

Abundance and Composition of Zooplankton (Copepoda, Cladocera, Rotifera) in Lake Taal: Potential Impact of Intensive Size Selective Predation by the Freshwater Sardine, *Sardinella tawilis* (Herre 1927)

Rey Donne S. Papa¹, Roberto C. Pagulayan² and Alicia Ely J. Pagulayan¹

¹Department of Biological Sciences and Research Center for the Natural Sciences,
University of Santo Tomas

²Institute of Biology
University of the Philippines-Diliman



Introduction

Taal Lake

- Batangas Province
- 3rd largest lake
- Pansipit River
- Rich Flora and Fauna
 - 52 species of fish (includes Tawilis and Maliputo)
 - Lake Taal Sea Snake



Zooplankton

- Supports economically important fish populations
- Indispensable members of aquatic food chain
- Changes in abundance, species diversity and community composition can provide important indications of environmental change or disturbance

Sardinella tawilis (Herre 1927)

- **Freshwater Sardine or “Tawilis”**
- **Endemic**
- **Pelagic**
- **Peak spawning from March to May**

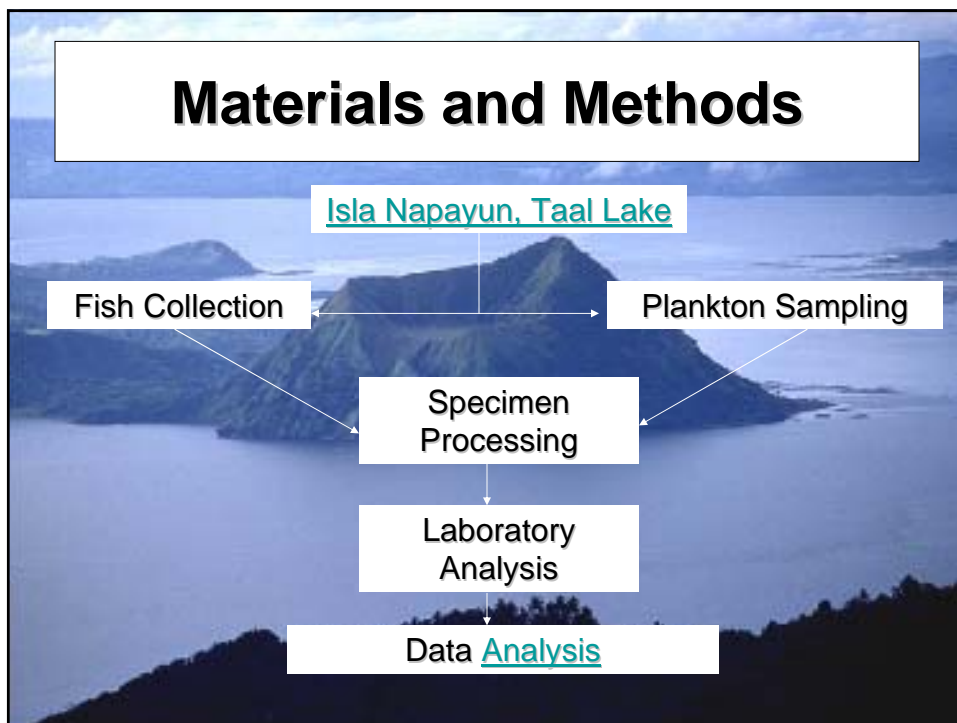


