

Hurricane Sandy – DOI Grant 2015 Interim Performance Report

Report period: Apr 2015 through Sept 2015

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:

- Due to the close programmatic affiliation between this project component and the NALCC-funded culvert assessment project (which ended in Sept), we have progressed quickly
- Core and work group coordination continued successfully and we have started transitioning to a Steering and Advisory Committee structure for the NAACC
- The protocols have been finalized and scoring system is nearly finalized
- The database, map interface, digital data entry continue to be improved
- The prioritization for field surveys was completed

Hydrologic Risk Assessment:

- The 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:

- This component is underway through development of Interactive Catchment Explorer (ICE) module of SHEDS (Spatial Hydro Ecological Decision System), which can be viewed as it progresses at www.ecosheds.org
- Occupancy and temperature model results and most watershed metrics are now in ICE.

TASK	TASK DESCRIPTION	% DONE	PROGRESS NARRATIVE
	Overall Coordination		
1	Assemble project and advisory team	100%	<ul style="list-style-type: none"> • Completed previously

TASK	TASK DESCRIPTION	% DONE	PROGRESS NARRATIVE
2	Develop team consensus on protocols and scoring	95%	<ul style="list-style-type: none"> • Proposed protocols have been finalized • Scoring system proposal was developed by Core Team with feedback from Work Group and is currently awaiting Steering Committee approval
3	Coordinate with USFWS led surveys and trainings	50%	<ul style="list-style-type: none"> • Met frequently with USFWS partners about the project and coordinating efforts during field season
Passage assessment			
4	Manage TNC subcontracts	50%	<ul style="list-style-type: none"> • Managing subcontracts successfully
5	Finalize assessment protocols	100%	<ul style="list-style-type: none"> • See above task 2
6	Provide protocols and training materials to coordinators	75%	<ul style="list-style-type: none"> • Protocol was provided to coordinators • Online training modules were developed for coordinators and observers
7	Provide trainings and technical assistance to coordinators	50%	<ul style="list-style-type: none"> • Trainings were provided in advance of field season (April, May) • Webinar on digital data entry held in June • Coordinator questions have been responded to in a timely fashion • Coordinator listserv was established to facilitate communications
8	Expand database to NJ, DE, RI, MA, MD, PA, VA	100%	<ul style="list-style-type: none"> • Developed protocol crossing and culvert web forms, data entry validation rules and database tables • Completed implementation of validation rules and connecting the web forms to the database tables • Integrated the original UMass protocol data and the NAACC protocol data for all states in a unified website with comprehensive search,

TASK	TASK DESCRIPTION	% DONE	PROGRESS NARRATIVE
			reporting and mapping functions
9	Expand map interface to meet needs of coordinators	100%	<ul style="list-style-type: none"> Improved maps for coordinators by allowing unsurveyed crossings to be mapped for all towns, including those that have no surveyed crossings Added the ability to search by multiple data sets, watersheds and towns (Watersheds now filter by state. Lists of Survey Ids and/or Crossing Codes may now be searched and mapped)
10	Develop digital entry for field data	100%	<ul style="list-style-type: none"> Created PDF field form that can be completed in the field using tablets and other hand held devices Updated to include counties/towns from all 13 states for the protocol Successfully collected digital data during field season
11	Prioritization for field surveys (TNC)	100%	<ul style="list-style-type: none"> Revised / QC metrics based on workgroup feedback Ran final prioritization incorporating feedback from workgroup Developed & distributed custom analysis tool to workgroup & made available via NAACC website Published final prioritization web map, including individual crossings
12	Use Critical Linkages to prioritize crossings for assessment	100%	<ul style="list-style-type: none"> Included in the prioritization web map compiled by TNC
13	Use Critical Linkages to prioritize crossings for upgrade/replacement	0%	<ul style="list-style-type: none"> The first Critical Linkages run using data collected during the 2015 field season is scheduled for around the end of the year.
14	Incorporate culvert data into TNC NE Aquatic Connectivity Study	15%	<ul style="list-style-type: none"> Initiated discussions / planning for the hydrography to be used Contacted former NE Aquatic Connectivity

