

CS 171 – Process Book

 CS 171 - Project Book

 CS 171 Team Agreement

Final website: <https://audreyzhangg.github.io/albatrosses/>

Group Members

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Project Proposal

Basic Information

- Project Title: Wings Over Water: Data Stories of the Albatross
- Team Members: Robin Pan, Audrey Zhang
- Team Name: The Brbs

Abstract: provide a paragraph describing your project's main goals, the data you will use, and the type of visualization(s) you plan to create.

- The main goal of this project is to create an interactive explainer that weaves together the natural history, movement ecology, conservation risks, and cultural footprint of albatrosses to better understand these lesser-known creatures. We plan to synthesize the various albatross types' traits and life-history information (including anatomy, wingspan, range, and population status) from BirdLife's species factsheets; colony locations and movement tracking from the Seabird Tracking Database; breeding-site, threat, and jurisdictional context from the ACAP Data Portal; and a segment of cultural references to and myths about albatrosses from BirdLife's blogs. The visuals will be laid out as follows: (1) a comparative anatomy panel with scaled silhouettes, wingspans, and other unique characteristics of different albatross types, (2) an animated map of migration routes and colony locations with a time slider, (3) a culture story section that shares literary and mythic mentions of the albatross and links them to different civilizations and points in history, (4) a threats dashboard where icons reveal severity, scope, site, and responsible jurisdictions with links to conservation organizations, and (5) a species explorer that gives detailed breakdowns of each of the 22 albatross types when users hover over the bird sketches. Together, these visualizations aim to be both scientifically grounded and approachable for the average internet surfer.

Background and Motivation: explain why you chose this project; discuss your motivation and any background, coursework, or research interests that inspired your team's decision; describe any prior work, examples, or sources that inspired your project; this may include research papers, websites, or specific visualizations (including those discussed in class).

- We chose albatrosses because they are such overlooked but interesting and unique creatures. For instance, they are the largest-wingspan flying birds and fly extreme distances during migration, yet many populations face threats and other risks that conservation groups are trying to combat. One of us (Robin) has extensive birding background and, thus, familiarity with the space, which made this an even more attractive project idea. Initially, we wanted to conduct

a deep dive into birds overall because of Robin's expertise but quickly realized that it would be wiser to choose a specific bird species to target. Robin recalled some fun facts about albatrosses, such as their tubenose salt gland that allows them to drink seawater, that Audrey found so curious, and after browsing public databases and open resources and finding several robust databases that we could reasonably pull numbers from, we concluded that this albatross idea would be a feasible and perfect scope.

Data: outline plans where and how you will obtain your data; briefly describe potential data source(s) and provide URLs or citations where appropriate; if data collection or preprocessing is required, briefly outline your plan.

- From our initial research, we've compiled a few databases from which we plan to build our data visualizations off of. Seabird Tracking Database (<https://www.seabirdtracking.org/species/albatrosses/>) is one great resource for Albatross colony and migration tracking (section 2). It has both a map-based overview of the data as well as over 100 individual databases with GPS tracking data. This may require some post-processing and learning how to utilize and understand GPS data. The Agreement on the Conservation of Albatrosses and Petrels Data Portal (<https://data.acap.aq/>) is a rich source of data for threats to albatrosses, including which species, the threat, the severity of threat, location, etc (section 4). Additionally, it also includes data on the jurisdictions different species fall under with regard to conservation. Its colonies dataset also provides a great complement to the Seabird Tracking Database with a list of all colonies and population sizes of each colony. For a deeper dive on each species and metrics such as lifespan, size, weight, flight length, etc BirdLife (<https://datazone.birdlife.org/species/factsheet>) provides individual fact sheets on each species and is rich in life history information (section 1 and 5). Lastly for information on albatrosses role in culture and mythology, we plan to use BirdLife's blog section, specifically this post: <https://www.birdlife.org/news/2023/06/19/albatrosses-inspiring-legends-myths/> (section 3). Other information will come from here: <https://www.sciencedirect.com/science/article/pii/S0006320725000023>, https://www.int-res.com/articles/meps_oa/m672p205.pdf, https://www.allaboutbirds.org/guide/Laysan_Albatross/id.

Mapping It Out

Audience – Brainstorming our audience, we came up with several options: elementary school kids who want a fun and dynamic visual tool to learn something new, environmental activists, professional and amateur birders, and the every day “Joe Schmoe”. However, we decided to ultimately go with the everyday “Joe Schmoe” because we believe it is a broad enough category of users that will derive entertainment from the diverse types of information and visualizations that we plan to create in our project. In particular, our target audience should have the following characteristics/interests:

- They should be of at least high school age and able to read and understand the content we present, as well as intuitively know how to use the visualization tools without need for additional “expert” guidance.
- It would be nice for them to have some vague interest in birds and/or science in general, but they do not necessarily have to have gone birding or know too much about bird biology/ecology/etc.
- They should be able to read and interpret a basic bar/line/etc. chart that might show up in a textbook or news article.
- Overall, we expect that our visualization will contain an encyclopedia-like level of detail – in other words, not too technical and requiring no background knowledge, but certainly with enough information for users to learn something new.

Questions – With the above description of our target audience in mind, we developed a list of potential questions they might ask about our data:

- What do albatrosses look like and how can I identify them?

6. What makes albatrosses unique from other birds?
7. How long do albatrosses live?
8. Where do they live?
9. What do they eat?
10. What is the albatross's lifestyle like?
11. What is their migration like?
12. Why is it important to know about albatrosses / why should I care about these birds?
13. What dangers/threats does this species face?
14. How can I make a difference in albatrosses' lives?
15. What do albatrosses symbolize in different cultures?
16. Are there any myths or stories surrounding these birds, and if so, what?
17. Are there trends or patterns in how albatrosses move?