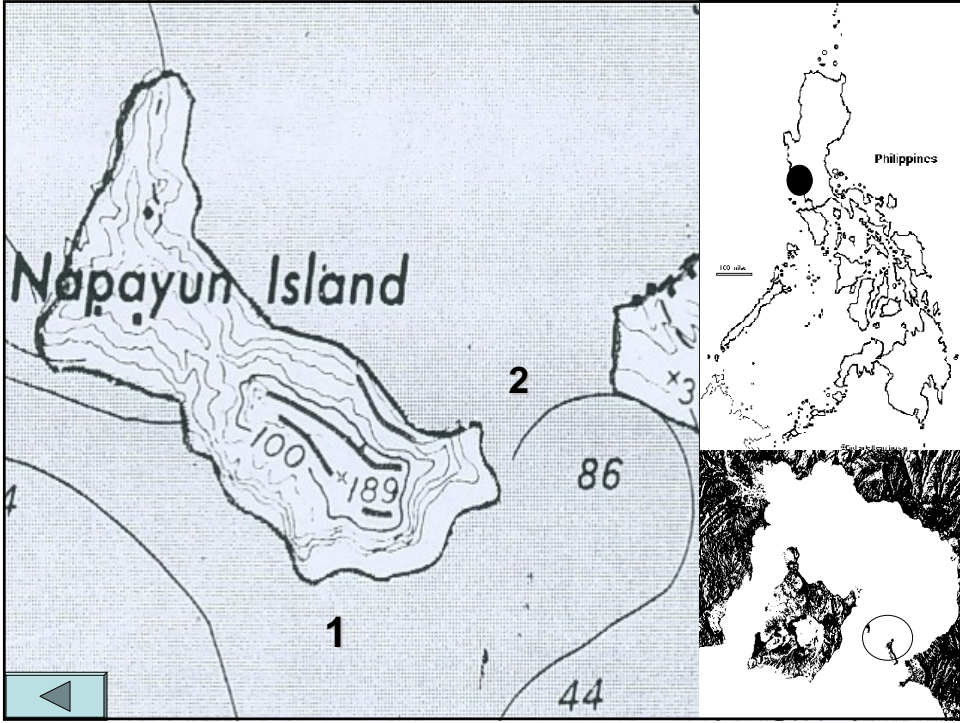
- **gill nets (*Panti*) and beach seine (*Pukot*)**
- **nighttime or before sunrise**
- **Subject to over fishing, illegal fishing**
- **Displaced by exotic species**

Objectives

- Determine zooplankton composition and abundance in the vicinity of Isla Napayun, Lake Taal
- Determine, if any, the possible impact of the prey preference of the *Sardinella tawilis* on the zooplankton community

Materials and Methods





Data Handling and Processing

Plankton Abundance

- Density (Ind. / L)
- Plotted per Month
- Compared with fish diet



• **Frequency of Occurrence**

$$\%FO = \frac{100 \times O_i}{\sum_{i=1}^n O_i}$$

%FO > 50% - **Dominant**

10% < %FO < 50% - **Secondary**

%FO < 10% - **Accidental**

• **Numerical Method**

$$TN = \sum_{i=1}^n N_i$$

- PAST (Paleontological Statistics Software Package for Education and Data Analysis)
 - Differences of the 3 major zooplankton groups in stomach
 - One-Way ANOVA and Kruskal Wallis H Test
 - Differences of the 3 major zooplankton groups in the water samples
 - One-Way ANOVA and Kruskal Wallis H Test

