NORTHEAST REGIONAL CONSERVATION NEEDS GRANT
2015 PROGRESS REPORT

Quarter: (circle one) 2015 1st 2015 2nd **2015 3rd** 2015 4th

Grant Program, Number and Title: RCN Grant 2012-02: **The conservation status of the brook floater mussel, *Alasmidonta varicosa,* in the Northeastern United States: trends in distribution, occurrence, and condition of populations**

Organization: Saint Anselm College

Project Leader: Barry J. Wicklow, Ph.D.

Abstract: Please provide a short (1-2 paragraphs) abstract that addresses EACH of the following: the objectives of your project, accomplishments to date, future plans and timelines with an estimate for when the project will be completed.

Objectives of our RCN proposal:

a. Gather and review all available occurrence data for each of 12 northeast states.
b. Build a comprehensive dataset that includes biological, habitat, and spatial parameters.
c. Map the spatial distribution of brook floaters using GIS.
d. Using GIS, analyze both natural features and anthropogenic modifications within watersheds where brook floater occur to further identify critical habitat and threats.
e. Analyze temporal trends using all available long-term datasets.

We are updating our EO dataset with new survey information from Maine, MA, and PA. In addition, we continue to make progress writing our summaries of *A. varicosa* occurrence, condition and conservation status by state. Our analysis of our Qualtrics survey questions ranking threats show that altered hydrology due to dams, habitat fragmentation due to dams or other inhospitable impacts, loss of forested riparian buffers and agricultural runoff of nutrients or toxins all had the highest mean scores for spatial extent and severity of threat. The threat from urbanization and development also had a high mean score for severity; threats of increased flood events and residual sediment contamination scored slightly lower. Most threats had high scores for immediacy but low scores for certainty. The highest mean scores for certainty were for threats of altered hydrology due to dams, habitat fragmentation due to dams or other inhospitable impacts, loss of forested riparian buffers, agricultural runoff of nutrients or toxins, urbanization and development and bridge and road construction. The highest four mean scores for reversibility (between reversibility difficult and irreversible) were: increased flood events, impacts from invasive animals, drought-induced mortality and residual sediment contamination.

Our future plans include: (1) Continue writing summaries of *A. varicosa* occurrence, condition and conservation status by state. (2) Perform a final quality check of the *location* of EO data, especially as it relates to the location of adjacent waterways from the official NHD dataset. Use our matched EO-waterway data to continue preparations for modeling and to redo summaries of environmental data within the 1km buffer rather than the entire HUC12 watershed. Such summaries include (a) environmental data we have gathered so far, which will be linked to EO locations and summarized within our new model units in preparation for modeling (b) summarize the percentage of impervious surfaces vs. forested land within various 1km buffer upstream of EOs. (3) Continue to develop habitat condition models at the population, and potentially at the HUC12 scales. (4) Report model results and use the model to describe how land use and other predictors of condition relate to habitat health. (5) Include, in our project report, recommendations for priority conservation populations, high-risk populations, and potential areas for restoration.

Were planned goals/objectives achieved last quarter? We have made progress on goals a, c and d.

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

As part of our effort to close data gaps for A. varicosa, we have made progress toward objectives a, c, and d from the RCN proposal:

a. Gather and review all available occurrence data for each of 12 northeast states.
c. Map the spatial distribution of brook floaters using GIS.
d. Using GIS, analyze both natural features and anthropogenic modifications within watersheds where brook floater occur to further identify critical habitat and threats.

We are updating our EO dataset with new survey information. For example: (1) ME surveys were completed last summer, (2) in MA an extensive search and removal of *A. varicosa* in the Nissitissit River was conducted prior the removal of the Millie Turner Dam last September and (3) PA we received recent survey information from PA Natural Heritage Program (objective a). We will add new EO data to the final distribution maps for each state as well as the range wide distribution map (objective c).

In addition, we continue to make progress writing our summaries of *A. varicosa* occurrence, condition and conservation status by state.

We have analyzed our survey questions sent to mussel biologists from Maine to Georgia. This survey was designed to help evaluate the conservation status of *A. varicosa* throughout its distribution range and included: (1) Seventy questions that rank threats to populations: a) spatial extent, b) severity c) immediacy, d) certainty, e) reversibility); (2) The name and location of streams where water quality and habitat have improved enough to consider reintroduction or augmentation of brook floater populations; (3) The name and location of conservation priority sites due to healthy *A. varicosa* populations; (4) The name and location of conservation priority sites due to immediate threat to *A. varicosa* populations; (5) The most important research/management priorities aimed at preventing the decline of *A. varicosa* populations.

