**Hurricane Sandy – DOI Grant**

**2015-16 Interim Performance Report**

Report period: Oct 2015 through Mar 2016

Grant Number and Title: F14AC00942 “Road Stream Crossing Assessment for Climate Resilience and Aquatic Connectivity in the Sandy-Impacted Northeast”

Organization: University of Massachusetts Amherst

Project Leaders: Scott Jackson, Benjamin Letcher, and Keith Nislow - Dept. of Environmental Conservation; Richard Palmer, Dept. of Civil and Environmental Engineering

Were planned goals/objectives achieved last quarter? Yes

Progress Achieved:

Coordination & Passage Assessment:

* Transition to Steering and Advisory Committee structure for the NAACC
* Scoring system finalized
* The database, map interface, digital data entry continue to be improved
* Progress on development of NE Aquatic Connectivity Analysis and Prioritization template web app
* Initial planning for condition assessment module
* Revised scope of work and budget in light of budget surplus

Hydrologic Risk Assessment:

* Foundation for this component is underway through a related ongoing project funded through MassDOT that is developing and applying models in the Deerfield watershed, Massachusetts.

Ecological benefits synthesis:

* Development of Interactive Catchment Explorer (ICE) module of SHEDS (Spatial Hydro Ecological Decision System), currently called the Stream Crossings Explorer.
* Occupancy and temperature model results and most watershed metrics are in ICE with coverage south through VA.

