

Harmful Algal Blooms (HAB's) in the Coast of Ghana, West Africa

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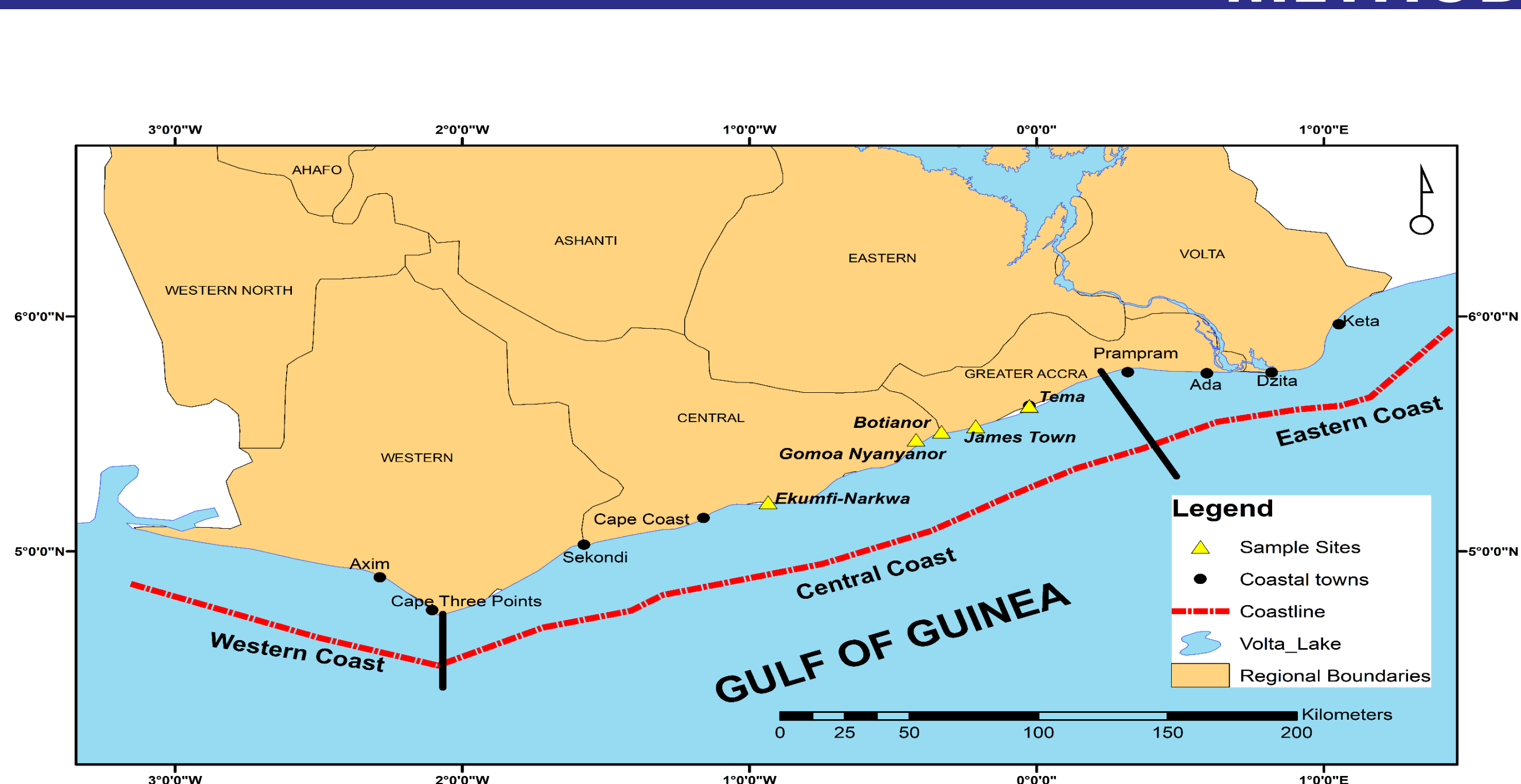
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BACKGROUND

