Life History Traits of Nile Perch and Nile Tilapia in the Upper Victoria Nile, Uganda

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INTRODUCTION

- **The Upper Victoria Nile (UVN)** is a biodiversity hotspot that supports small-scale fisheries and freshwater biodiversity conservation in Uganda.
- **Challenge:** Stock depletion due to extensive habitat modification from damming, pollution, and over-exploitation.
- **Knowledge Gap:** Sustainable management is constrained by limited knowledge of life history traits of Nile perch and Nile tilapia in the UVN.

STUDY AREA

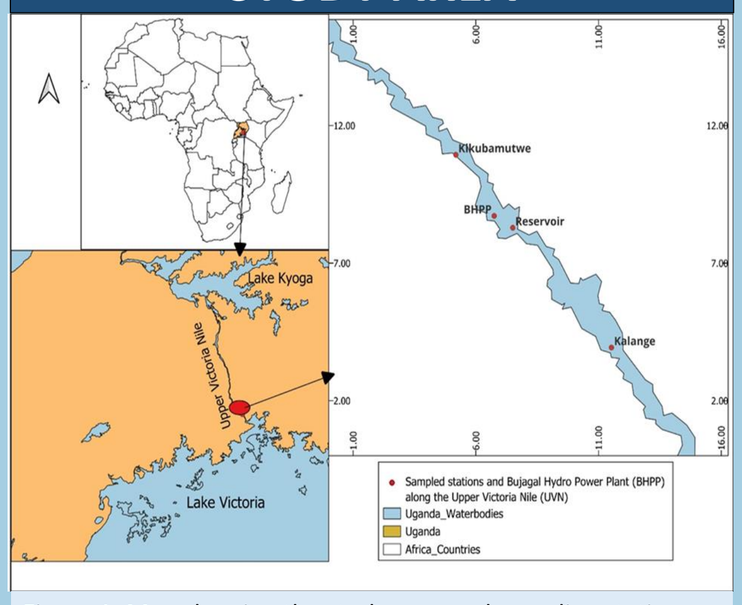

Figure 1: Map showing the study area and sampling stations: Kalange, Reservoir, Kikubamutwe, and BHPP.

STUDY SPECIES

Nile perch (*Lates niloticus*)

Nile tilapia (*Oreochromis niloticus)*

OBJECTIVES

General objective

- To investigate spatial and temporal variation in selected life history traits of Nile perch and Nile tilapia, and to evaluate the sampling strategy for assessing their populations.

MATERIALS & METHODS

Data

- Biological data collected during routine monitoring surveys from 2009 to 2025 by NaFIRRI to assess impacts of the Bujjagali Hydro Power Plant (BHPP) in the UVN.

Sampling

- Conducted at Kalange (upstream of BHPP), the BHPP Reservoir, and Kikubamutwe (downstream of BHPP) using standard multi-filament, multi-mesh gillnets (0.5–8 inches).

Analysis

- Length at first maturity (L50): GLM (binomial + logit); GLMM for variability testing
- Length-Weight Relationship (LWR): Le Cren (1951) method; comparison via ANCOVA
- Gillnet mesh size-selectivity: Millar (1997) SELECT

RESULTS

Nile perch (*Lates niloticus*)

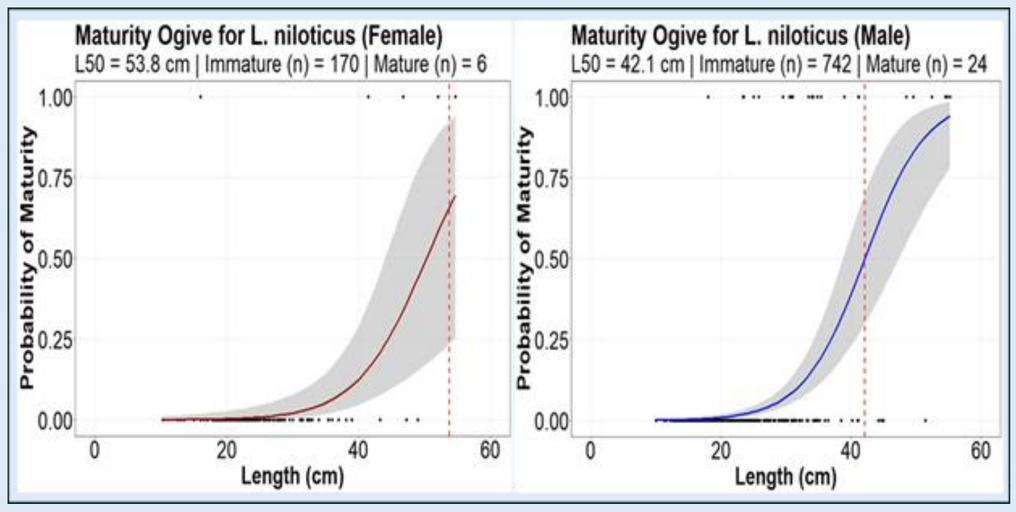

Figure 2: Maturity ogives for both female and male *Lates niloticus* sampled.

