Distribution and Abundance of Chaetognaths in Verde Island Passage, Southern Luzon, Philippines during the summer with emphasis on *Flaccisagitta enflata* (Grassi, 1881) and *Aidanosagitta neglecta* (Aida, 1897)

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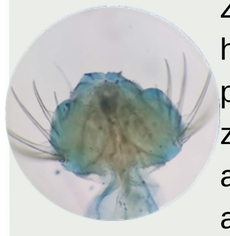
Introduction

Map showing the Verde Island Passage, Philippines (Adapted from Geronimo, 2013)

Verde Island Passage (VIP) is a crucial, biodiverse marine corridor, with unique hydrographical features and processes driving high primary productivity that supports rich fisheries for small pelagic fish.

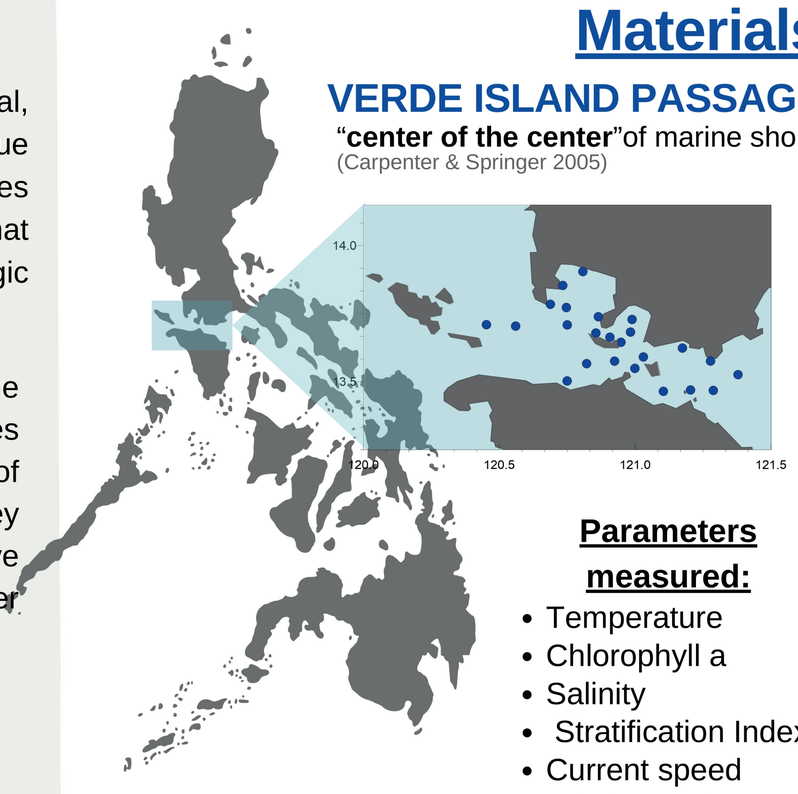


Zooplankton links such high productivity and the higher trophic levels, which are important to fisheries production. Chaetognaths are important predators of zooplankton, including fish eggs and larvae. They are sensitive to environmental changes and serve as biological indicators associated to specific water masses and productive areas

Objective:

Characterize the abundance and spatial distribution of chaetognaths in VIP.

Materials & Methods



VERDE ISLAND PASSAGE (VIP)

"**center of the center**"of marine shore fish diversity in the world
(Carpenter & Springer 2005)

Study Area & Field Sampling:

- Survey Month: **May 2007**
- Vertical haul: 24 Stations
- WP-2 Zooplankton Net
  - Mesh size-200 µm;
  - Mouth diameter - 60 cm (Unesco,1968)
- Preserved in 10% buffered seawater-formalin solution

Parameters measured:

- Temperature
- Chlorophyll a
- Salinity
- Stratification Index
- Current speed
- Wind Speed

Laboratory Processes and Identification

Total Zooplankton Samples

Working Sample (1/4 Aliquot)

Major Zooplankton Groups

Identification Chaetognath Species

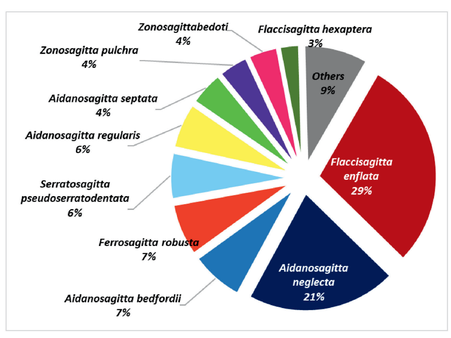

125 random individuals

Results and Discussion

Chaetognaths

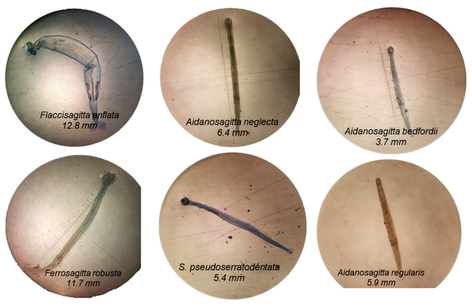
- **4%** Total zooplankton density >previous local studies
- 3rd most dense taxon group
- **23 SPECIES** identified (8 genera)