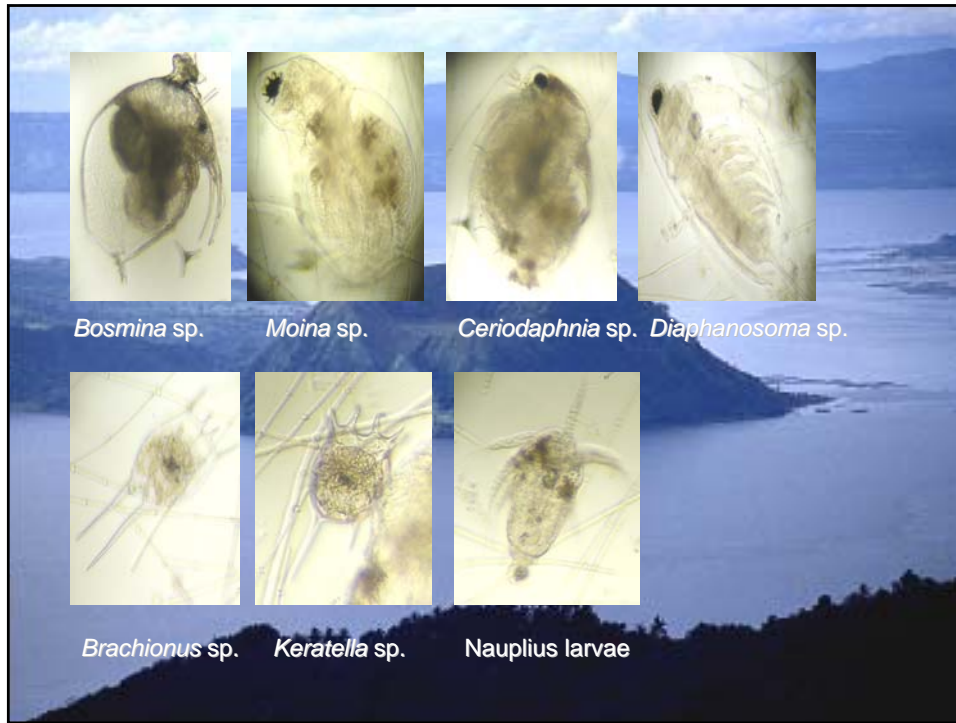


Zooplankton Species