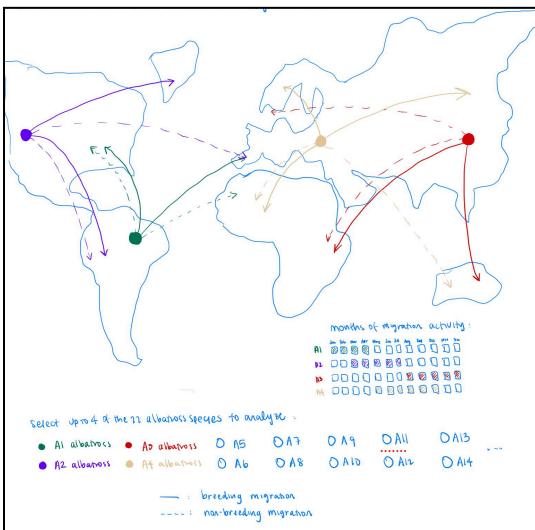
Data – As noted in the earlier “Project Proposal” section, there is plenty of data that we envision using and that might prove helpful as we develop our narrative and visualizations. We have labelled each variable by its respective data type:

18. Breeding Sites:
 - a. Species name (categorical)
 - b. Number of birds (quantitative)
 - c. Location (quantitative)
 - d. Population trends (ordinal)
19. ACAP Listed Species
 - a. Common name (categorical)
 - b. IUCN/conservation status (ordinal?)
20. Threats
 - a. Nature of threat (categorical)
 - b. Severity / Scope / Magnitude of threat (ordinal)
 - c. Bycatch
 - i. Location (categorical)
 - ii. Number of birds in bycatch (quantitative)
 - iii. Change over seasons/months
 - iv. Types of fishing (categorical)
21. For each species:
 - a. Population size (quantitative)
 - b. Wingspan, height (quantitative)
 - c. Average life expectancy (quantitative)
 - d. Clutch size (quantitative)
 - e. Nesting period (quantitative)
 - f. Fun facts

Initial Visualizations – Before diving into the in-depth data analysis and visualization constructions, we individually brainstormed several possible visualizations in answer to some of the questions posed above.

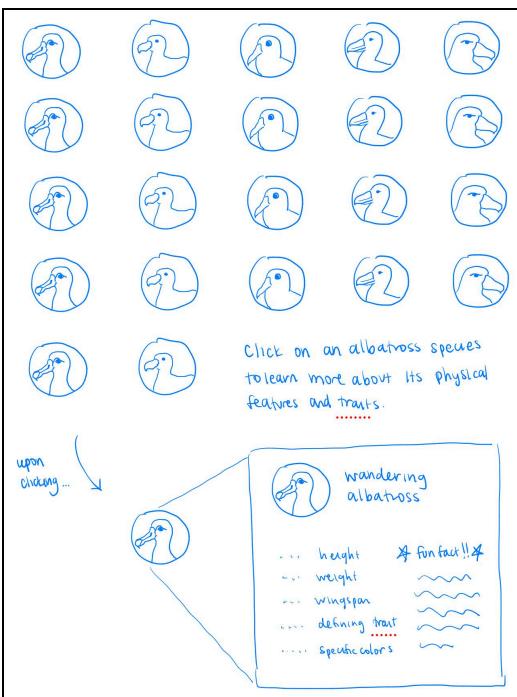
Audrey:

- Visualization #1: What is an albatross' migration pattern like?



This sketch stays pretty close to the original question “what is an albatross’ migration pattern like?” but narrows it to a more clear and teachable framing of where and when: simple arrows showcasing breeding and non-breeding migration paths, a tiny month strip to show when activity occurs, and a cap of 4 species (of the 22 different types) to avoid clutter. Originally, when we were coming up with ideas, we were a bit ambitious and wanted to show many GPS tracks and live movement... and maybe we still will try to do that. But this visualization trades that precision for better readability and comparability, which might be better for in-class and accessible explanation. It’s also a stronger question because the underlying data is quite spatial and temporal and visual, so viewers can instantly see paths, timing, and colony origins. The main limitation is that there may be sampling bias and the nature of the arrows may not be accurately representative of what the actual paths look like, but the payoff is a much more digestible overview that can probably be scaled.

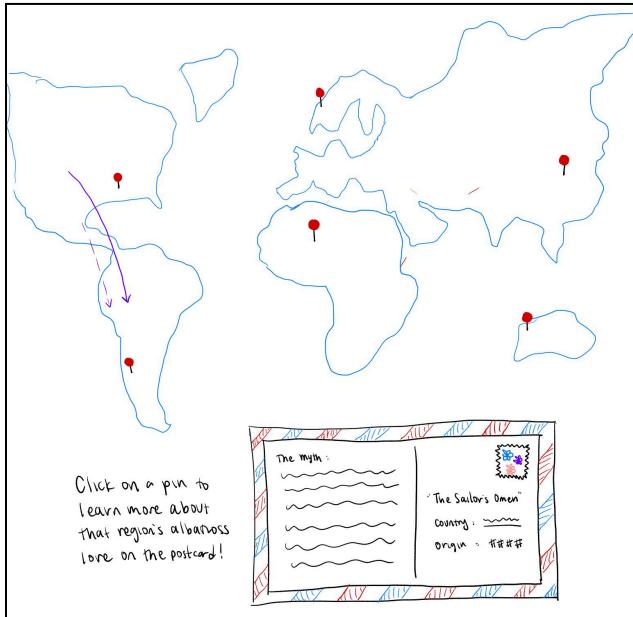
- Visualization #2: What do albatrosses look like, and how can I identify them?