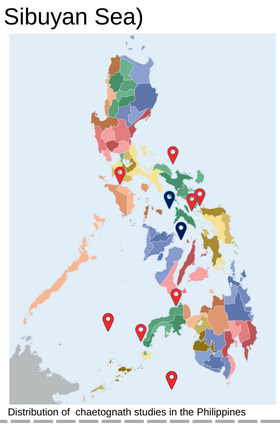
Species Percent Abundance



***Flaccisagitta enflata* =** <u>most abundant</u> in all the stations **(29%)** (consistent with most areas in the Philippines)

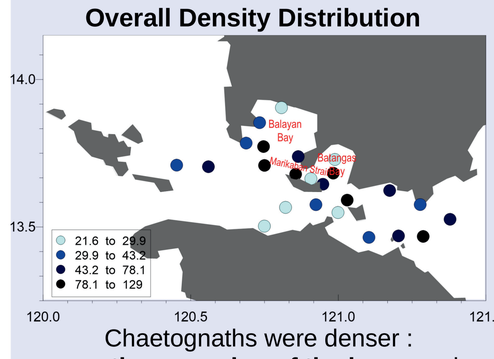
***Aidanosagitta neglecta* =** <u>2nd most abundant</u> **(21%)** (similar to Visayan Sea and Sibuyan Sea)




Distribution of chaetognath studies in the Philippines

Density Distribution of Chaetognaths

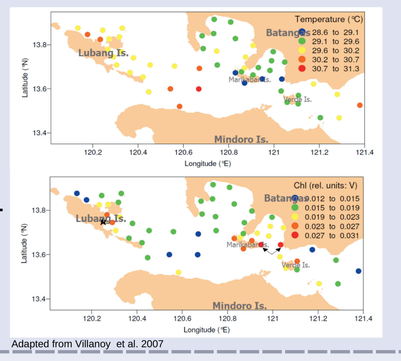
Overall Density Distribution



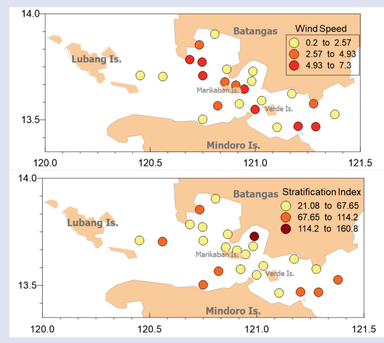
Chaetognaths were denser : **<u>mouth or opening of the bays</u>** and **<u>narrow Marikaban Strait</u>**

High chaetognaths densities generally consistent with:

↓temp



↑ wind speed



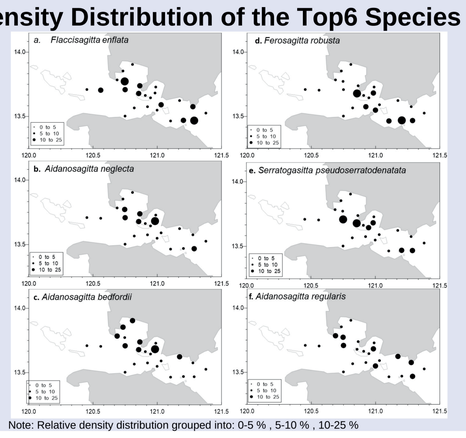
↑ Chl a

↓stratification index

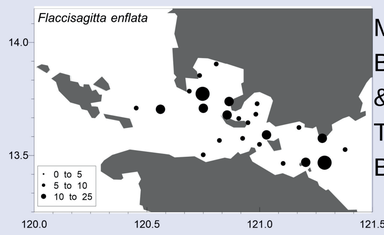
Adapted from Villanoy et al. 2007

Distinct distribution patterns for the chaetognaths:
= influenced by factors:
<u>physico-chemical properties of the water</u> : temperature, chl a, salinity, etc.,
<u>biotic factors :</u> food availability and quality (Pierrot-Bults & Nair, 1991).
= <u>associated to certain water mass</u>s, species-specific (Casanova, 1999)

