APPALACHIAN LANDSCAPE CONSERVATION COOPERATIVE GRANT 2012 PROGRESS REPORT

Quarter: (circle one)   2012 1st 2012 2nd 2012 3rd 2012 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 is underway. The collected data is being compiled into a database, which currently includes more than 50 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. Per the suggestions from the Technical Comments, the model database will be annotated with respect to the relevance of each model to the project.

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.

Through conversations with Ryan MacManamay and Arlene Olivero (The Nature Conservancy), it has become clear that there is considerable overlap between the stream classification portion of this project and a larger scale stream classification project (http://applcc.org/projects/aquatic-habitat-classification) also supported by the Appalachian LCC. Both project teams are hoping to capitalize on this overlap in several ways. First, we plan to integrate data and classification methodologies of the two projects so the results of classifications developed at different scales (Marcellus, Marcellus Physiographic Regions, App LCC, larger extents) can be evaluated based on their ability to explain variation in biological attributes, hydrologic sensitivity, or be modeled with NHD reach attributes. Second, standardizing data across the two projects may allow for Marcellus-specific stream classes or modeled data to be added to the larger scale stream classification final products (for Marcellus streams only). We plan to conduct a conference call in mid-January to explore this more and establish an official collaborative effort.

In the next quarter (2013 1st 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.

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

Accomplishments.—We have initiated communication with various individuals/agencies that monitor and compile stream biological data in the Pennsylvania and West Virginia portions of the Marcellus Shale region, to build upon our New York State fish information.

Name	Organization
Cara Campbell	Research Fish Biologist, U.S. Geological Society, Leetown Science Center, Northern Appalachian Research Laboratory
John Arway	Executive Director, Pennsylvania Fish and Boat Commission
Leroy Young	Pennsylvania Fish and Boat Commission
Rod Kime	Pennsylvania Department of Environmental Preservation
Nevin Welte	Western Pennsylvania Conservancy
Tyler Wagner	Assistant Unit Leader-Fisheries of the Pennsylvania Cooperative Fish and Wildlife Research Unit

Dan Cincotta	West Virginia Department of Natural Resources
Scott Morrison	West Virginia Department of Natural Resources
Brian Carr	West Virginia Department of Environmental Preservation
John Wirts	West Virginia Department of Environmental Preservation
Terry Messing	United States Geological Survey – West Virginia
Andy Loftus	Andrew Loftus Consulting and MARIS fish database developer
Stuart Welsh	Assistant Unit Leader-Fisheries, of the West Virginia Cooperative Fish and Wildlife Research Unit
Ruth Thornton	The Nature Conservancy – West Virginia
Lou Reynolds	Environmental Protection Agency
Sam Dinkins	ORSANCO

In the coming quarter (2013 1st quarter), we intend to add data from the above listed organizations to our biological database, which 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 revised into a more complete and user friendly format and included as an appendix to the Year One Milestone Report on 30 June 2013. Per the suggestions from the Technical Comments, the model database will be annotated with respect to the relevance of each model to the project.

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

In the next 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 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 and provided in on 30 June 2013.

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

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.

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

In the coming months we plan to be able to add data from the above mentioned agencies to our biological database, which will be summarized in the Year One Milestone Report on 30 June 2013.

Expected End Date: 30 June 2014

<u>Costs</u>:

Funds Expended Previous to this Report: $11,518

Amount of ALCC Funds Requested within this Report: $8,778.36

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: 1/16/2013