L50: Sexual dimorphism — females mature at a larger size than males. Wide CI due to low number of mature fish captured. No spatial/temporal variability detected. **LWR:** Negative allometric growth. Significant spatial and temporal variability.

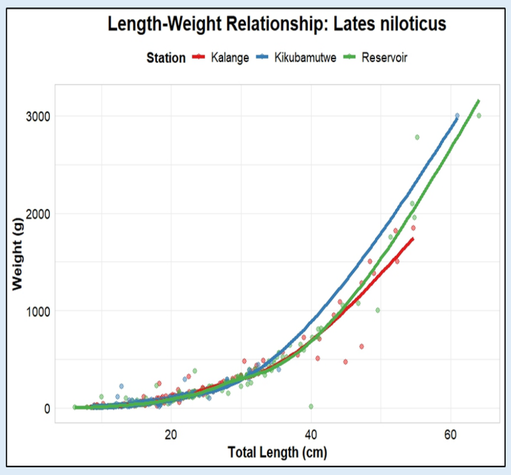

Figure 3: LWR curves for *L. niloticus.*

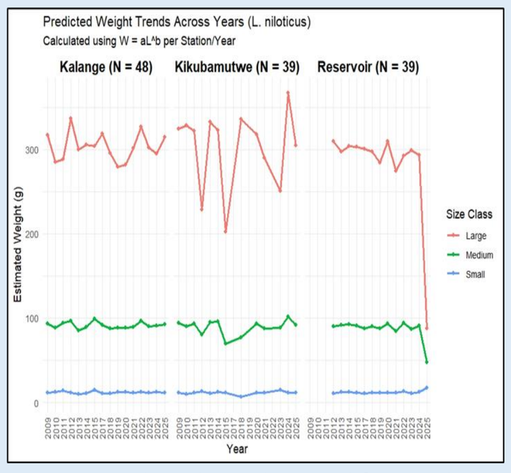

Figure 4: Predicted weight trend for *L. niloticus.*

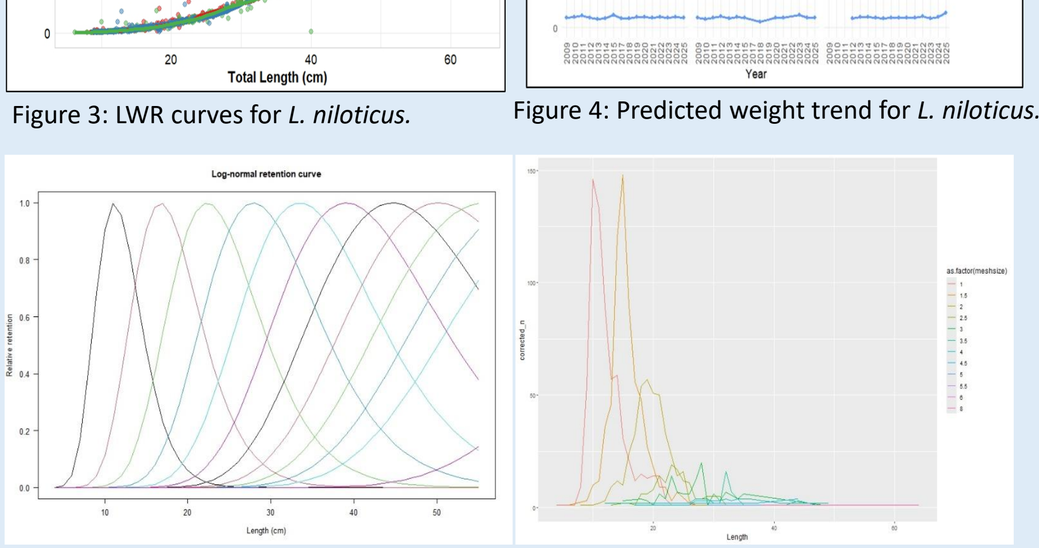

Figure 5: Gillnet selectivity curves for *Lates niloticus* sampled.