This directly answers the original question of “what do albatrosses look like and how can I identify them?” but simplifies delivery: a grid of all the 22 species’ images/portraits opens a pop-up upon click that includes information

about core attributes, like wingspan/mass/colors and an interesting fun fact. Instead of just a broad “what makes them unique among seabirds”, we get more of a plain-view-as-is overview instead of an analysis. So, as a question, it’s less analytically rich than the migration one, but it certainly is better for engagement. The risk here might be some oversimplification, but we will make sure all the facts and claims are specific and link to sources for more information if users want to explore.

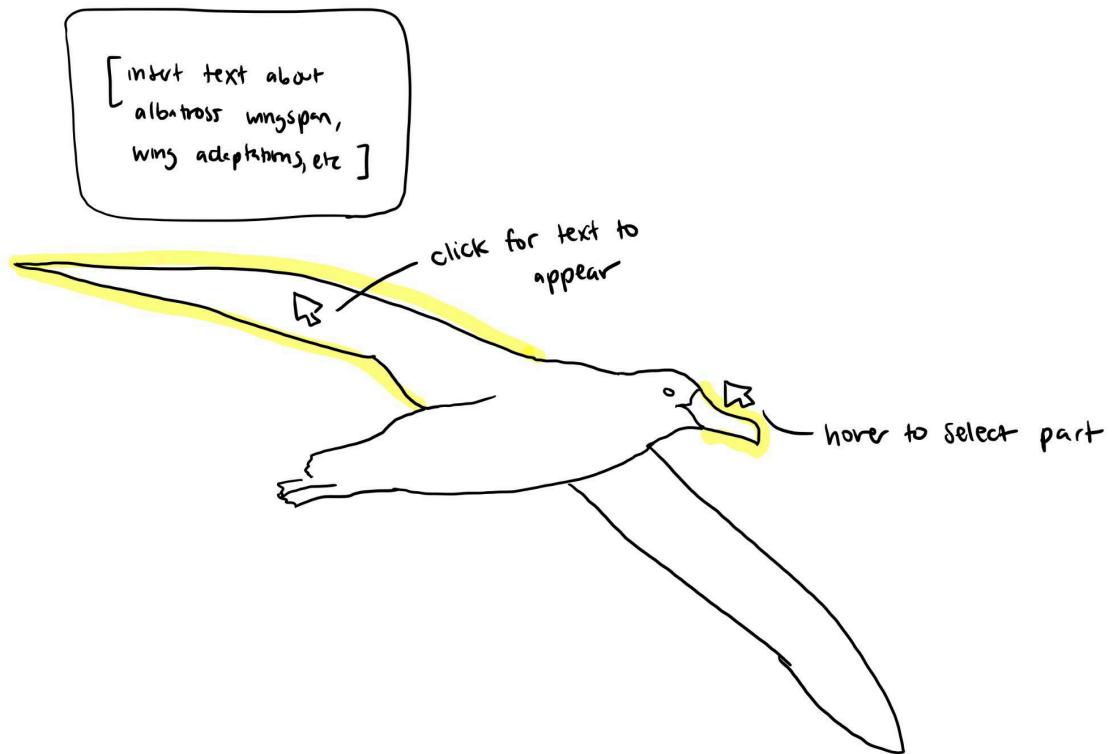
- Visualization #3: Are there any myths or stories surrounding these birds, and if so, what?



This keeps the spirit of “are there myths or stories” but reframes it as “where do these stories come from and what themes tend to appear” by pinning each tale to a specific region/era with a cute postcard pop-up. The difference from our original list is the added geographic and thematic structure, like the specific origin date, omen, myth, etc., making the qualitative topic more scannable. While it’s maybe less quantitative than some of the other data questions, it’s probably more appealing to audience curiosity, particularly the layman people we are targeting. Concise summaries and interesting narratives and sources will be provided so that the visualization remains credible but also fun.

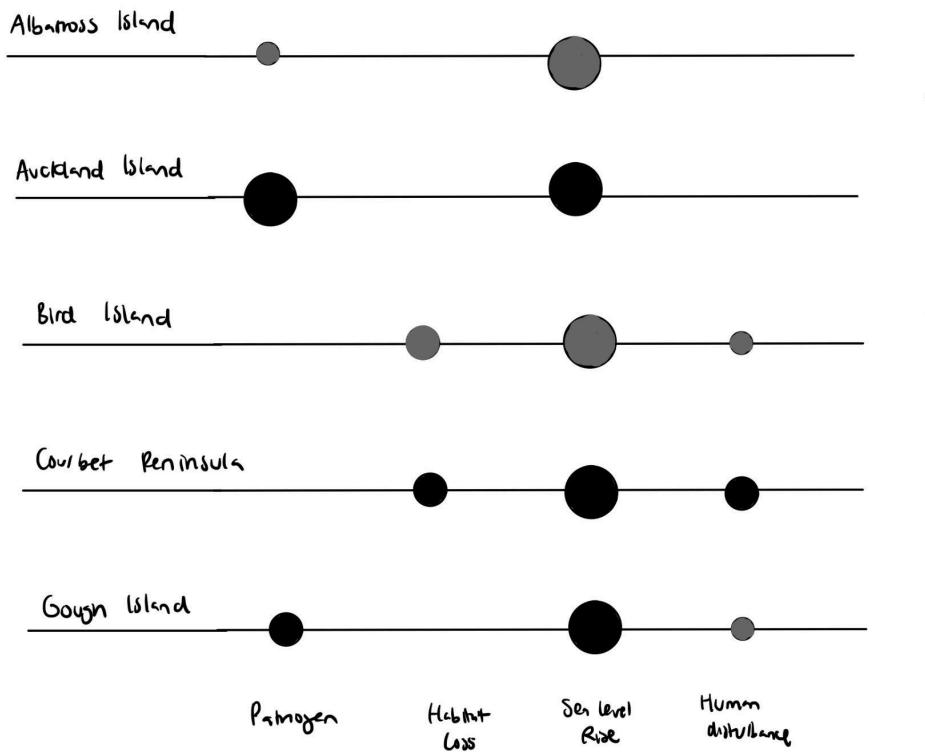
Robin:

Visualization #1: What do albatrosses look like and how can I identify them? What makes albatrosses unique from other birds?