In the West African sub-region, there is little to no report about harmful algal blooms (HABs) and the effects they have on the environment. Algal blooms have occurred seasonally or year-round in a variety of aquatic habitats in Ghana and Nigeria, although there are no records of any human fatalities associated with these blooms (Anang,1979; Akin-Oriola,2006). This study sought:

- ❖ To identify and characterize harmful and potentially toxic phytoplankton species along the Central Coastline of Ghana
- ❖ To evaluate the influence of the environmental driving factors
- ❖ To investigate toxin effects of HABs in selected shellfish (Oysters, Bloody cockle and Clams) [Profiling of Toxins]

Sampling Areas



METHODOLOGY AND RESULTS



METHODOLOGY:

ALGAE

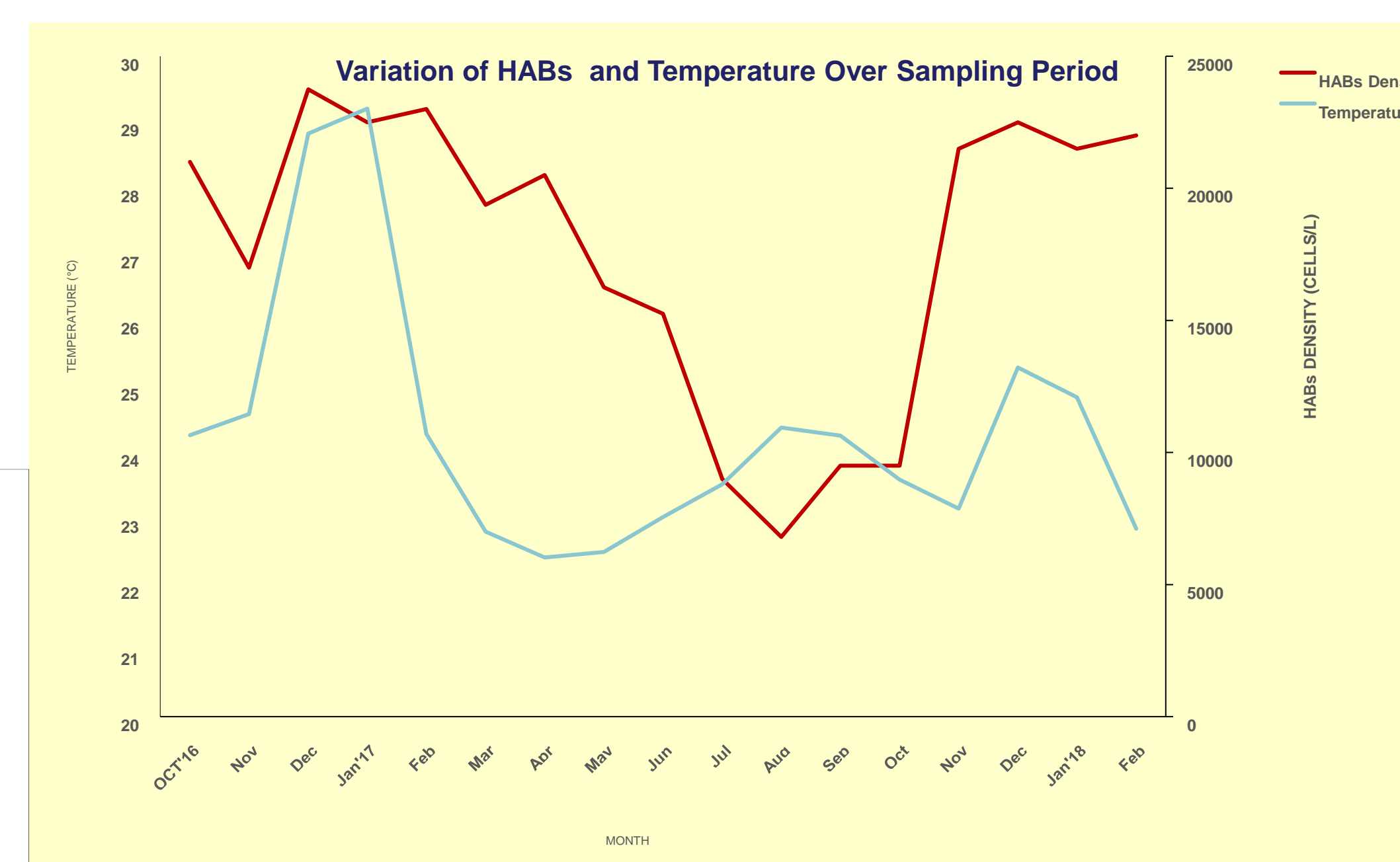
