EXP 6. Marine Data Report

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Dataset	Marine
Experiment no.	6

Dataset link-
https://www.kaggle.com/datasets/jocelyndumlao/reef-ecological-assessment-del-norte

Dataset Description-
This dataset presents a comprehensive ecological assessment of Alacranes Reef and Bajos del Norte Reef located in Del Norte County. The assessment focuses on understanding the biodiversity, habitat health, and underwater ecosystem dynamics within these reef environments.

The data included in this dataset has been meticulously collected through field survey techniques utilizing SCUBA diving. The dataset encompasses valuable information on fish abundance, biomass, and the cover of invertebrates and macroalgae. This data not only sheds light on the current state of these reef ecosystems but also provides insights into their overall ecological balance and health.

Each entry in the dataset provides details about species abundance, biomass estimates, and the distribution of invertebrates and macroalgae. The dataset serves as a vital resource for researchers, ecologists, and policymakers interested in studying aquatic ecology, conservation, and the interplay between various organisms within delicate reef environments.

Content

Label: Refers to a classification label associated with the data.
Year, Month, Day: Date components indicating when the data was recorded.
Region: Indicates the region of observation, such as "Bajo del Norte" or "Alacranes."
Island: Specifies the island where the observation was conducted.
Side: Differentiates between sides, such as "Windward" or "Leeward."
ID Reef, Reef, Reef Joined: Identification details for reefs and their associations.
Protection Status: Denotes the conservation status or protection level of the reef area.
Latitude, Longitude: Geographical coordinates of the observation point.
Habitat: Describes the type of habitat, often coral-dominated.
Transect: Numerical identifier for the observation transect.
Area: Indicates the area covered by the observation.

Phylum, Taxa1, Taxa2, Taxa3, Family: Taxonomic classifications of the observed species.

Trophic Group: Categorization of organisms based on their trophic role (e.g., carnivore, herbivore).

Trophic Level: The position of an organism in the food chain.

Functional Groups: Groupings based on ecological functions.