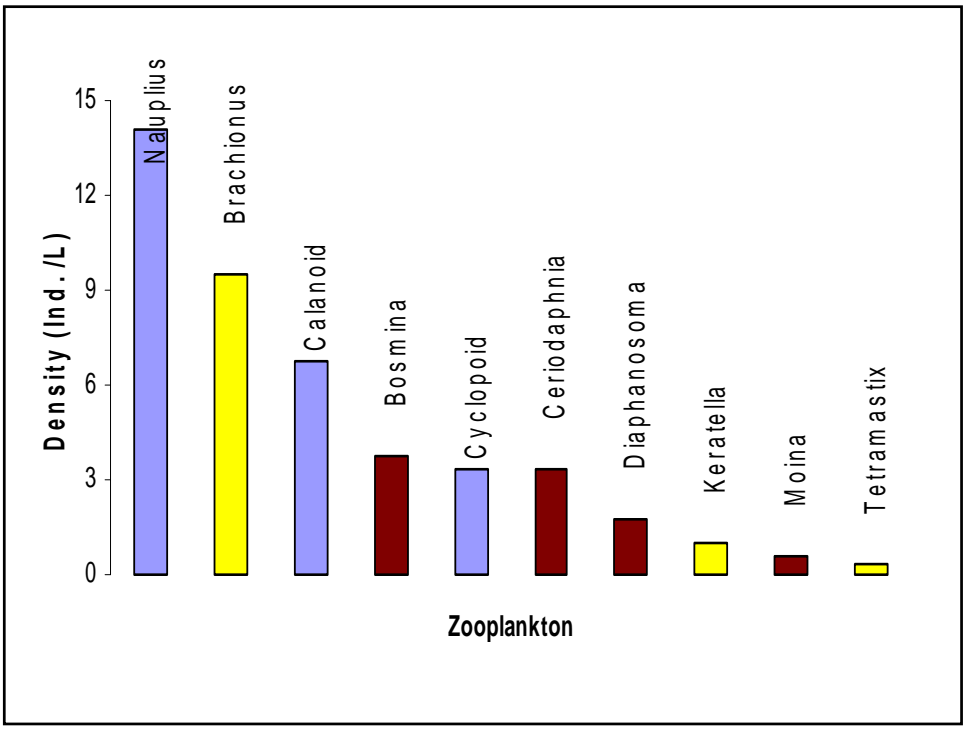
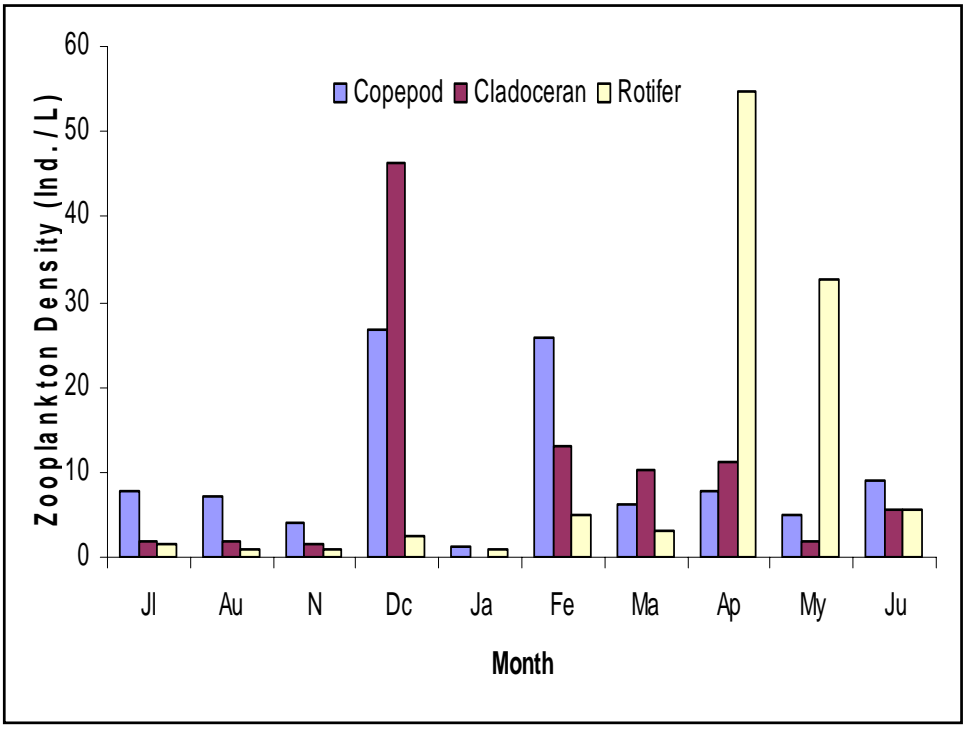