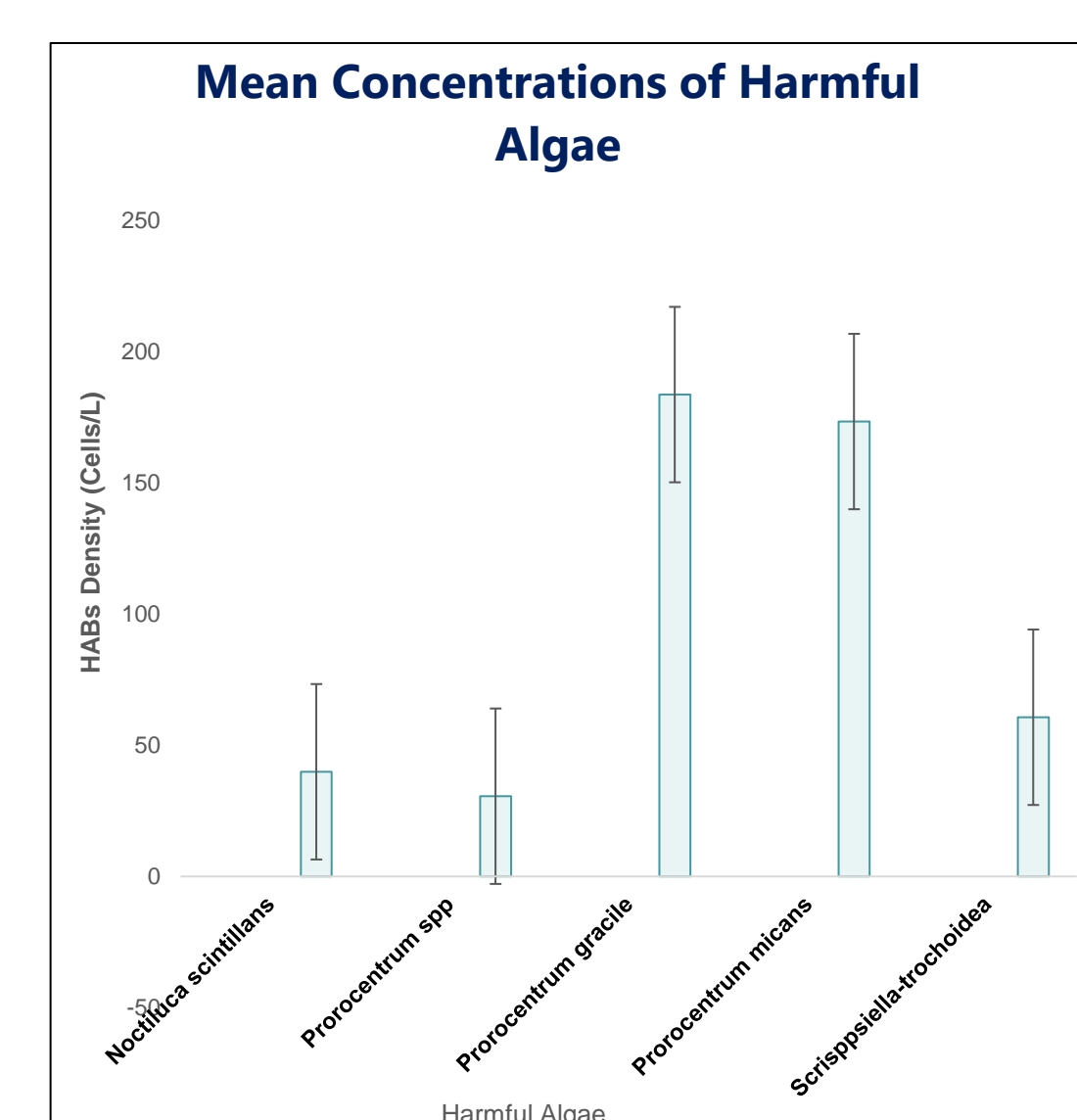
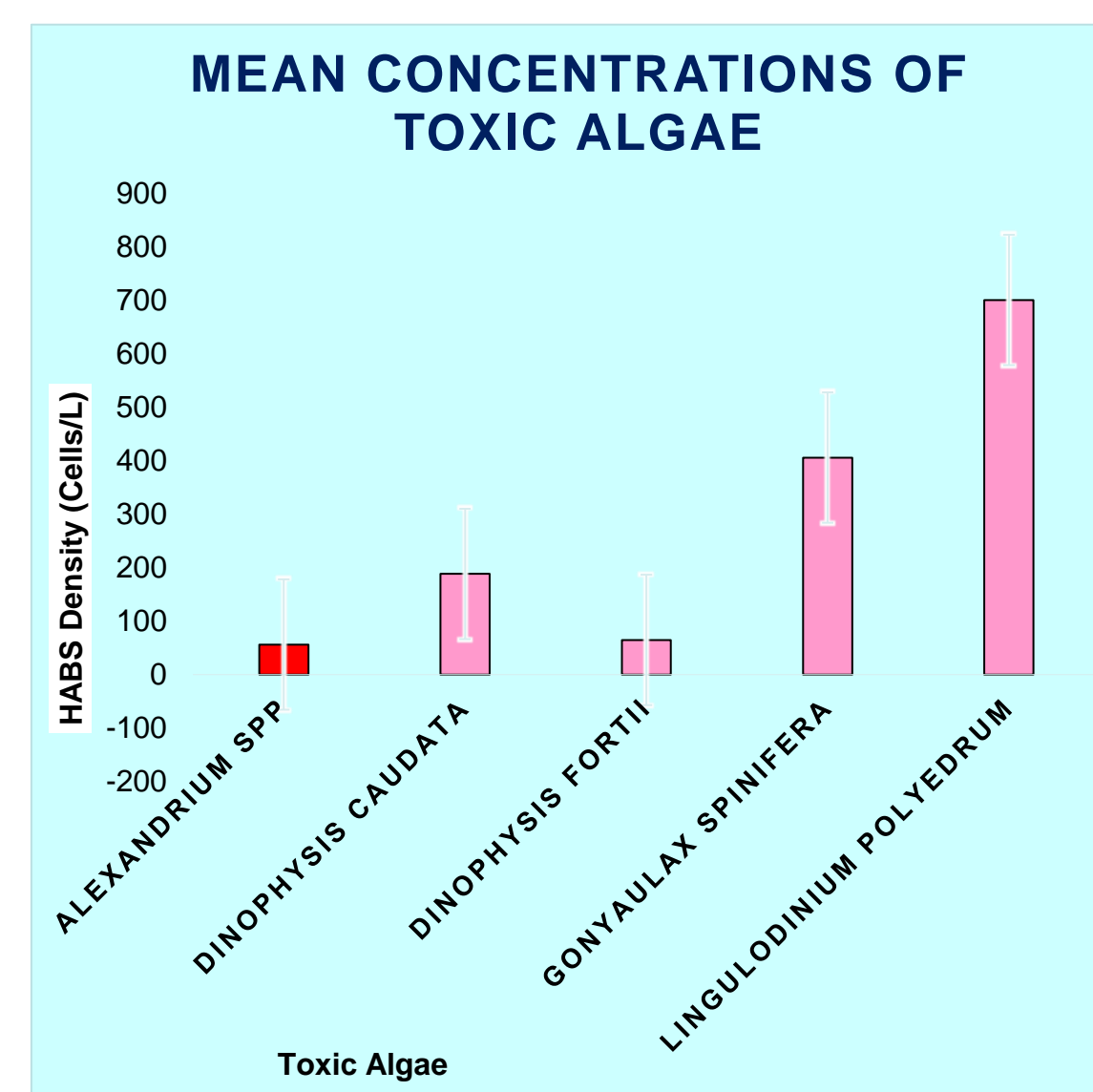
- ❖ Water samples – 5L Niskin bottle 50mL subsample preserved with Lugol's iodine solution for quantitative analysis.
- ❖ 20 µm mesh net samples were horizontally collected – Lugol's iodine solution added for preservation.
- ❖ Qualitative analyses were conducted using a light microscope equipped with phase contrast at 400 final magnifications.