A_ord, B_pen: Numerical values related to the species' properties.
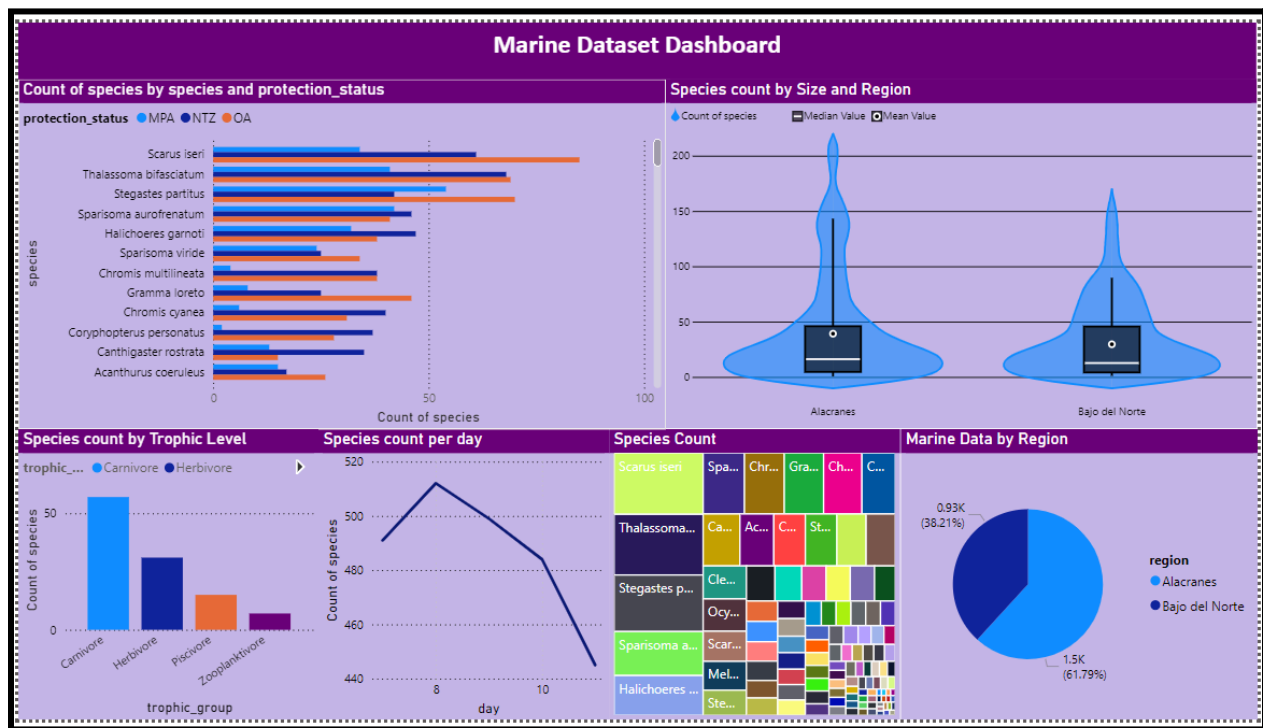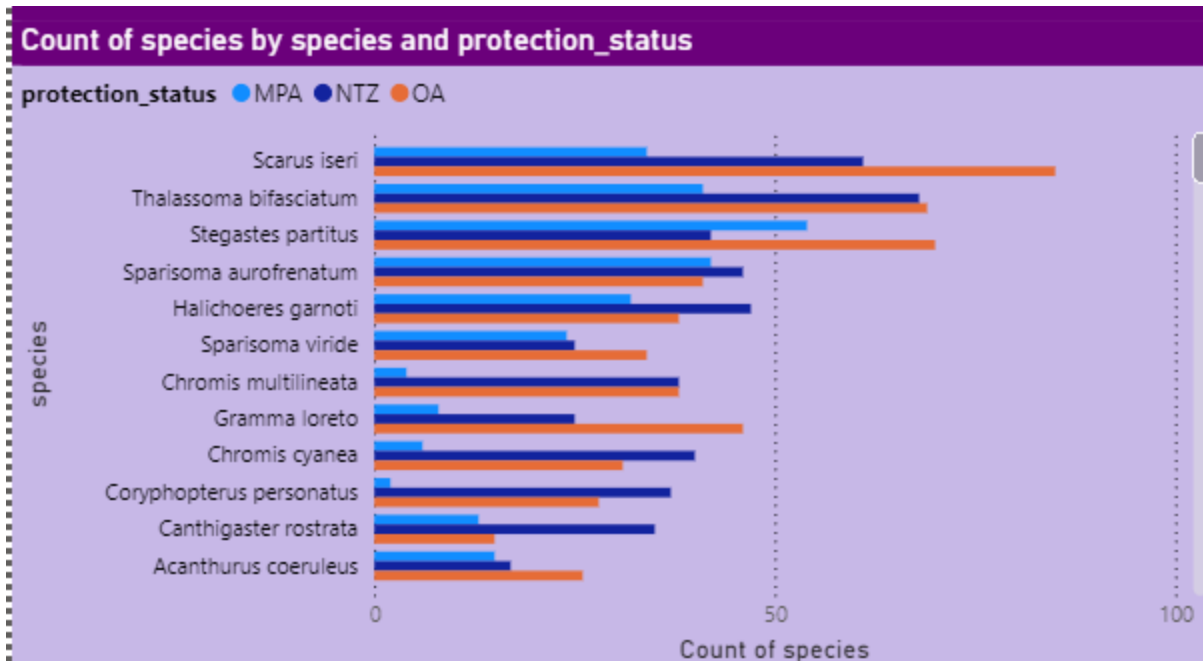
Species: Scientific name of the observed species.

Quantity: The count or quantity of the observed species.

Size: Size of the species.

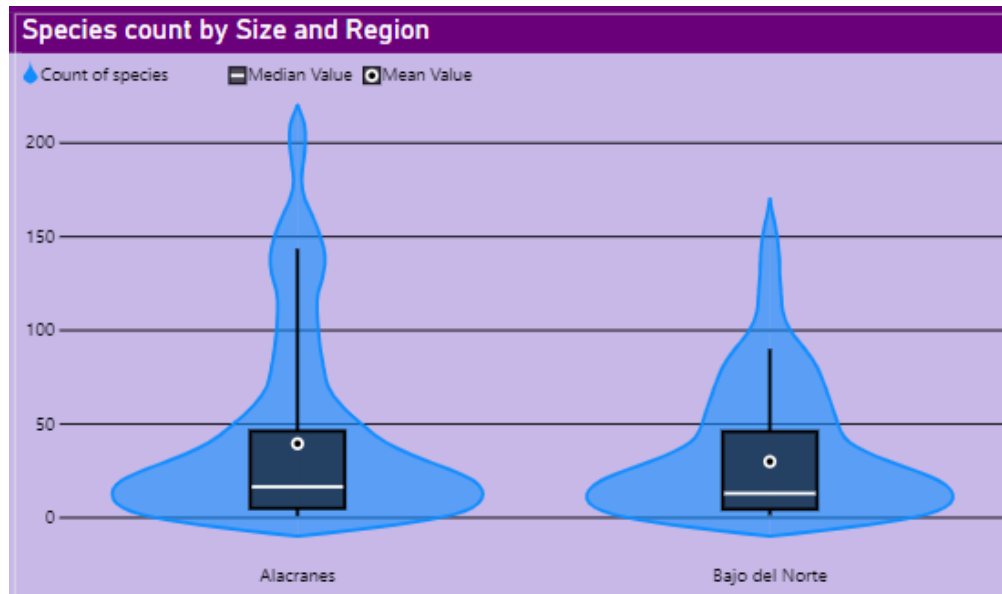Biomass: Biomass value of the species.