Our analysis of questions ranking threats show that altered hydrology due to dams, habitat fragmentation due to dams or other inhospitable impacts, loss of forested riparian buffers and agricultural runoff of nutrients or toxins all had the highest mean scores for spatial extent and severity of threat. The threat from urbanization and development also had a high mean score for severity; threats of increased flood events and residual sediment contamination scored slightly lower. Most threats had high scores for immediacy but low scores for certainty. The highest mean scores for certainty were for threats of altered hydrology due to dams, habitat fragmentation due to dams or other inhospitable impacts, loss of forested riparian buffers, agricultural runoff of nutrients or toxins, urbanization and development and bridge and road construction. The highest four mean scores for reversibility (between reversibility difficult and irreversible) were: increased flood events, impacts from invasive animals, drought-induced mortality and residual sediment contamination.

We intend to use these survey results and our modeling results to compare significant threats to populations by geographic area, recommend high priority conservation areas, locate high risk populations and identify streams for potential restoration and augmentation (objectives a, b, and c).

Difficulties Encountered: None.

Activities Anticipated Next Quarter:

Given the recent arrival of the new EO data and Qualtrics survey results, we are now in a position to continue progress with the following activities:

1. Continue to write summaries of *A. varicosa* occurrence, condition and conservation status by state.

2. Perform a final quality check of the location of EO data, especially as it relates to the location of adjacent waterways from the official NHD dataset. We will use our matched EO-waterway data to continue preparations for modeling and to redo summaries of environmental data within the 1km buffer. Such summaries include
   a. environmental data we have gathered so far, which will be linked to EO locations and summarized in preparation for modeling.
   b. impervious surfaces vs. forested land within 1km buffer upstream of EOs.

3. Continue to develop habitat condition models at the population, and potentially at the HUC12 scales.

4. Report model results and use the model to describe how land use and other predictors of condition relate to habitat health.

5. Include recommendations for priority conservation populations, high-risk populations, and potential areas for restoration and augmentation.

Expected End Date: December 2015

Costs:

Total life to date expenses (include this quarter): $72,003.28

Total Approved Budgeted Funds: $72,940.00

Are you within the approved budget plan and categories? Yes

Signature:

Date:

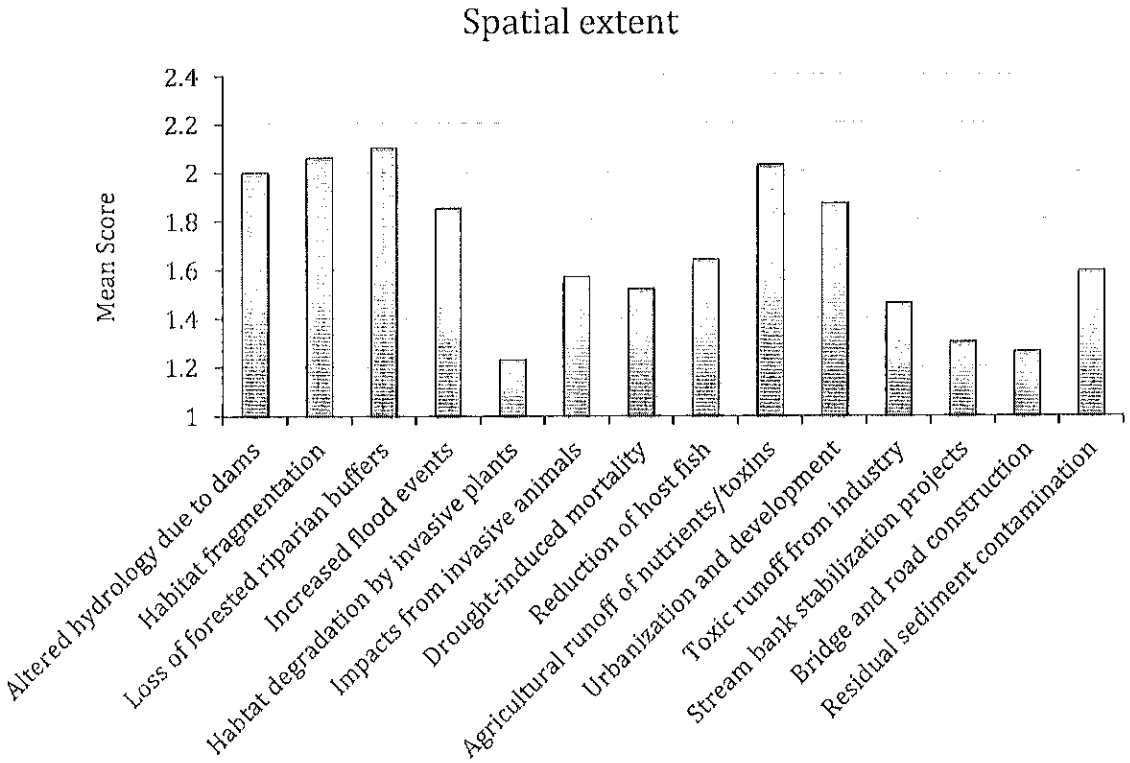

Figure 1. Mean scores for spatial extent of threat (% of the habitat/population negatively affected by the threat). Scores: 1 = localized (<10%); 2 = dispersed/patch (10-50%); 3 = pervasive (>50%).

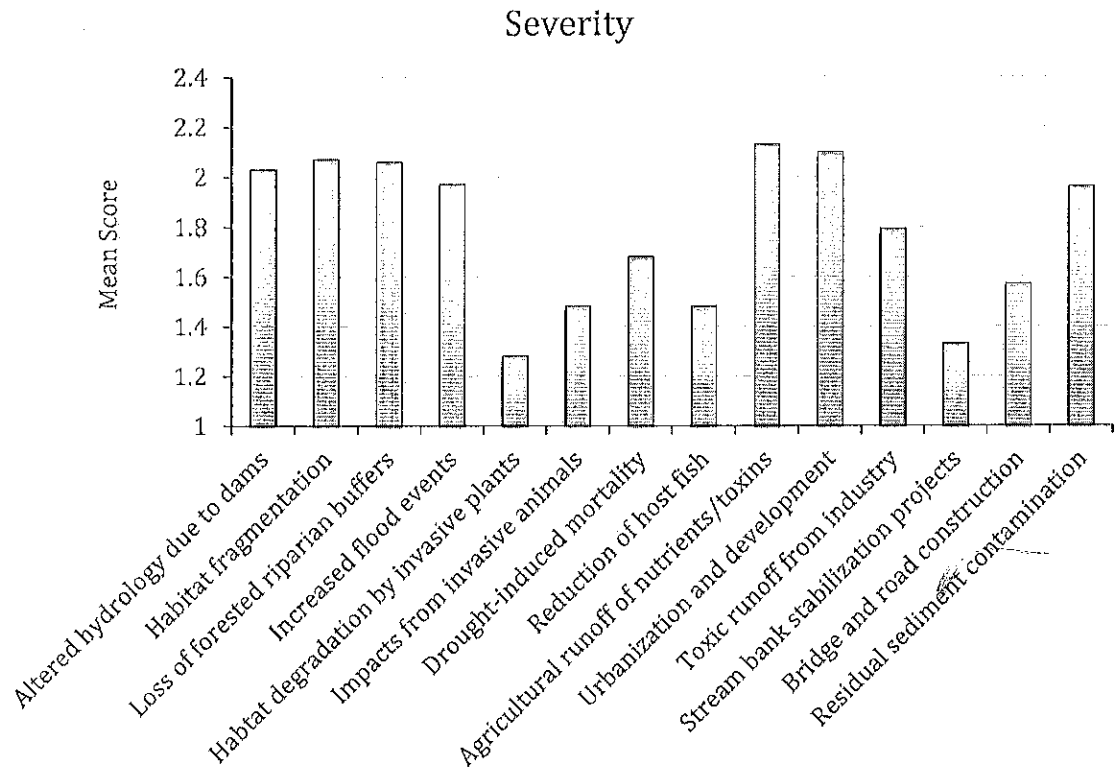

Figure 2. Mean scores for severity of threat (intensity of threat impacting exposed target under spatial extent). Scores: 1 = slight/minor; 2 = moderate/substantial; 3 = severe.