| **TASK** | **TASK DESCRIPTION** | **% DONE** | PROGRESS NARRATIVE |
| --- | --- | --- | --- |
|  | **Overall Coordination** |  |  |
| 1 | Assemble project and advisory team | 100% | * Completed previously
 |
| 2 | Develop team consensus on protocols and scoring | 100% | * Proposed protocols finalized previously
* Scoring system proposal was approved by Steering Committee
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| 3 | Coordinate with USFWS led surveys and trainings | 75% | * Met frequently with USFWS partners about the project and coordinating efforts at end of 2015 field season and in prep for 2016 season
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|  | **Passage assessment**  |  |  |
| 4 | Manage TNC subcontracts | 70% | * Managing subcontracts successfully
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| 5 | Finalize assessment protocols | 100% | * See above task 2
 |
| 6 | Provide protocols and training materials to coordinators | 85% | * Continued to support coordinators and provide updates primarily via listserv
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| 7 | Provide trainings and technical assistance to coordinators | 75% | * Trainings planned for 2016 field season
* Coordinator questions have been responded to in a timely fashion and listserv used for communications
 |
| 8 | Expand database to NJ, DE, RI, MA, MD, PA, VA | 100% | * Completed previously
 |
| 9 | Expand map interface to meet needs of coordinators | 100% | * Completed previously
 |
| 10 | Develop digital entry for field data | 100% | * Completed previously
 |
| 11 | Prioritization for field surveys (TNC) | 100% | * Completed previously
 |
| 12 | Use Critical Linkages to prioritize crossings for assessment  | 100% | * Included in the prioritization web map compiled by TNC
 |
| 13 | Use Critical Linkages to prioritize crossings for upgrade/replacement | 10% | * Data in the NAACC and UMass datasets have been scored as a first step in the Critical Linkages process
* Critical Linkages using data collected during the 2015 field season will be run in April
 |
| 14  | Incorporate culvert data into TNC NE Aquatic Connectivity Study | 40% | * Completed work to integrate dam data edits from state databases
* Integrated new natural barrier data from USGS waterfall database
* Set up data editing web map to allow steering committee, advisory committee, and other reviewers to access the data for review and editing; distributed web map editing information to reviewers
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| 15 | Prepare final report and WUI | 40% | * Developed a template Aquatic Barrier Prioritization plugin using the Coastal Resilience framework. This template will be adapted for the NAACC-revised NE Aquatic Connectivity analysis.
* Stream Crossings Explorer in development will include passability information
 |
|  | **Hydrologic risk assessment** |  |  |
| 16 | Gather hydrologic data for representative basins for selected watershed | 35% | * Assembled data on catchments with road stream crossing data to cross compare with unimpaired reference stream gages
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| 17 | Apply existing USGS StreamStats Software | 10% | * Developed arcgis model that can collect input data for RPFE (Streamstats). Tested robustness of DA scaling method and correlated method to watershed scale physical catchment properties.
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| 18 | Develop modification to StreamStats Software to incorporate changes in future climate | 5% | * Explored the use of Streamstats for the Deerfield basin, and determining best method to include climate change
* Explored the use of other regression based models rather than streamstats to estimated 2, 5, 20, 50 and 100 year flood events in which we can incorporate climate change more easily
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| 19 | Estimate impacts of climate change on 20 selected small watersheds | 10% | * Quantile-based bias correction to account for underestimating the magnitude of the larger storms from the NARCAPP climate data simulations for precipitation. Temperature is in progress.
* Will discuss if need to decrease total number of watersheds from 20 to a lower number due to the lack of hydraulic information associated with culverts in identified basins
 |
| 20 | Link to crossing dimensions data on these selected watersheds; estimate relative risk of failure of road-stream crossings and culverts under current and predicted future stream flows | 10% | * Developed a categorical method for assessing categories of low, medium, and high vulnerability of failure based on flood flows to apply to crossings.
* Method is based on AEP curves and culvert hydraulic capacities
 |
| 21 | Determine road crossing/culvert replacement standards and robust designs to withstand future flood events and provide guidance | 15% | * Reviewed the literature on road stream crossing design including HDS-5 manual (US DOT - FHWA), stream simulation method (USDS-USFS), and created a matrix of reviewed culvert hydraulic models. Also reviewed a couple commonly employed culvert hydraulic modeling software.
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| 22 | Generalize approach for region and develop support system for application.  | 10% | * Using MassDOT methodologies applied in the Deerfield River, we will employ knowledge gained in this study to work towards a general approach for region.
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| 23 | Prepare final report and web-based interface for users | 0% |  |
|  | **Ecological benefits synthesis** |  |  |
| 24 | Calculate watershed metrics | 95% | * Finalized high resolution catchments (Median area is 1.3 km2)
* Developed R package to extract DayMet data and assign summaries to high resolution catchments
* Developed R package to assign raster layer summaries to high resolution catchments
* Most watershed metrics have been summarized for high resolution catchments
* Occupancy and temperature model results and most watershed metrics are in ICE. Spatial coverage has been extended south through VA.
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| 25 | Evaluation of passability prioritization metrics | 25% | * Data from the Crossing database has been incorporated in SHEDS; waiting on completion of critical linkages
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| 26 | Link and overlay aquatic organism passage, hydrologic vulnerability, and ecological metric layers | 25% | * postGres databases have been set up to accommodate linking layers; preliminary target watersheds for overlaying AOP and ecological metric layers have been identified; waiting on confirmation by hydrology group
 |
| 27 | Design a Web User Interface | 50% | * Developing Stream Crossings Explorer; continued progress on adapting the Interactive Catchment Explorer in SHEDS to allow 'personal optimization' of culvert replacement
 |
| 28 | Design system to optimize stream crossings for removal/replacement | 25% | * Preliminary design is in place
* Met with Dan Sheldon from the Computer Science Department to discuss adapting his connectivity algorithm to the culvert module in ICE
 |
| 29 | Consult with users | 20% | * First user group demonstration scheduled. This will occur in May.
 |
| 30 | Prepare final report and web-based interface | 0% |  |

Difficulties Encountered:

* We continue to search for an appropriate platform for the digital data form and data collection process. This year we will be converting to a new platform that was not available last year but that will better meet the needs of NAACC. However, this essentially means duplicating work that had been completed last year.
* The very nature of a collaborative means that lots of people have a say in the way the NAACC is implemented. In practice this has involved many suggestions and requests related to the database and digital data collection system. Responding to those suggestions and requests has significantly increased the amount of programming time and cost for database-related development and maintenance.
* Sources of funding necessary for database hosting and maintenance beyond the startup phase for NAACC still need to be identified.

Activities Anticipated Next Quarter:

* Critical Linkages assessment
* NAACC Trainings
* Continue data processing for NE Aquatic Connectivity Project and development of web app for prioritization
* Update data field form and prep for 2016 field season
* Continue updates to database and map interface
* Substantial work on condition assessment module
* Tweak hydrologic component scope
* Continued development of the stream crossings explorer data viewer including user feedback session

Expected End Date: September 30, 2016 (In process of extending to June 2017)

Are you within the approved budget plan and categories: Yes

Signature:



Date: April 28, 2016