

Closing Report

Faculty Research Grant Proposal- Biochemical Fitness of Overwintering Sea Bass

Submitted by Dr. Peter G. Bushnell, Department of Biological Sciences

Project objectives:

The primary objectives of the summer 2004 research investigations was to study the bioenergetic and physiological implications of migration and overwintering in sea bass by examining energy stores, growth rates, and enzyme profiles of red and white muscle in pre and post migration juvenile fish. The specific objectives include:

- 1) quantifying onboard energy stores
- 2) assessing aerobic metabolic capacity
- 3) assessing anaerobic metabolic capacity
- 4) assessing growth rates

While I requested \$8000 only \$3000 was granted and was used to partially offset living and research expenses. I was very pleased that a SMART grant was awarded to Becca Siefert to accompany me and aid in the research effort.

Project Outcome:

Not the same as the objectives, but close. Due to a lack of success getting the VIMS CMER project funded, we did not have access to sea bass. We therefore opted to look at the effects of starvation on croaker, a commonly available species near the lab. The study was pared down to measuring exercise performance in two groups (fed and starved), take tissue samples, and then analyze them for aerobic and anaerobic enzyme activity. Since we had a number of studies going on simultaneously (blood dissociation curves of sandbar sharks; blood dissociation of bluefin tuna; capturing and maintaining bluefin tuna successfully in the lab; physiological responses of sandbar sharks to different salt water concentrations) we assigned each of the students present to be in charge of one project. Becca Siefert was in charge of this study and was in charge of maintaining the animals, measuring their exercise performance and taking the tissue samples for later analysis. Initially she worked very closely with me as I showed her how to set up the equipment, run the experiments and take the samples. Once I was confident she knew what she was doing, I let her take over more and more of the responsibility.

All in all things worked out pretty well. While we learned a little too late that one of the procedures we were using was not going to work (so what else is new?), the rest of the work we did was fairly successful. Rebecca presented the data at an Undergraduate Research Conference in Chicago and it was well received. She is also going to present at the National Conference on Undergraduate Research in Virginia.

As of this writing the enzyme analysis had yet to be conducted. Samples are stored in the

freezer awaiting a block of time when we can do them.

Like most things in research, some of the other studies went well and others did not. The blood dissociation studies on the sandbar sharks was successfully concluded and we hope to write an manuscript on it this summer. The capture and maintenance of bluefin tuna was a colossal failure. While we were able to capture them and bring them back to the lab, none survived more than four days in captivity. Necropsy reports indicated they were succumbing to a skin pathogen which destroyed their skin. We are currently trying to figure out what to do different and whether we should try again. On the positive side, we were able to get blood samples from the dying tuna and were able to complete four blood curves on them. This is the first time this has ever been done and we are trying to decide whether our “first ever” data on stressed animals is better than nothing and should be published.

Results of this summer's worked formed the basis of a presentation at an undergraduate research conference at Argonne National Laboratories and, with a bit more analysis, will be presented in a slightly different version at the NCUR meeting in Virginia this Spring. Depending on the presence or absence of bluefin tuna this summer we will either finish of the tuna blood studies or publish the data we have.