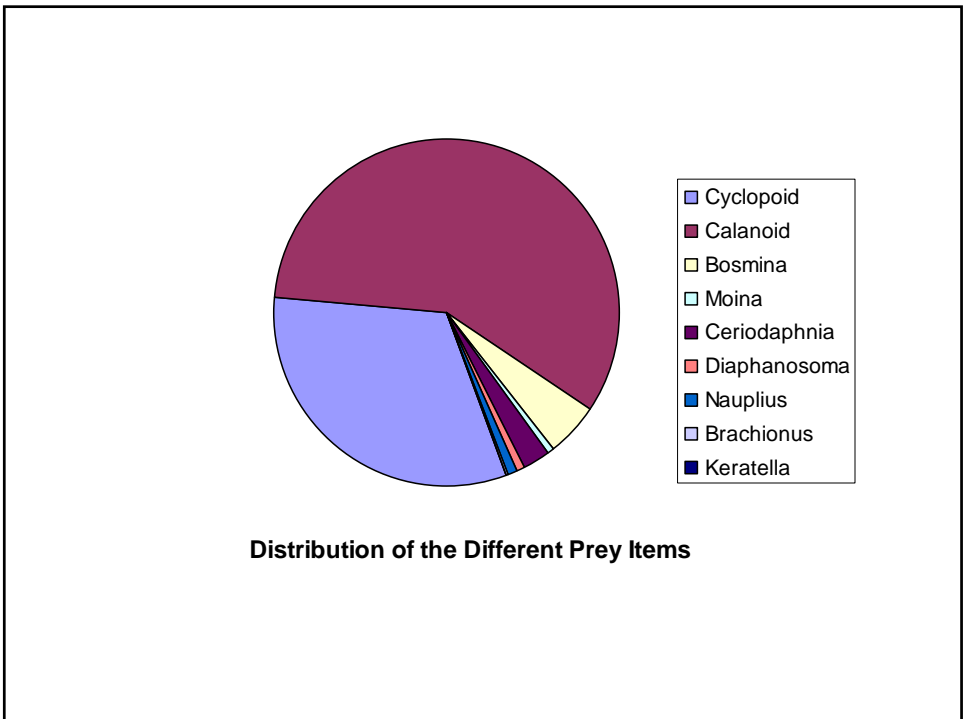
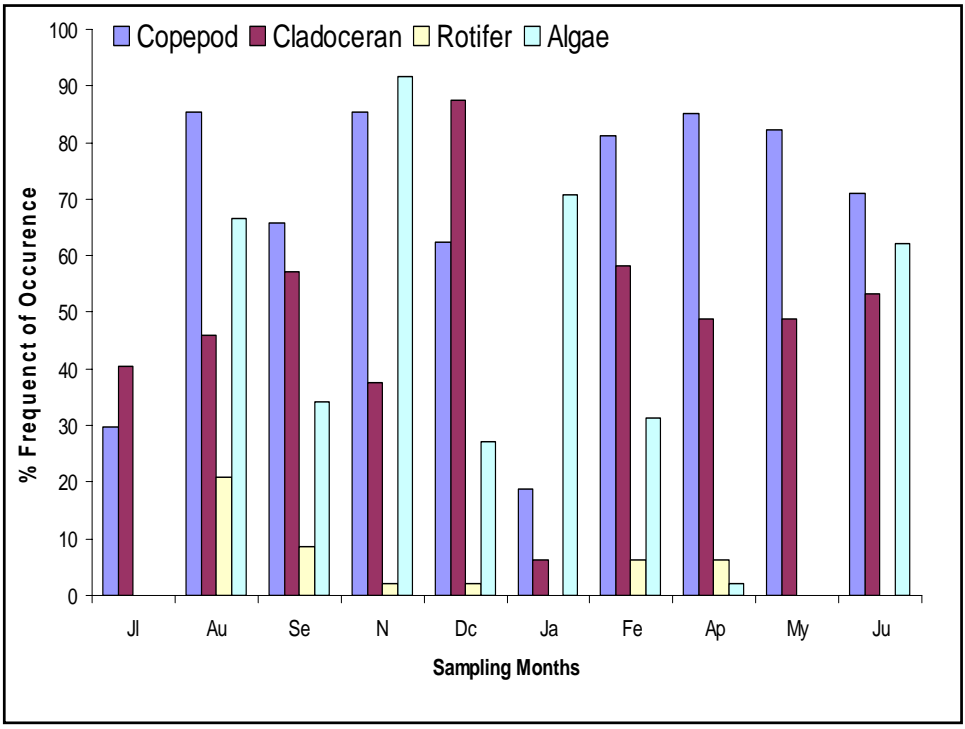
Cyclopoid Copepods