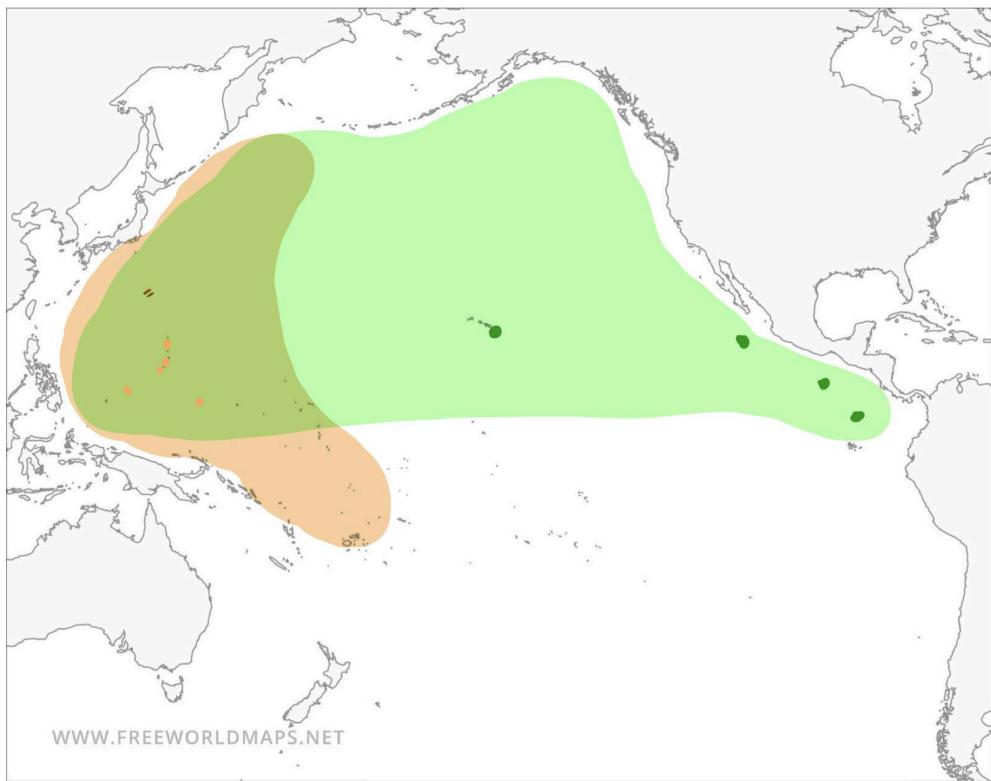
I wanted to introduce albatrosses in a very beginner friendly way, as the visualization for these questions would probably be one of the first visualizations. As the average person on the streets may not even know what an albatross looks like, I thought it would be helpful to start with a full body illustration of a stereotypical “average” albatross, which gives them something to visualize in their head throughout the rest of the website. Additionally, I wanted to provide some basic information about albatrosses and their anatomy but in a more interactive and engaging way than just listing text in a body paragraph. By allowing users to hover to select parts of the albatross and click to make text appear, the user can learn more about albatrosses and make easy connections between the fun fact and where on the albatross it corresponds to. Additionally, having small text boxes only appear when a certain part of the albatross is clicked prevents the screen from being too overwhelming and covered in dense text.

Visualization #2: What dangers/threats do albatrosses face?



This data was very challenging to illustrate since the original dataset had many factors about the threats including species, subthreats for certain threats (ex: some data points included the specific pathogen whereas others only listed pathogen in general), threat magnitude, scope, severity, and site of threat. Thus first I tried to distill what information I wanted to transmit and what I did not. I chose not to display species information since many species were not listed on the data set and species that shared breeding sites typically had similar threats. Thus instead I focused on threats at each breeding site. I chose to represent only threat magnitude since I thought it summarized the scope and severity of the threat well and I didn't want the visualizations to get too cluttered. In a further rendition of this design, perhaps the user can toggle if the size of the circle represents magnitude, scope or severity of threat. Then I had each threat along the x axis and each breeding site on the y axis to easily visualize which threats are more common and also see patterns between and across breeding sites.

Visualization #3: Are there trends or patterns in how albatrosses move?



- Albatross Species
- Amsterdam albatross
 - Antipodean albatross
 - Tristan albatross

Highlight = range
Solid = breeding site

In this visualization, I wanted to show the distributions and ranges of albatrosses. The transparent color indicates its range and the nature of its transparency allows the user to “stack” ranges on top of each other by selecting multiple species, allowing the user to compare distributions between different species. Each species is color coded for quick and easy identification of each species. Since breeding sites are typically much more specific and smaller in area, I identified each breeding site with a large dark colored dot and stripes on that dot if multiple species share that breeding site. Something that I am thinking about is if we should limit the number of species selected at a time and what this visualization would look like with many or all species selected and if it would get too busy.

Data Exploration

1. Finalize and document your data sources: Confirm datasets, record sources, file formats, and any usage restrictions.
 - a. Breeding sites – [ACAP](#): XLS file, no usage restrictions
 - b. Species-specific info – [Data Zone](#) / [All About Birds](#): CSV file / HTML website, no usage restrictions
 - c. Threats – [ACAP](#): XLS file, no usage restrictions
2. Create a data inventory: List the number of items and variables for each dataset. List all variables with their data types (categorical, ordinal, quantitative, temporal, geographic, etc.), value ranges, how it was collected, and missing data patterns.