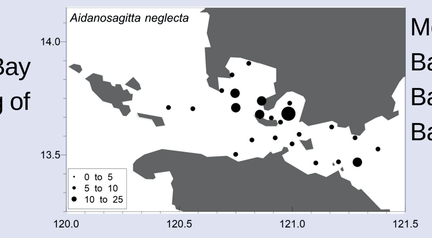
Density Distribution of the Top6 Species



Note: Relative density distribution grouped into: 0-5 % , 5-10 % , 10-25 %

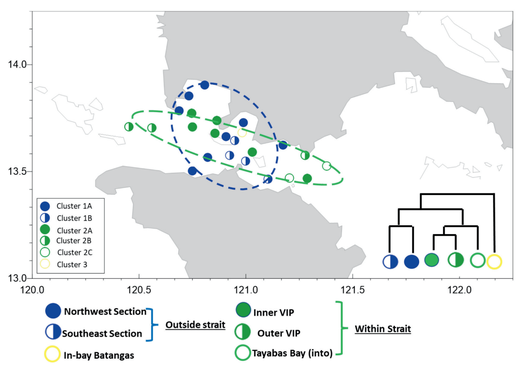


Mouth of Balayan Bay & opening of Tayabas Bay

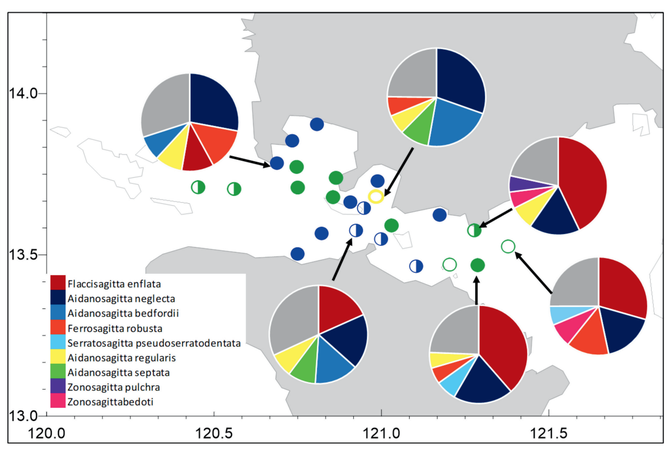


Mouth of Batangas Bay & Balayan Bay

Chaetognath Assemblages



Cluster Analysis used *Bray-Curtis Index* in Chaetognath <u>relative abundance data</u> of 23 chaetognath species: **(70% similarity level)**



***F. enflata* denser within the strait**

- relatively offshore
- oceanic & epipelagic species (warmer more saline waters)
- dominant in mixed layers more than other chaetognath species

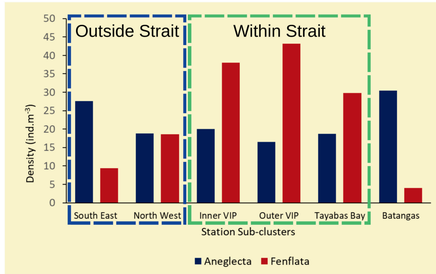
= wide tolerance to range of salinities (Noblezada & Campos, 2012)

***A. neglecta* denser outside the strait**

- relatively inshore
- neritic epipelagic species (salinities are lower)

= freshwater runoff from tributaries that empty in the bays
= waters sheltered from the main VIP current in the strait

- most common chaetognath species in bays and inlets (Tokioka, 1979)



Significant difference in the mean density of *F. enflata* outside and inside the strait
(p= 0.000)

No Significant difference in the mean density of A. *neglecta* outside and inside the strait
(p= 0.721)

<u>Species contribution in terms of abundance</u> (SIMPER)

<u>Outside Strait</u>

Species	% Contribution
Aidanosagitta neglecta	18.47
Ferrosagitta robusta	16.62
Flaccisagitta enflata	15.67
Aidanosagitta bedfordii	13.25
Aidanosagitta regularis	12.81

<u>Within Strait</u>

Species	% Contribution
Flaccisagitta enflata	21.755
Aidanosagitta neglecta	14.815
Aidanosagitta regularis	12.01
S.pseudoserratodentata	8.71

Summary

- Mean density of chaetognaths in VIP is highest among the reported densities in the Philippines.
- Stations at the opening of the bays, Marikaban Strait highest density.

= <u>↑*Chl a* concentration</u>, <u>↓temperature</u>, <u>↑wind speed patterns</u> & <u>↓stratification index patterns</u>

- *Flaccisagitta enflata* - most abundant in all the stations (29%)

= consistent with majority of the studies in the country
= typically more abundant "offshore" vs. *A. neglecta* which is more abundant in "inshore"

- Contrasting distribution of the 2 species consistent in the cluster analysis: associated with species specific preference to environmental factors

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