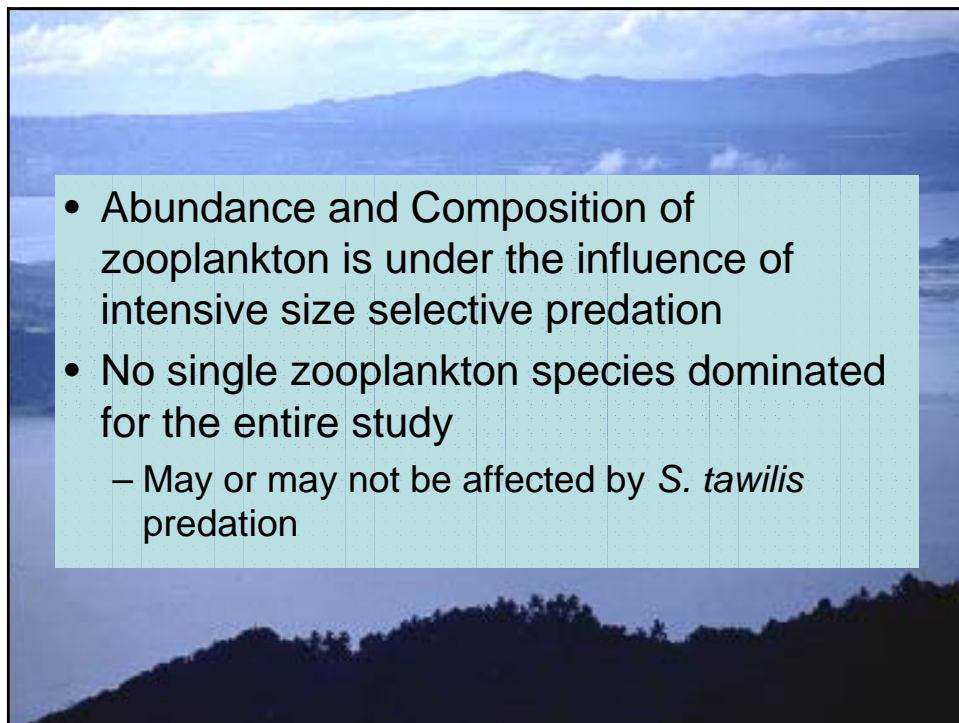
Calanoid Copepod



Mean Length of Zooplankton		
Major Taxa	Lowest Possible Classification	Mean length of Zooplankton (in μm .)
Copepoda	Cyclopoid	582.4 +/- 30.7
	Calanoid	767.4 +/- 36.4
	Nauplius larva	235.7 +/- 16.4
Cladocera	<i>Bosmina</i> sp.	311 +/- 20.2
	<i>Moina</i> sp.	530.7 +/- 103.5
	<i>Ceriodaphnia</i> sp.	333.9 +/- 16.1
	<i>Diaphanosoma</i> sp.	537.9 +/- 42.2
Rotifera	<i>Brachionus</i> spp.	172.3 +/- 7.5
	<i>Keratella</i> sp.	180 +/- 7.5







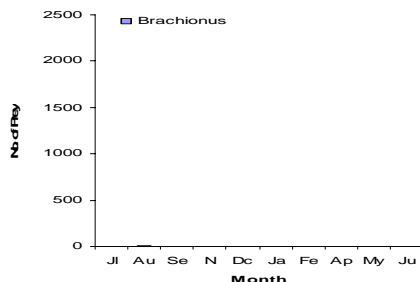
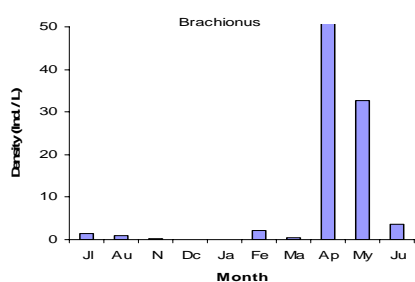
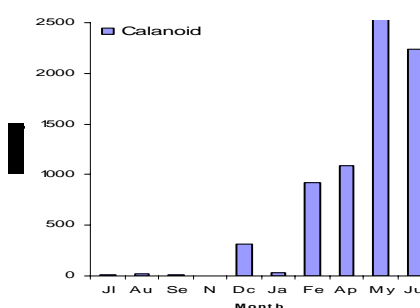
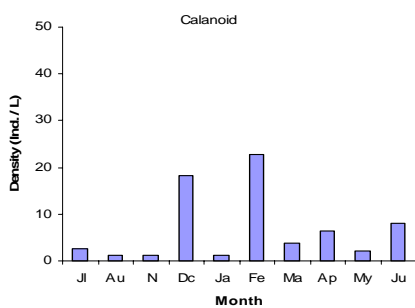
- Copepod densities were noted to be low
 - No drastic increase was noted
- Adult Copepods were present during entire study
- Nauplius were the most abundant organism noted during the entire study
- *Bosmina* sp. and *Brachionus* sp. showed noticeable drastic increases in density following months of low densities