- a. Breeding Sites:
- i. Species name (categorical)
 - ii. Number of birds (quantitative)
 - iii. Location (quantitative)
 - iv. Population trends (ordinal)
- b. Species-Specific Information:
- i. Common name (categorical)
 - ii. IUCN/conservation status (ordinal?)
 - iii. Life history information (quantitative)
- c. Threats:
- i. Location of threat (geographical)
 - ii. Nature of threat (categorical)
 - iii. Severity / Scope / Magnitude of threat (ordinal)
3. Explore your data: Explore the dataset using tools like Excel or by writing AI-assisted code for basic statistical summaries, distributions, and outlier detection for all variables you are planning to use. Document your AI/tool interactions with screenshots or prompt/response examples.
- I have two different files: one is from birdlife and it gives some info about each albatross species in a csv file called "species-filter-results.csv"; the other is from ACAP and it's an xls file that gives the breeding site info including island group, island name, breeding site name, species in scientific name, and geological position. I want to explore these datasets and get info about basic statistical summaries, distributions, and outlier detection for my relevant variables. Can you help me figure out how to do that based on the cleaned data?
- Thought for 15s

Thought for 15s

BirdLife Species CSV - First 10 Rows			
SIS ID	Sequence	Family	Scientific name
1 30004	23490	Albatrosses	<i>Diomedea antipodensis</i>
2 3971	23600	Albatrosses	<i>Phoebetria palpebrata</i>
3 3987	23590	Albatrosses	<i>Phoebetria fusc</i>
4 3965	23650	Albatrosses	<i>Thalassarche chlororhynchos</i>

BirdLife Dtypes	
	dtype
1 SIS ID	int64
2 Sequence	int64
- a. Breeding Sites + Species-Specific Information (decided to take these together): we explored two sources that, across both, included info about IUCN status, population size, migratory status, RL AOO (area of occupancy), and RL EOO (extent of occurrence):
- i. AOO: min = 0, median = 54.5, max = 24100 km squared → basically, most species occupy tiny breeding areas, while just a few occupy more; the minimum of 0 likely just means “effectively zero/very restricted or not reported precisely”
 - ii. EOO: min = 8800, median = 58750000, max = 177000000 km squared → we knew from previous knowledge that EOOs tend to be huge for pelagic birds like albatrosses and in fact, some species span insanely large ocean areas (and that’s why our EOO numbers are so big compared to the AOO values)
 - iii. Population size: data available for 16/22 species ranging from size 92 to 1600000, median = 54,000 → it seems that most species have modest adult populations, but a few are much larger, which means that the distribution is right-skewed

- iv. Interquartile range rule: as we expected, a few species showed high-end outliers for adult population size, reflecting genuinely large and widespread populations
- v. Positioning (latitude/longitude): the ACAP breeding sites csv contained information about coordinates recorded in degrees-minutes-seconds (DMS), which we then converted to decimal latitude/longitude; there was very little missingness (only 1 row missing latitude and 1 missing longitude) and no exact duplicate rows, so only light cleaning was required
- vi. Finally, the ACAP file included some non-albatross names, which we filtered out; we then standardized scientific names and joined the two files, and thankfully, all albatross rows matched

The screenshot shows a Jupyter Notebook environment with several open cells and a Gemini AI sidebar.

Code Cells:

```

Reasoning: Aggregate the 'Species' and 'Threat species' columns into a list of tuples for each group.

[9]  ✓ 0s
1 threat_tuples = grouped_df.apply(lambda x: list(zip(x['Species'], x['Threat s
2 threat_tuples_df = threat_tuples.to_frame(name='Species-Threat_species')

[10]  ✓ 0s
1 threat_tuples_df.head()

```

Data Preview:

Breeding site name	Nature of threat	Species-Threat_species
Albatross Island (AU)	Parasite or pathogen - Pathogen	Thalassarche cauta, (Avian pox virus)
Auckland Island	Predation by alien species - Predation by alien species	Diomedea antipodensis, Sus scrofa (Pig), Thalassarche steadi, Sus scrofa (Pig), Thalassarche steadi, Felis catus (Cat), Diomedea epomophora, Sus scrofa (Pig)
Bird Island (SGSSI (IGSIS))	Parasite or pathogen - Pathogen	Diomedea exulans, Avia Influenza (Avian Influenza)
Courbet Peninsula	Predation by alien species - Predation by alien species	Diomedea exulans, Felis catus (Cat)
Falaise d'Entrecasteaux	Parasite or pathogen - Pathogen	Thalassarche carteri, Pasteurella multocida (Avian cholera)

Gemini Sidebar (AI Assistant):

- For each island, if the nature of threat is repeated, combine the multiple threat species and species into 1 column that is a list of tuples (species, threat species)
- Okay, I understand. To achieve that, I'll create a plan that involves grouping the data and aggregating the relevant columns.
 - Group data: Group the DataFrame by 'Breeding site name' and 'Nature of threat'.
 - Aggregate data: For each group, aggregate the 'Species' and 'Threat species' columns into a list of tuples, where each tuple is (Species, Threat species).
 - Combine data: Combine the grouped and aggregated data back into a single DataFrame.
 - Finish task: Display the resulting DataFrame with the combined information.

Generating...
 Preparing
 Group data
 Explain the structure of 'threat_tuples_df'
 Filter 'threat_tuples_df' for 'Predation by alien species'
 Show me unique values in 'Nature of threat'
 What can I help you build?