PARALYTIC SHELLFISH POISONING (PSP) TOXINS

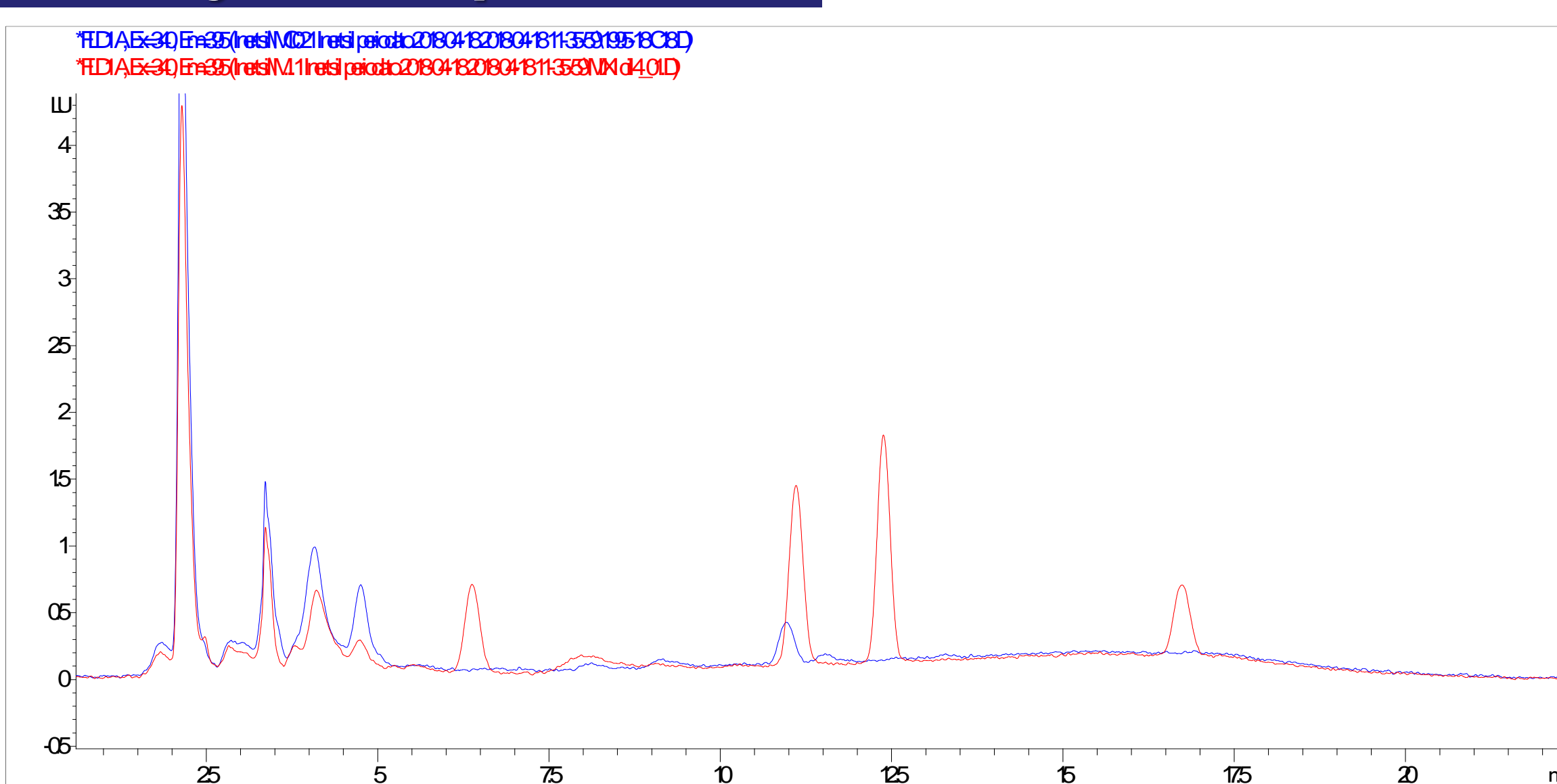
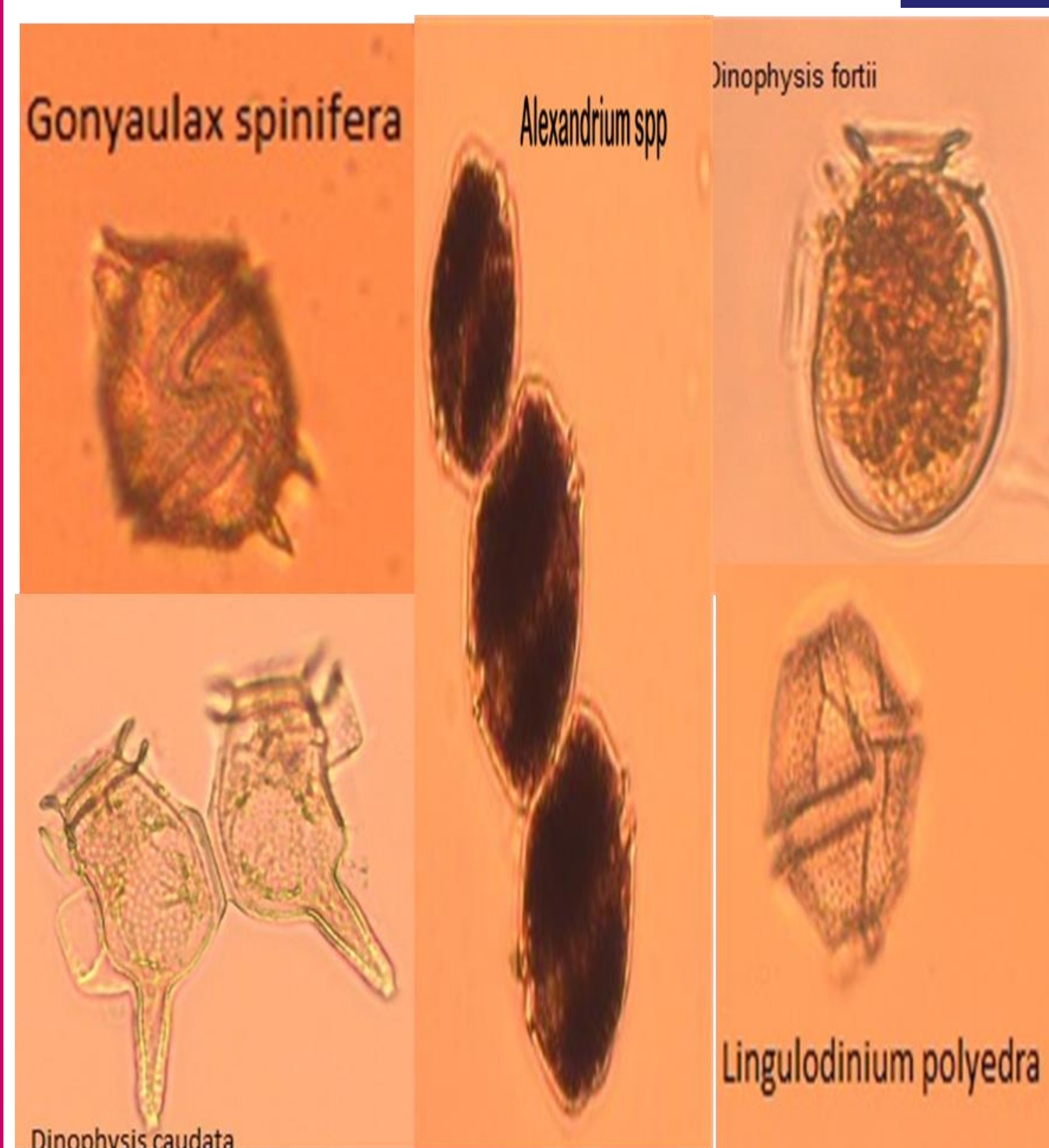
- ❖ Paralytic Shellfish Poisoning (PSP) Toxins (Shellfish) [AOAC Official Method 2005.06]