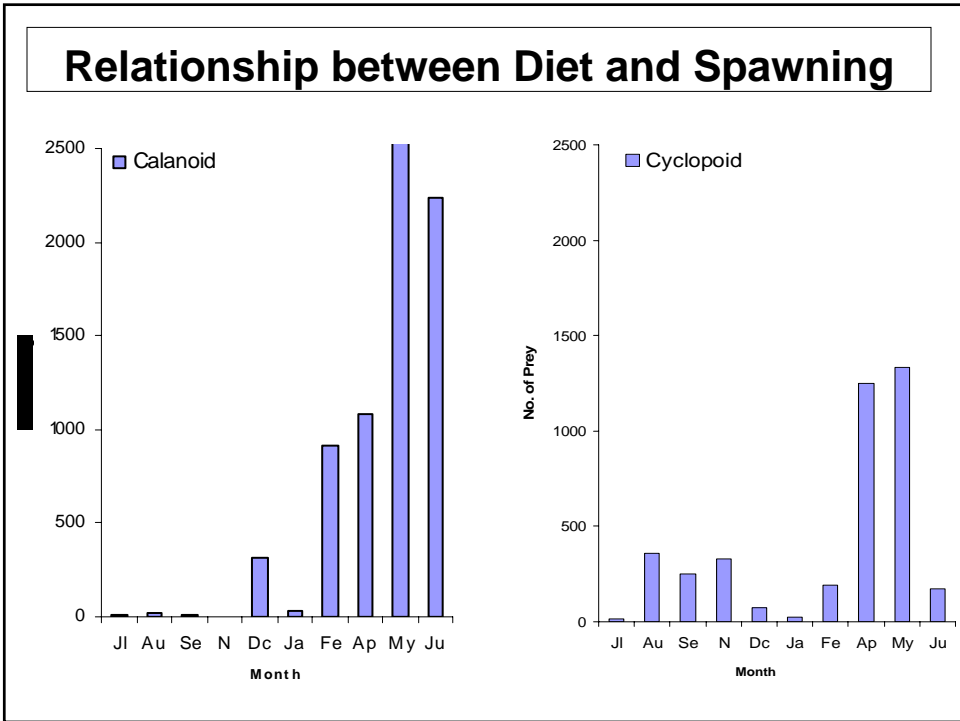
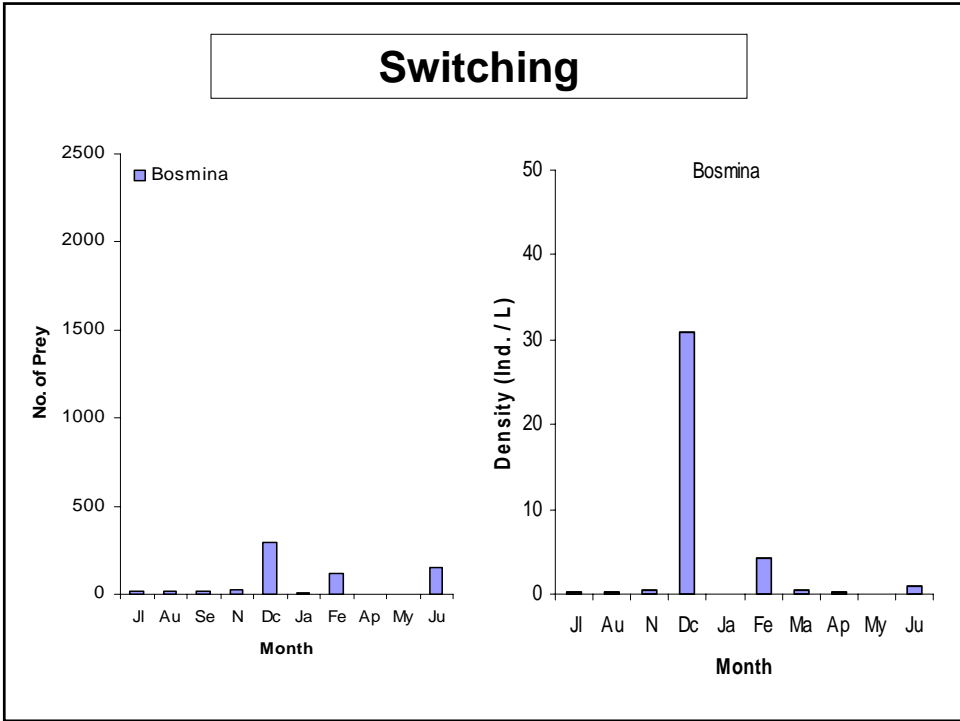
- Zooplankton community was dominated by smaller bodied zooplankton
 - Observed only as “Accidental” prey by the *S. tawilis*
- Preference for copepods may be due to ability by *S. tawilis* to select larger prey
 - Size Selective Planktivore
 - Optimal foraging
 - Switching
 - Relationship between spawning and food intake

Size Selection

- Can visually attack, detect and locate a single individual of zooplankton
- May use visual cues
- Cyclopoid and Calanoids were the most common and most numerous prey in the diet of *S. tawilis*
- Influences the zooplankton community structure

Optimal Foraging







Summary

- Zooplankton community is comprised of:
 - 4 genera of Copepoda
 - 4 Genera of Cladocera
 - 2 Genera of Rotifera
- Zooplankton community was dominated by small bodied organisms
- Under the influence of size selective predation by *S. tawilis*
 - Shows a preference for the Copepods
 - Largest of the 3 zooplankton groups



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