- b. Threats: This data didn't require too much processing. I minimally removed some unnecessary columns and rearranged and reformatted a few others to make it easier to process and visualize later.
 - i. We processed this as a pandas dataframe since one of the teammates was very familiar with pandas and knew it would be useful for merging and rearranging columns
 - ii. Originally there were a lot of extra unnecessary rows with empty values in many of them - this was because for threats that had a threat species (ex: predation, parasites, etc) each threat species had their own row, which resulted in multiple rows for the same breeding site and empty values for islands or threats that didn't involve a threat species. To fix this, I combined the species and threat species in 1 column.
4. Identify data cleaning needs: Document missing values, inconsistencies, duplicates, and transformation requirements / Clean your data: Remove duplicates and transform the data as needed for visualizing your data story.
- a. Breeding Sites + Species-Specific Information: we were pleasantly surprised that the data needed pretty light cleaning sufficed
 - i. For the BirdLife file, we cleaned up text, turned the “numeric” columns into actual numbers, and ID'd each species by using its scientific name in lowercase; we treated the Red List (RL) status as a

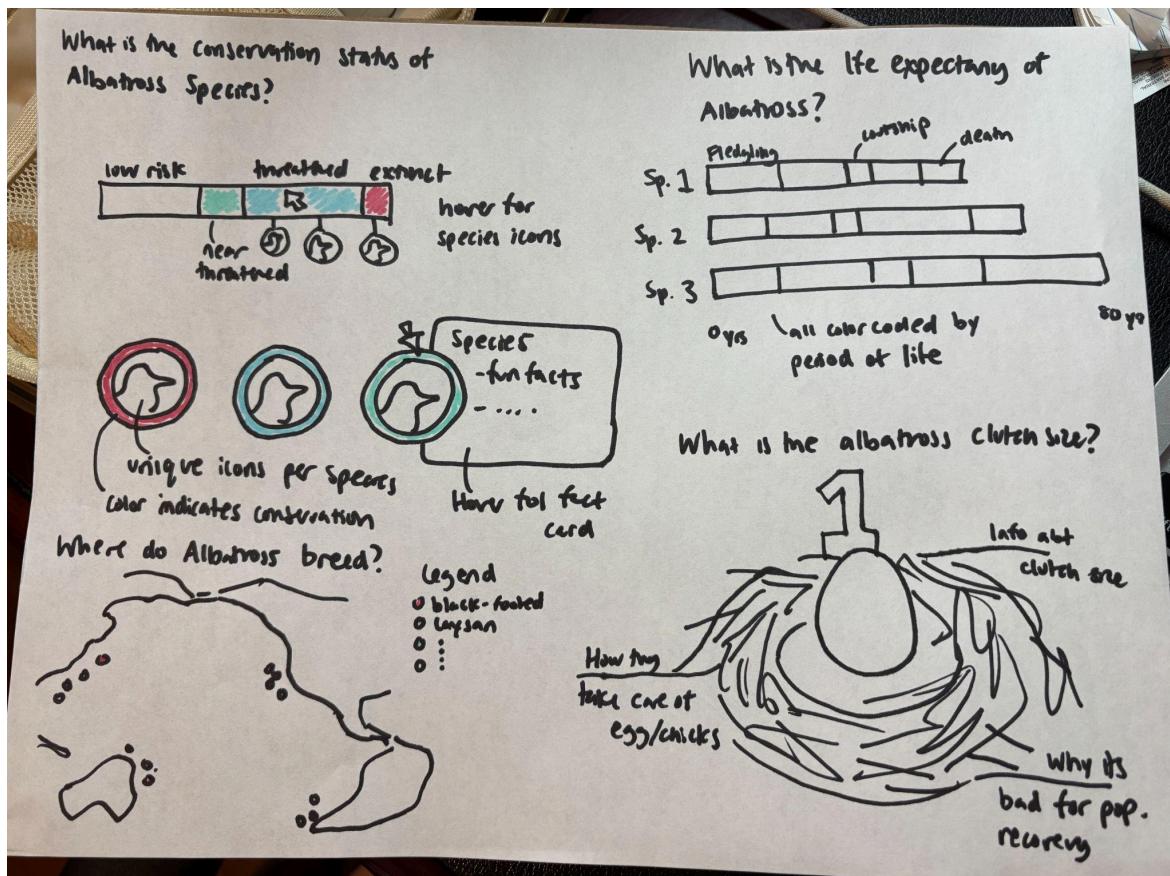
- ranked risk ladder of critically endangered (CR), endangered (EN), vulnerable (VU), near threatened (NT), and least concern (LC); six species didn't have a population estimate, so we just left those blank and labelled "Unknown" in the UI
- ii. For the ACAP file, we made the column names consistent, converted the latitude/longitude from the "degrees–minutes–seconds" format into regular decimals, and checked that all coordinates fall within real-world ranges; while we didn't delete any rows, we did mark the one with a missing/invalid coordinate
 - iii. We're keeping two simple tables—one for species (BirdLife) and one for breeding sites (ACAP)—and we only combine them using that species ID when we want to add species info to site maps
- b. Threats:
- i. We ended up not including bycatch information in this dataset - see more details in the reflection
 - ii. We mostly focused on using the ACAP threats data - for this we sorted the data by breeding site and removed duplicates of nature of threats and reformatted the threat species column to have a list of all threat species and their respective albatross species in 1 row instead of multiple rows with 1 species in each row
 - iii. We removed threat severity and scope columns since we focus on threat magnitude
5. Write a two-paragraph reflection: How does your actual data compare to your original vision? Which audience questions you came up with earlier can/cannot be answered? What are your biggest data quality challenges?

We were fortunate that most of our data ended up being quite faithful to our original vision of exploring the life history, migration, and conservation of albatrosses, though we had to simplify certain areas compared to our initial plan. We successfully compiled information from various datasets in ACAP and BirdLife to build a cohesive set of datasets that covers information on albatross range and breeding sites and their threats. However we did realize that some of the data we hoped to include—especially on bycatch—was not feasible to integrate. The available bycatch information required extensive compilation across multiple scientific papers that used inconsistent methods (different albatross species, fishing zones, and collection techniques), making it impossible to form a standardized and comprehensive dataset.