RESULTS:

- ❖ It was observed that high temperature correlated positively with high toxic algae high surface temperature (> 25 °C), this may have contributed to the availability of certain species. Which is an indication that Climate variable like increasing SST of the ocean might be influencing the availability of certain harmful and toxic phytoplankton.
- ❖ The study identified five potentially harmful species which are mostly toxin-producing thecate dinoflagellates some of which are *Lingulodinium polyedra*, *Gonyaulax spinifera*, *Dinophysis caudata*, *Dinophysis ovum* and species of *Alexandrium*. Both the diversity and density of HABs species showed seasonal variations. *Lingulodinium polyedra*, with cell maxima of 50- 3251 cells/L, was observed in December 2018 and August 2022 followed by *Gonyaulax spinifera* (115-890 cells/L) and *Prorocentrum gracile* signaling the risk of harmful algal bloom events in the study area. This could be attributed to the minor upwelling season in Ghanaian shore.
- ❖ The high diversity of some species observed only in the major upwelling season indicates that phytoplankton bloom is affected by temperature.



Potentially Toxic Species



From Chromatograms obtained, it is suspected that probably PSP toxins **dcSTX**, **NEO** and **GTX2,3** are present. But concentrations were below the Limit of Quantification; This may be so because of the Co-occurrence with the PSP Toxin producer **Alexandrium spp.**

REFERENCES

- ❖ GA Akin-Oriola, MA Anetekhai & A Oriola (2006) Algal blooms in Nigerian waters: an overview, African Journal of Marine Science, 28:2, 219 - 224, DOI: 10.2989/18142320609504151
- ❖ Anang, E.R. (1979). The seasonal cycle of the phytoplankton in the coastal waters of Ghana. *Hydrobiologia*. 62 (1): 33–45.

CONCLUSIONS

- Five (5) of the identified species (***Lingulodinium polyedra***, ***Gonyaulax spinifera***, ***Dinophysis caudata***, ***Dinophysis fortii***, ***Alexandrium spp***) are potential Toxin producers (potentially causing Diarrhetic and Paralytic Shellfish Poisoning [DSP and PSP])
- Bloody cockles** were found to contain traces of **PSP Toxins (GTX2,3; NEO and dcSTX)** though they were below the limit of quantification
- HABs is a world-wide challenge and Ghana must initiate steps to undertake progressive studies into this event, thus continuous measurement and studies is needed to be undertaken to generate temporal and spatial trends to predict harmful algal blooms to support the global campaign, mitigating the impacts of climate change.

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