Nile tilapia (*Oreochromis niloticus*)

L50: Males mature at a slightly larger size than females. No spatial/temporal variability.

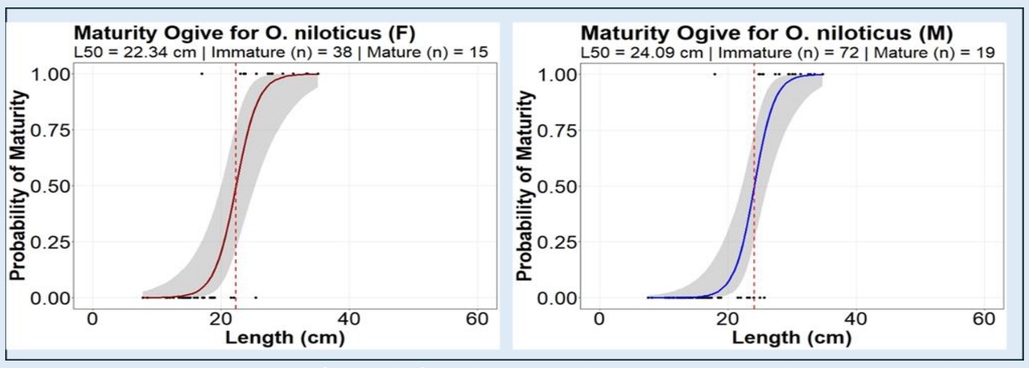

Figure 6: Maturity ogives for both female and male *Oreochromis niloticus* sampled.

LWR: Positive allometric growth, with no significant spatial variation but significant temporal variation.

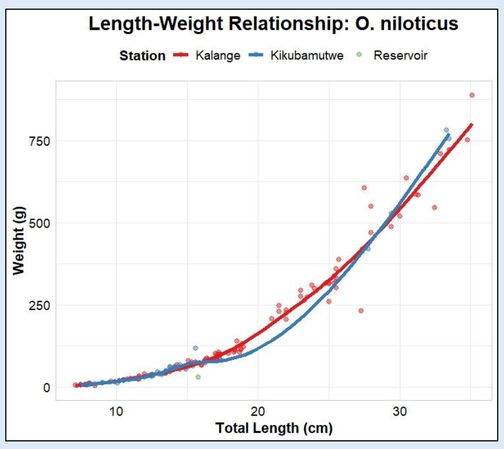

Figure 7: LWR curves for *O. niloticus.*

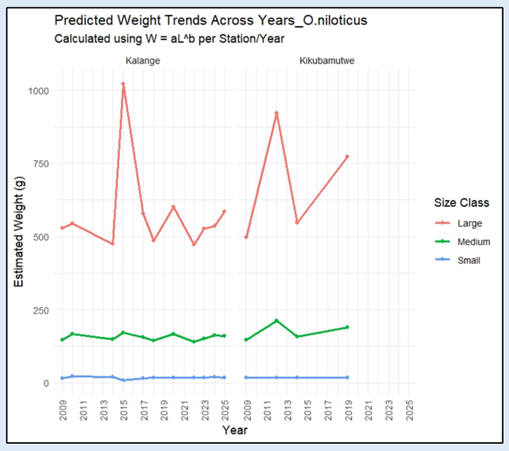

Figure 8: Trend of predicted weight *O. niloticus.*

CONCLUSION

Lates niloticus

L50

- Population dominated by immature fish (**98% of sampled fish**) and likely nursery area for the species.
- No significant spatial and temporal variations but estimates uncertain because of wide confidence intervals due to the capture of very few mature individuals.

LWR

- Negative allometric growth (LWR) with significant variation across stations and years.
- Fluctuations highly pronounced at the downstream site (Kikubamutwe).

Oreochromis niloticus

L50

- Positive allometric growth associated with no significant spatial variations but significant temporal variations.
- Sexual dimorphism with males maturing at a slightly larger size.

Sampling strategy evaluation

- 16 years of data provided valuable insights into the populations of Nile perch and Nile tilapia in the UVN.
- However, due to low sample sizes, assessment of temporal variation was limited.

RECOMMENDATIONS

- Implement adaptive, species-specific monitoring frameworks to evaluate distribution, migration, efficiency of passages (e.g., fish ladders) at critical barriers in fragmented channels.
- Improve sampling; stratified sampling , reduce use of larger mesh gillnets to boost sample sizes
- Correlate LWR shifts with water quality parameters and prey abundances
- Assess population dynamics.

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