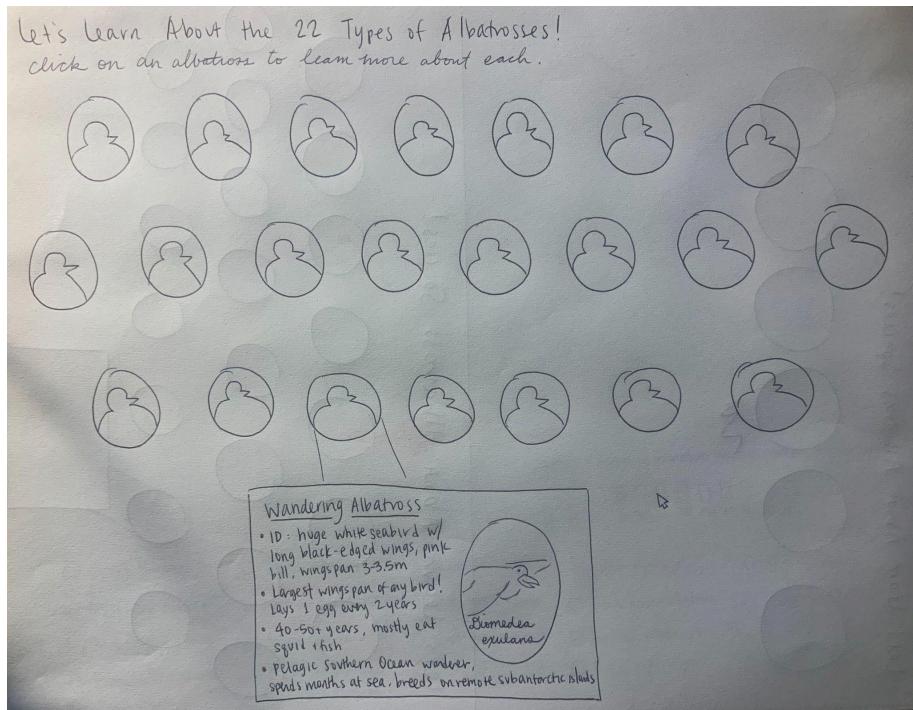
Additionally, we found it very difficult to manage the GPS data on individual albatross movement. Upon further reflection, we decided that rather than specific movements or migration patterns, it would be more useful for most readers to just understand the ranges and locations where these albatross can be found. As a result, we focused instead on threat magnitude and breeding-site-level data that could be consistently represented. Thus we were unable to answer specific bycatch questions such as: how many birds are caught in bycatch per year? How does bycatch vary throughout the year? What routes to different species fly on? Instead, we focused on telling the larger story of albatrosses as a whole and focusing on breadth of threats instead of depth on a specific one. The biggest data challenges we faced with our other datasets included blank/unknown information and reformatting columns and rows in a way that made sense for the specific data that we wanted to feature and how we wanted to use this data. Ultimately, these constraints led us to prioritize clarity and comparability over completeness, shaping our project into a more digestible yet still data-grounded visualization of the albatross story

