relief map. ESRI 2011.
Map Produced by TNC Eastern Division 2013.
Source: Erik Martin dams on 1:100k NHDstreams
with a catchment >= 1 sq. mi.
0 20 40 80 120 160
Kilometers
N
W
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S
0 20 40 80 120 160
Miles
Basemap
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