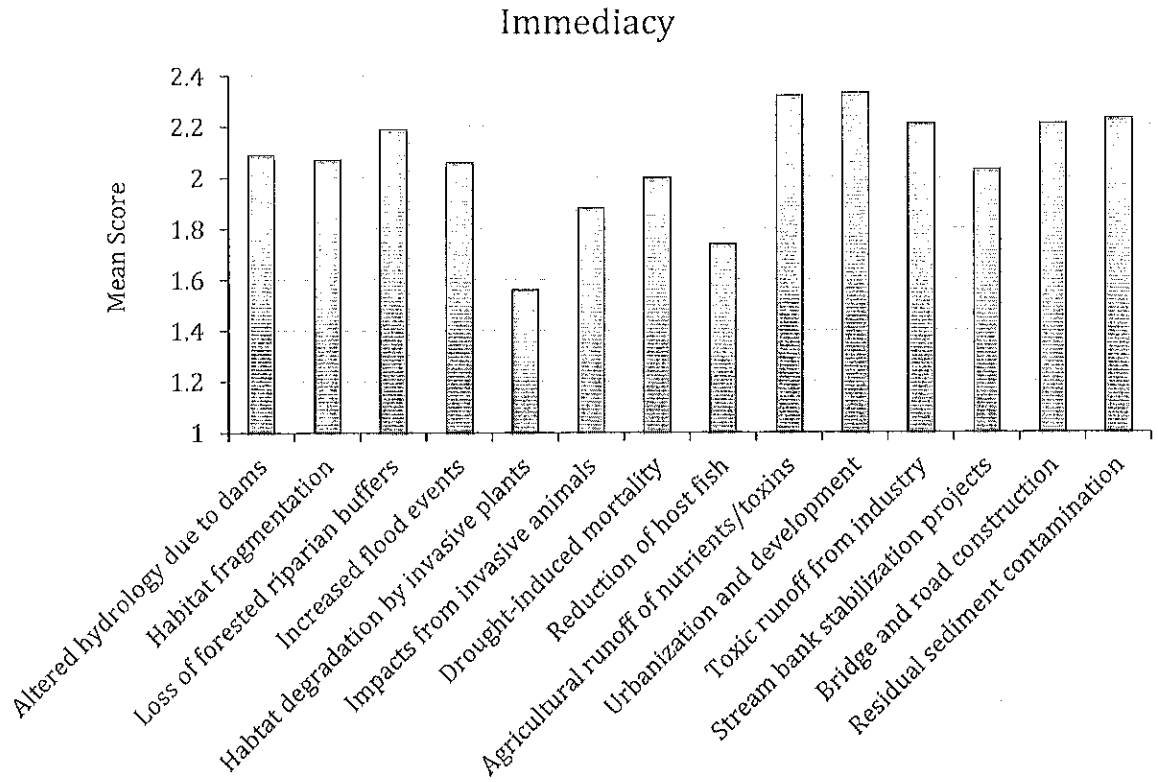

Figure 3. Mean scores for immediacy of threat (the time scale over which the impacts will be observable). Scores: 1 = long-term (10-100 years); 2 = near-term (1-10 years); 3 = immediate.

