

APPALACHIAN LANDSCAPE CONSERVATION COOPERATIVE GRANT 2012 PROGRESS REPORT

Quarter: (circle one)

2013 1st

2013 2nd

2013 3rd

2013 4th

Grant Program, Number and Title: 2012-03, Development of a hydrologic foundation and flow-ecology relationships for monitoring riverine resources in the Marcellus Shale region

Organization: New York Cooperative Fish and Wildlife Research Unit, B02 Bruckner Hall,
Cornell University, Ithaca, NY 14853

Project Leader: William L. Fisher, wlf9@cornell.edu, 607-255-2839

ALCC Need Addressed: Inventory and review of ecological flow models and monitoring networks with applicability to Appalachian watersheds

Were planned goals/objectives achieved last quarter? Yes

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

Goal 1: Determine what ecological flow models that predict both low and high flows and are in use or are applicable to the Marcellus Shale region.

Objective 1: Literature review of hydrologic models currently used within the Marcellus Shale region.

Accomplishments.—A review of recent literature describing development and application of hydrological/ecological flow models in or applicable to the Marcellus Shale region has been completed. The collected data was compiled into a database (HydroModels, ver. 4), which is attached. The database currently includes 59 models, describing the functionality, input data requirements, spatial and temporal scales, calibration needs, limitations, and particular applications of the models. The database also includes citations to the technical documentation and case study applications of each model, as well as developer contact information. The hydrological model database will be revised into a more complete and user friendly format and included as an appendix to the Year One Milestone Report on 30 June 2013.

Objective 2: Development of geo-referenced stream gage database.

Accomplishments.—We are in the process of expanding our gage database to increase regional coverage and the number of reference gages. The GAGES database (Falcone 2010) is too conservative and limited and, therefore, results in significant gaps in regional coverage. We are addressing this in several ways. First, we contacted Ryan MacManamay (Oak Ridge National Laboratory) about a gage database he has been building. His database uses both active and inactive gages, has more liberal selection criteria for reference gages that have been tested, and uses pre-impact/regulation gage records as well. This database has the potential to significantly increase the number of relevant reference gages for our project. For example, the GAGES database

identifies 129 reference gages that overlap with the Marcellus Shale region while MacManamay's database identifies 185 reference gages for the same area. Second, we have also acquired a list of reference gages used to develop USGS daily streamflow modeling tools for PA (168) and NY (94). We will compare these gages to MacManamay's gages to determine if there are any additions. Third, we are also extending the regional extent of the study area to include physiographic regions that overlap with the extent of Marcellus Shale. This should add more gage data that is representative of the regional differences within the Marcellus and provide a more robust dataset for classifications as well as future flow modeling activities.

In this quarter, we met with Arlene Olivero and Mark Anderson (The Nature Conservancy), and Ryan MacManamay (DOE, Oak Ridge National Laboratory). We are proceeding with coordination between the two APP LCC projects in terms of developing and using the same base GIS (attributed NHD Plus files) for stream classification and predictors of hydrologic classes and potentially flow models (depending on final model selection). This will integrate stream and hydrologic classification across projects, and provide potential to expand flow modeling to the entire APP LCC in future projects.

In the next quarter (2013 2nd quarter), we will finalize the reference (least-altered) gage database based on additions from the MacManamay database, and gages used in development of NY and PA daily streamflow estimator tools. We will also consider how well the final database integrates with the larger scale database being used by the AppLCC Aquatic Habitat Classification project. We will also evaluate how well the reference gage database represents stream size, gradient and temperature ranges within the region. The stream gauge database will be summarized in the Year One Milestone Report on 30 June 2013.

Objective 3: Contact and coordination with users and developers of stream flow modeling tools.

Accomplishments.—We have amassed a list of contacts for hydrological models and associated developers and users as part of the hydrological model database developed to fulfill Objective 1. In the coming months, we will determine which of the reviewed models will be most useful for our future tasks (Year Two Objectives) and make contact with the individuals/organizations who have developed and/or used those particular models. The selection of appropriate models will be described in the Year One Milestone Report on 30 June 2013.

Below is a list of several contacts we made and events we attended during the 2013, 1st quarter.

Met with Chris Gazoorian from the USGS New York Water Science Center. He is the developer of the New York Streamflow Estimator Tool. The tool is based on Stacy Archfield's model for estimating daily streamflows at ungaged sites. The tool will be available within the project timeline for NY and PA. PA's tool is already on line and NY's beta version will be available for testing in late April/early May 2013.

We attended a meeting on Aquatic Science Projects of the LCCs and Northeast Climate Science Center in Hadley, MA on 13-14 March 2013. This meeting included aquatic science projects sponsored by the North Atlantic LCC, Appalachian LCC, and Northeast Climate Science Center. Two projects focused in the North Atlantic LCC and NE Climate Science Center are using a version of the ABCD model to model stream flows and temperature for predicting brook trout occupancy. There is some overlap between currently modeled regions and our study area and this model would be a good candidate for a Marcellus Shale-wide hydrologic model. It would provide continuity between two LCC regions and the NE Climate Change Center. We need to follow up with Ben Letcher (USGS Silvio Conte Fish Center and U. of Massachusetts, Amherst) and Austin Polebitzki (U. of Wisconsin, Platteville).

Objective 4: Development of geo-referenced stream biological database for the Marcellus Shale region.

Accomplishments.—We have acquired primarily fish data from several databases and agencies for the 4 state region. We are using the MARIS database format and will update the existing MARIS database with data from additional years, states (Ohio) and agencies (USGS).

State	Source	Taxa	Years
NY	MARIS	Fish	1976-2007
NY	NY DEC	Fish	2007-2013
PA	MARIS	Fish	1976-2007
PA	Fish and Boat Comm.	Fish	*working on 2007+
WV	MARIS	Fish	1997-2010
OH	Ohio EPA	Fish	1977-2012
OH	Ohio EPA	Macroinvertebrates	1974-2012
NY,PA, WV, OH*	USGS NAWQUA	Fish	1993-2012
NY,PA, WV, OH*	USGS NAWQUA	Macroinvertebrates	1993-2012

*Covers Northeastern Highlands, Northern Allegheny Plateau, Erie Drift Plain, North Central Appalachians, Ridge and Valley, Central Appalachians, Western Allegheny Plateau Ecoregions

We are working on acquiring macroinvertebrate data from NY, WVA and PA.

The complete list of organizations to our biological database will be summarized in the Year One Milestone Report on 30 June 2013.

Difficulties Encountered: None.

Activities Anticipated Next Quarter:

Objective 1: Literature review of hydrologic models currently used within the Marcellus Shale region.

The hydrological model database will be completed and included as an appendix to the Year One Milestone Report on 30 June 2013.

Objective 2: Development of geo-referenced stream gage database.

The stream gage database will be summarized in the Year One Milestone Report and provided in on 30 June 2013.

Objective 3: Contact and coordinate with users and developers of stream flow modeling tools.

The selection of appropriate models will be described in the Year One Milestone Report on 30 June 2013.

Objective 4: Development of geo-referenced stream biological database for the Marcellus Shale region.

The complete list of organizations to our biological database will be summarized in the Year One Milestone Report on 30 June 2013.

Expected End Date: 30 June 2014

Costs:

Funds Expended Previous to this Report: \$20,293

Amount of ALCC Funds Requested within this Report: \$15,888

Total Approved Budgeted ALCC Funds: \$153,206

Are you within the approved budget plan? Yes

Are you within approved budget categories? Yes

Signature: William L. Fisher

Date: 4/15/2013