

## **Preliminary Report**

### **Objectives:**

- To determine the genetic variability within *Oreochromis niloticus* populations in different drainage basins in Ghana – Partially achieved

This objective is about 50% completed. We successfully collected Nile tilapia *Oreochromis niloticus* samples from seven new sites representing four major rivers (Pra, Ankobra, Tano and Black Volta). Together with samples obtained in 2015 from the Afram River, White Volta River, and Oti River, this project will provide comprehensive information about the genetic diversity of *O. niloticus* in Ghana and help us identify populations requiring management and conservation actions.

- To assess the effect of aquaculture on the genetic diversity of natural populations of *O. niloticus* in Ghana – Partially achieved

This objective is about 80% completed. We obtained *O. niloticus* samples from five major farms and hatcheries operating on the Volta Lake. We also collected fish samples from two sites on the Volta River downstream of the aquaculture facilities. Using phylogenetic analysis, we found that at least one farm was growing the genetically improved farmed tilapia (GIFT) strain of *O. niloticus* in 2017. We also found strong signals of the GIFT strains in the wild samples from the Volta River, suggesting a possible escape of the GIFT into the wild. Ongoing analysis using microsatellite DNA data should provide information about the level of mixing of the GIFT with wild populations of *O. niloticus*, and help with future identification and preservation of “pure” local populations.

### **Difficulties:**

As part of our sampling protocol, we anticipated the need to purchase fish samples from distribution centres of known farms in case fish farmers were reluctant to provide samples. We did not expect any challenges with sample collection at the distribution centres since we only needed fish fin-clips, which were usually discarded by fish processors at distribution centres. However, we faced significant resistance in our quest to obtain fish samples. Explaining the research objectives created suspicions and sometimes outright refusal to provide samples. We therefore resorted to purchasing fish as regular customers but ended up with several crates of whole fish because we needed defensible sample sizes.

### **Outcomes:**

Data analysis for this project is still ongoing and we should be able to fully describe the project outcomes after the project is completed. However, one important outcome worth mentioning is that we produced a report detailing our preliminary findings that the GIFT strains of *O. niloticus* were being farmed in Ghana. A copy of the report was submitted to the Fisheries Commission of Ghana and other stakeholders in February 2018.

### **Involvement:**

Local communities contributed significantly to the successful completion of the project's field sampling. We are deeply indebted to all the fishers and boat

operators who willingly worked with us. Some fishers went over and beyond our expectation. They conducted sampling in our absence, sent us photos to confirm the species, commenced fishing, and kept fish alive ahead of our visits.

We also received immense support from local contacts such as chiefs, opinion leaders and local volunteers including a fish farmer in Elubo (Western Region), who readily provided samples from his farm, helped obtain samples from another farmer, and worked with local fishers to provide wild samples. The locals served in many capacities and can truly be described as "citizen scientists."

Even though the locals who assisted us received monetary compensation, it is my opinion that the true benefit these individuals and their communities received was the knowledge and empowerment they gained regarding the conservation of important fish resources. Overall, we interacted with nearly 50 individuals in the various communities, excluding all the fish traders and marketers we encountered.

### **Sharing & Promotion:**

- In addition to sharing our preliminary results with the Fisheries Commission of Ghana, we have also shared our research findings at two scientific meetings. The first presentation entitled "The potential effect of aquaculture on the genetic purity of natural populations of Nile tilapia *Oreochromis niloticus* population in Ghana" was given at the World Aquaculture Society Conference in Las Vegas, Nevada in February 2018.
- The second presentation entitled "The effect of aquaculture on the genetic purity of natural populations of Nile tilapia *Oreochromis niloticus* population in Ghana" was given at the Interfaces of Global Change Graduate Research Symposium in Virginia Tech in April 2018.
- I also am looking forward to sharing the research findings at the stakeholder workshop scheduled at the end of the project.
- Finally, results from this project, which will form a significant part of my dissertation, will be published in peer-reviewed journals.

I used the Rufford Foundation logo in all conference presentations to acknowledge the generous support from the Rufford Foundation. We acknowledged the Rufford Foundation's support in the tilapia genetics report submitted to the Fisheries Commission of Ghana. The Rufford Foundation also received publicity when my research was featured in Virginia Tech News in October 2017.

Through this project I have received several recognitions including receiving AquaFish/USAS Chapter Best Student Abstract Award in Las Vegas earlier this year.

### **Timescale:**

Most of the Rufford Foundation grant was used within the first 4 months of the project from May 19th to August 31st 2017. This period covered the field sampling and DNA extraction phases of the project. The project was anticipated to be completed within 12 months. However, due to logistical constraints, the laboratory work was

extended by four months and new expected completion date is September 30th 2018.

### **Plans & Future:**

This project will provide the foundation for future research. Upon completion of the project we will be able to clearly define new objectives and seek additional funds to conduct follow-up studies.

Upon completion of the project, we will provide a list of the important next steps.

### **My Team:**

My team consisted of my dissertation research advisors, **Drs. Emmanuel A. Frimpong** and **Eric Hallerman**, who are co-supervisors of this project. Both Drs. Frimpong and Hallerman were involved in the conceptualization of the project, supervised the field work, and are currently overseeing data analysis and report writing.

My core field crew consisted of three dynamic individuals with fisheries and aquaculture postgraduate training, who have assisted me in varying capacities on past projects. **Nathaniel G. Adjei** was instrumental in establishing the local contacts in Kantu and Talewona (Upper West Region) and assisted sample collection and packaging.

**Abigail E. Tarchie** and **Anthony Aliebe** assisted with sample collection and packaging in the Elubo and Half-Assini (Western Region). Both Abigail and Tony worked as local language translators since they are natives of the region. Tony also assisted with English/French translation for fishers, who worked at the border between Ghana and Ivory Coast. Abigail and Tony also assisted with fish sampling when both Nathaniel and I travelled to South Africa to make presentations at the World Aquaculture Society Conference from June 26 – 30, 2017.

**Clay Ferguson**, an undergraduate student in the Department of Fish and Wildlife Conservation (recently graduated) assisted me with DNA extraction at Virginia Tech.

### **Comments:**

The conservation awareness created through this project, though on a small scale, is the beginning of a long-term community involvement and partnership to help protect fish resources from unsustainable human activities.