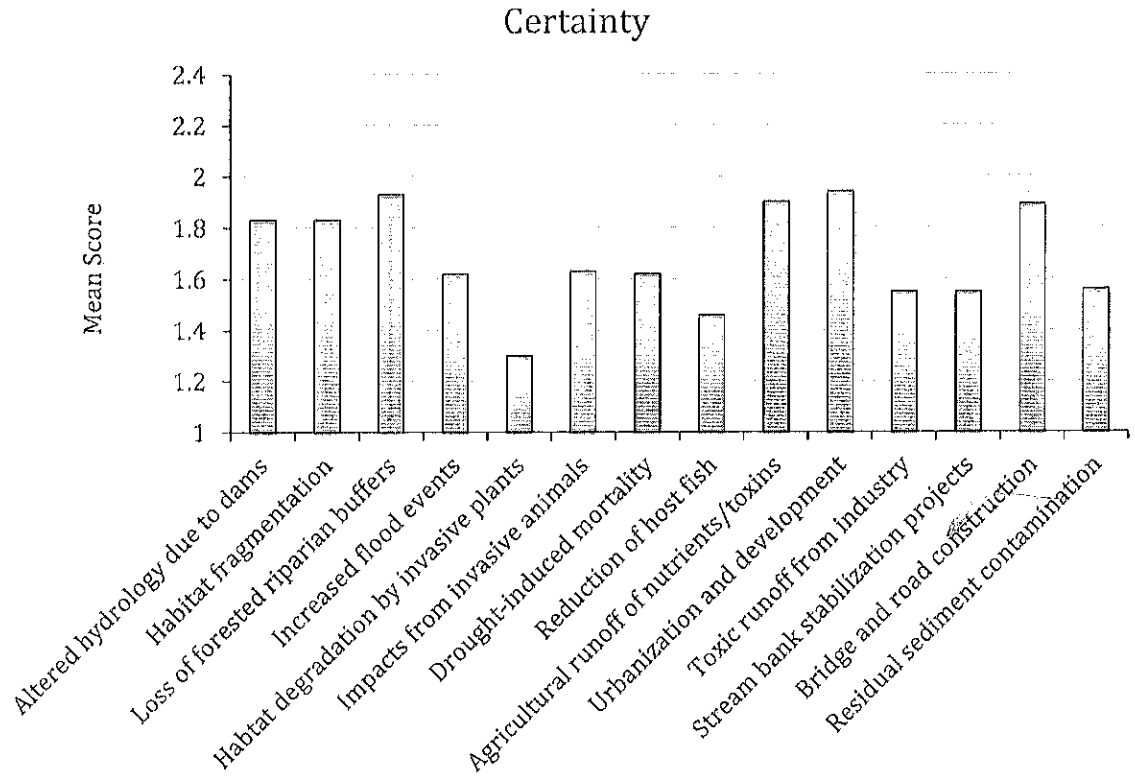

Figure 4. Mean scores for certainty of threat (amount of information/understanding of threat and response). Scores: 1 = low; 2 = moderate; 3 = high.

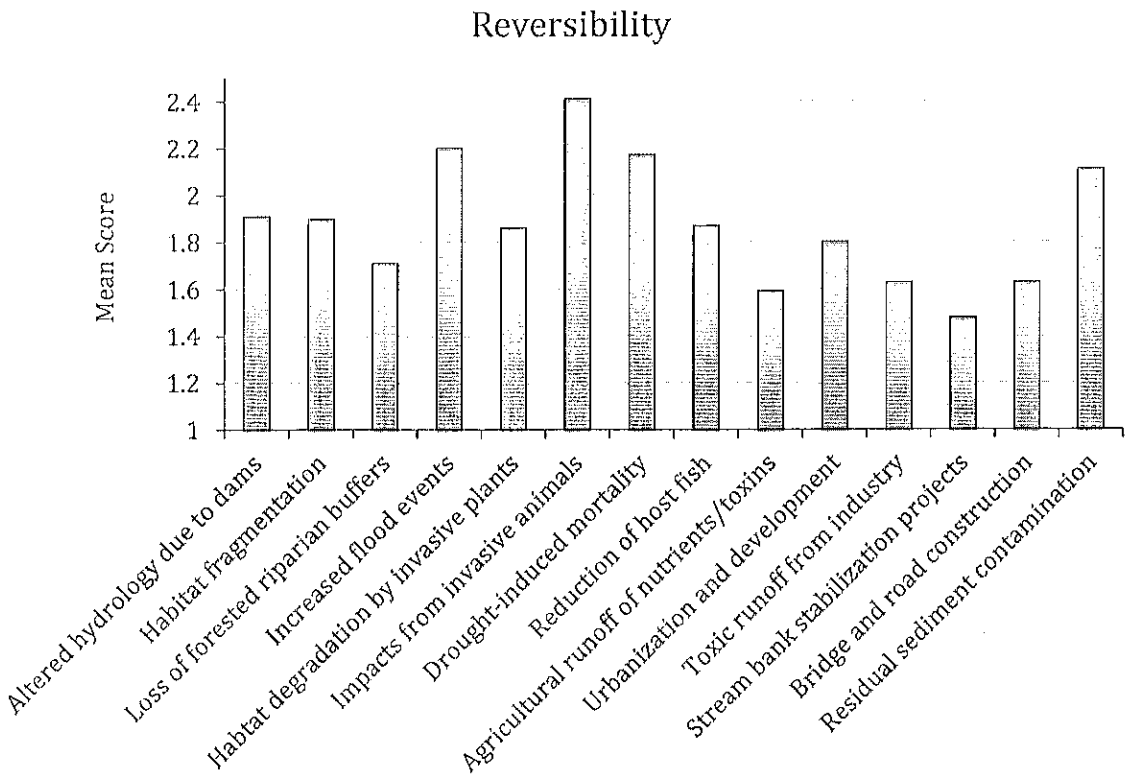

Figure 5. Mean scores for reversibility of threats (the likelihood of reversing the impact within 10 years). Scores: 1 = reversible; 2 = reversibility difficult; 3 = irreversible.