TASK	TASK DESCRIPTION	% DONE	PROGRESS NARRATIVE
			<p>workgroup to solicit dam data edits</p> <ul style="list-style-type: none"> • Obtained dam data from online sources (this includes data for 8 states plus the NID) • Documented tradeoffs and led team discussion around the appropriate hydrography to use for the analysis. • Reached consensus on using the medium resolution NHD for the analysis
15	Prepare final report and WUI	5%	<ul style="list-style-type: none"> • Explored potential for developing web application in JavaScript
	Hydrologic risk assessment		
16	Gather hydrologic data for representative basins for selected watershed	5%	<ul style="list-style-type: none"> • Assembled data on catchments with road stream crossing data to cross compare with unimpaired reference stream gages
17	Apply existing USGS StreamStats Software	5%	<ul style="list-style-type: none"> • 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.
18	Develop modification to StreamStats Software to incorporate changes in future climate	5%	<ul style="list-style-type: none"> • 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
19	Estimate impacts of climate change on 20 selected small watersheds	5%	<ul style="list-style-type: none"> • Determined most applicable method for bias correcting future climate data. Collaborated with climate scientist to discuss best methods

TASK	TASK DESCRIPTION	% DONE	PROGRESS NARRATIVE
			<p>in applying GCM-RCM outputs for hydrologic models. Looked at forecasted regional changes and compared historical to future data predictions</p> <ul style="list-style-type: none"> 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	5%	<ul style="list-style-type: none"> Developed a categorical method for assessing categories of low, medium, and high vulnerability of failure based on flood flows to apply to crossings.
21	Determine road crossing/culvert replacement standards and robust designs to withstand future flood events and provide guidance	10%	<ul style="list-style-type: none"> 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.
22	Generalize approach for region and develop support system for application.	5%	<ul style="list-style-type: none"> Using MassDOT methodologies applied in the Deerfield River, we will employ knowledge gained in this study to work towards a general approach for region.
23	Prepare final report and web-based interface for users	0%	
	Ecological benefits synthesis		
24	Calculate watershed metrics	90%	<ul style="list-style-type: none"> Finalized high resolution catchments (Median area is 1.3 km²) Developed an R package to extract DayMet

TASK	TASK DESCRIPTION	% DONE	PROGRESS NARRATIVE
			<p>data and assign summaries to high resolution catchments</p> <ul style="list-style-type: none"> • Developed an 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 is ME to NY. New model runs will extend range south through VA.
25	Evaluation of passability prioritization metrics	25%	<ul style="list-style-type: none"> • Data from the Crossing database has been incorporated in SHEDS
26	Link and overlay aquatic organism passage, hydrologic vulnerability, and ecological metric layers	10%	<ul style="list-style-type: none"> • postGres databases have been set up to accommodate linking layers
27	Design a Web User Interface	35%	<ul style="list-style-type: none"> • Have preliminary plan to adapt the Interactive Catchment Explorer in SHEDS to allow 'personal optimization' of culvert replacement
28	Design system to optimize stream crossings for removal/replacement	25%	<ul style="list-style-type: none"> • 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	0%	<ul style="list-style-type: none"> • This will occur after the above tasks
30	Prepare final report and web-based interface	0%	

Difficulties Encountered: None.

Activities Anticipated Next Quarter:

- Transition to Steering Committee and Advisory Committee structure
- Finalize scoring system and conduct Critical Linkages analysis
- Continue updates to database and map interface
- Determine 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 for hydrologic risk component
- Continued development of the ecological benefits synthesis as an ICE module in SHEDS

Expected End Date: September 30, 2016

Costs:

Total expenses this period: \$101,145 (\$87,382 direct)

Total life to date expenses (including this period): \$138,507 (\$119,180 direct)

Total Approved Budgeted Funds: \$574,375 (\$510,426 direct)

Are you within the approved budget plan and categories: Yes

No youth or veterans were employed using these funds.

Signature:



Date: October 30, 2015