Report-

Count of species by species and protection_status

protection_status ● MPA ● NTZ ● OA

Count of species

Question:

How does the protection status affect the count of different marine species?
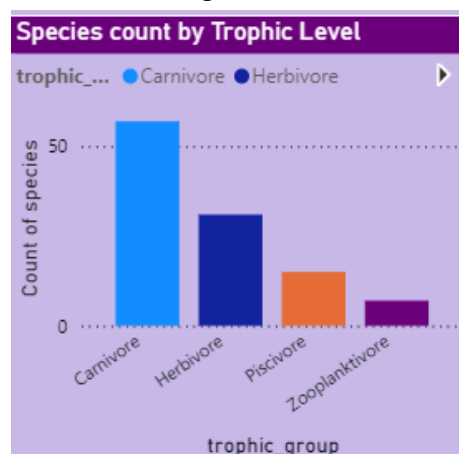
The "Count of species by species and protection status" bar chart shows variations in species count under three protection statuses: MPA (Marine Protected Area), NTZ (No-Take Zone), and OA (Open Access). Species like Thalassoma bifasciatum and Scarus iseri have higher counts in MPA areas, suggesting that protection positively affects their population. Some species, however, appear across all three zones, indicating they may thrive regardless of protection. The distribution highlights how specific regulations may influence species density, with certain species preferring protected regions more than others. This analysis could guide conservation efforts by identifying species that benefit most from restricted areas.

Species count by Size and Region

Count of species   Median Value   Mean Value

200

150

100

50

0

Alacranes   Bajo del Norte

Question:

How do species sizes differ between the regions Alacranes and Bajo del Norte?

The violin plots for species count by size in Alacranes and Bajo del Norte show that both regions have similar size distributions, with a median and mean roughly at the center of each region's distribution. However, the Alacranes region has a wider spread of species sizes, suggesting more variability in the size of species found there. In contrast, Bajo del Norte has a more condensed distribution, implying less diversity in species size. Both regions have similar central tendencies, but the variance in Alacranes suggests a habitat that may support a broader range of species sizes. This could reflect ecological differences between the two regions.

Species count by Trophic Level

trophic_... Carnivore Herbivore

Count of species

50

0

Carnivore   Herbivore   Piscivore   Zooplanktivore

trophic_group

Question:

Which trophic level has the highest count of species, and what might this indicate about the marine ecosystem?

The "Species count by Trophic Level" bar chart shows that Carnivores have the highest count, followed by Herbivores, Piscivores, and Zooplankton. This suggests a marine ecosystem with a robust predator presence, possibly indicating a balanced food chain where prey species are sufficient to support a larger number of predators. The high count of herbivores also hints at abundant plant material or algae, supporting herbivore populations. The lower counts in Piscivores and Zooplankton might mean these groups are either less diverse or less populous in this ecosystem. These trophic dynamics give insight into food web stability and the types of ecological interactions in this marine area.
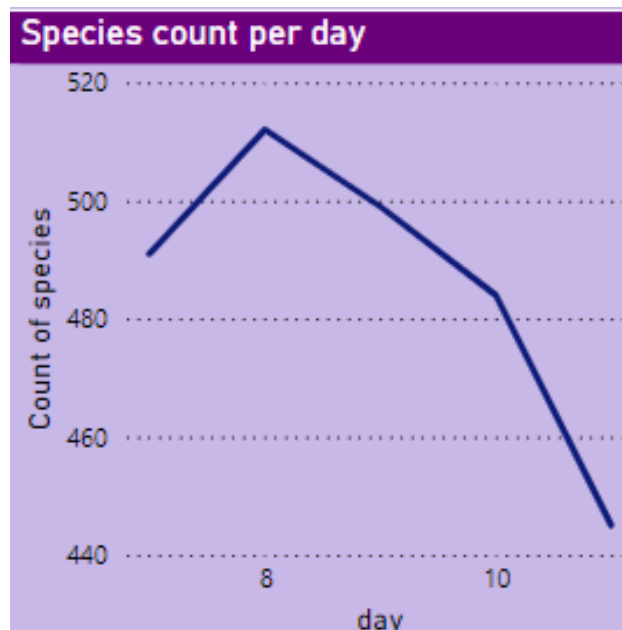
Question:

How does the species count fluctuate over the observed days, and what might explain these changes?

The line graph for species count per day reveals a peak in species count around day 8, followed by a noticeable decline. This fluctuation could be attributed to seasonal or environmental changes impacting species visibility or presence on different days. For instance, environmental factors like temperature, currents, or food availability might influence daily counts. The rise and fall could also reflect migratory patterns or sampling inconsistencies. Understanding these patterns can help in planning surveys and assessing temporal biodiversity changes in the region.

Species Count
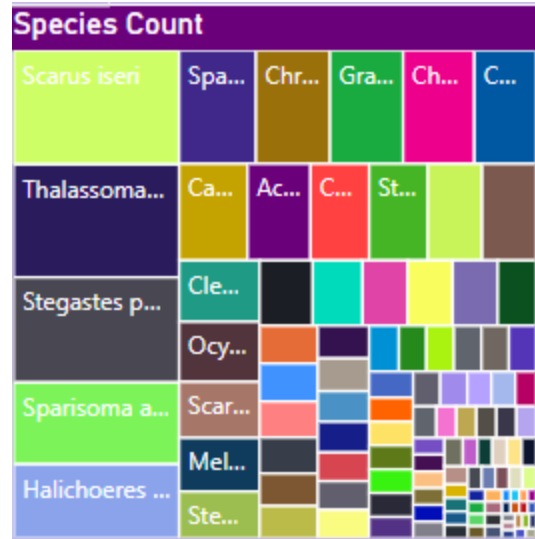
Question:

Which species have the highest representation, and how does this distribution help in understanding biodiversity?

In the treemap, species like Scarus iseri, Thalassoma bifasciatum, and Stegastes partitus occupy larger sections, indicating they are more prevalent in the dataset. The size variations among species boxes help to quickly visualize which species are dominant and which are less common. High representation of certain species could indicate that these species are particularly adapted to local conditions or have few predators. Conversely, smaller sections for other species could signal rarity, which may necessitate targeted conservation efforts. This layout aids in quickly assessing species dominance and diversity within the marine ecosystem.

Marine Data by Region
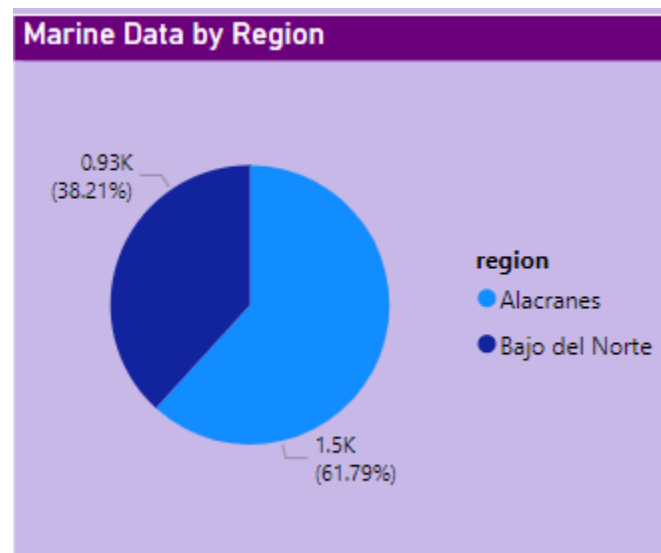
Question:

What does the distribution of marine data by region reveal about Alacranes and Bajo del Norte?

The pie chart indicates that Bajo del Norte accounts for 61.79% of the total data points, while Alacranes has 38.21%. This suggests that a larger portion of the species observations or samples were collected in Bajo del Norte. This imbalance could reflect sampling focus, regional accessibility, or biodiversity differences, with Bajo del Norte potentially being a richer or more targeted area for data collection. Alternatively, it could simply indicate a need to balance future sampling between the two regions for more comprehensive data. The distribution provides insights into where efforts are concentrated and highlights areas where further data collection might be beneficial.