Sketching

Robin Pan

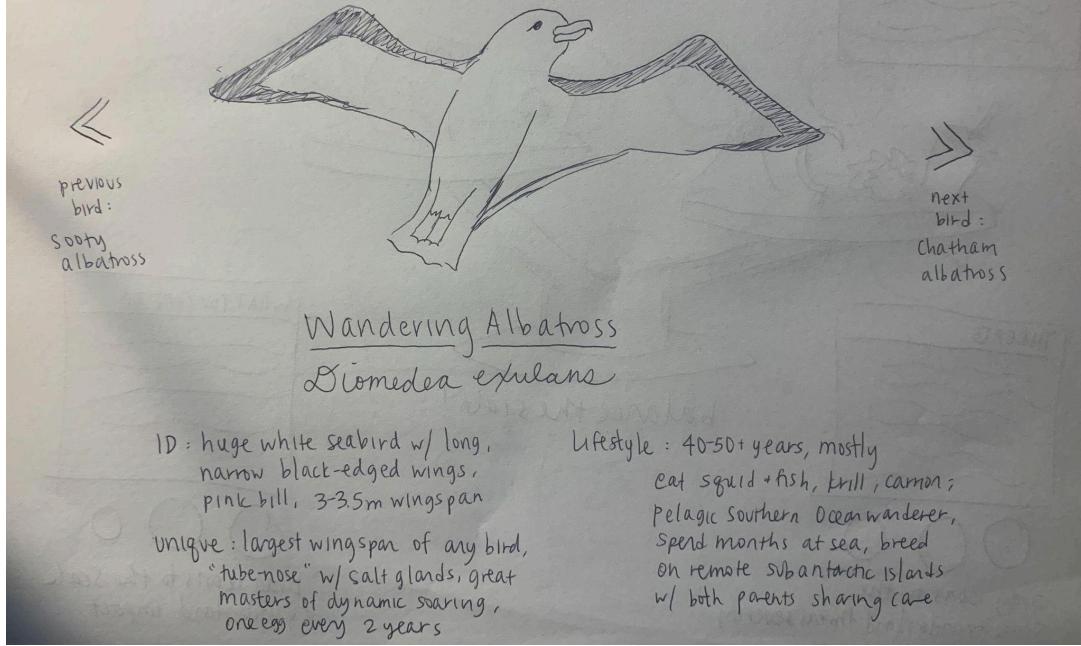


Audrey Zhang

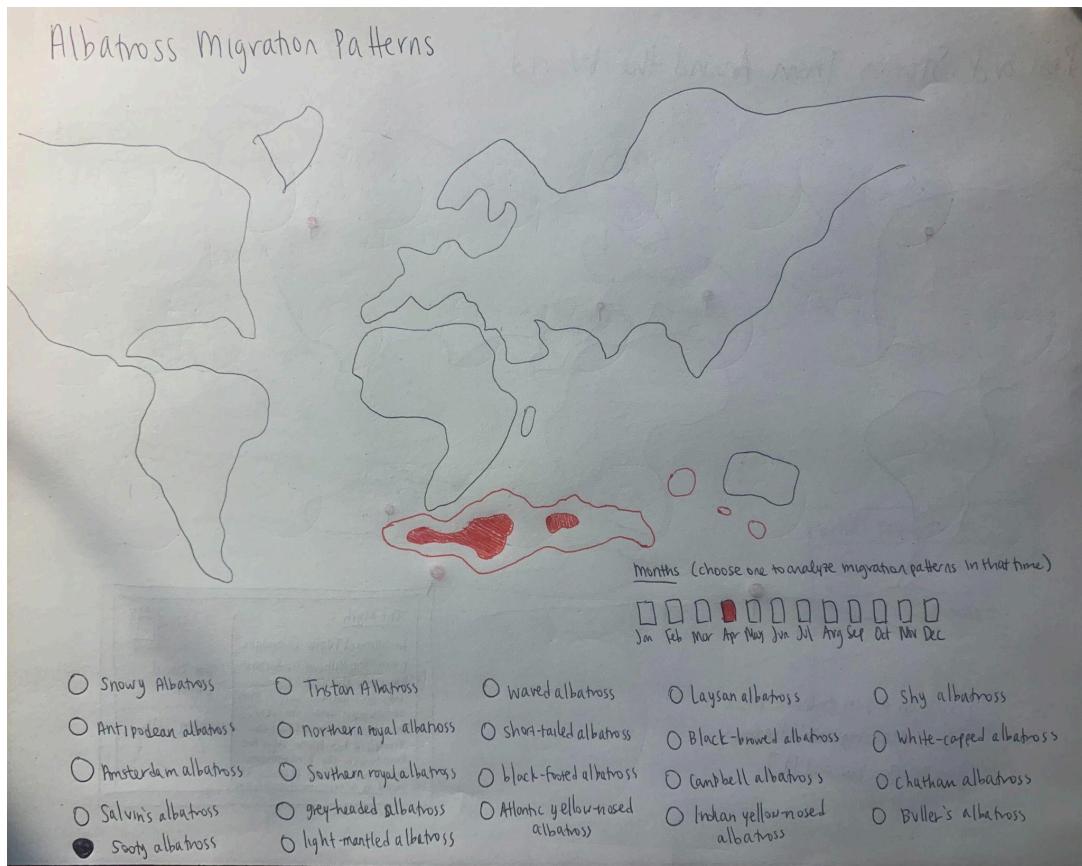


^What do albatrosses look like and how can I identify them? What makes albatrosses unique from other birds? How long do albatrosses live? What do they eat? What is the albatross's lifestyle like?

Let's learn About the 22 Types of Albatrosses !!
 [scroll through to learn about the lifestyles of different albatrosses]

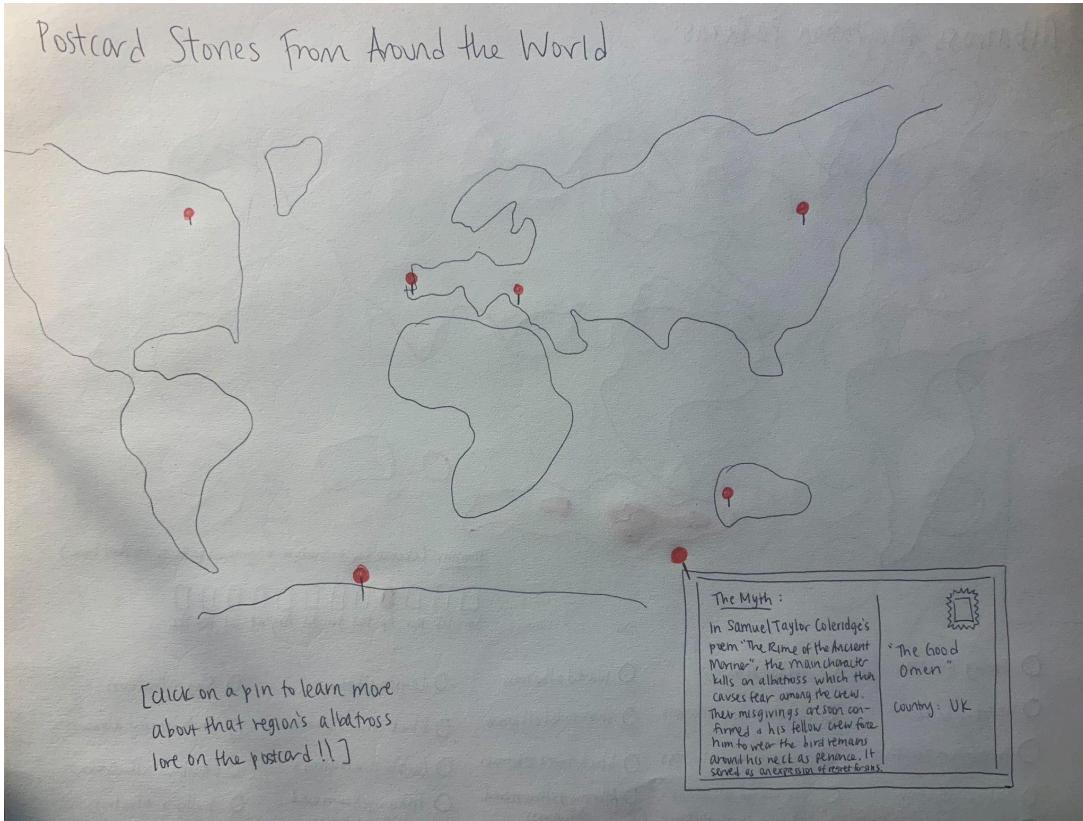


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^Where do albatrosses live? What is their migration like? Are there trends or patterns in how albatrosses move?

Postcard Stories From Around the World



^What do albatrosses symbolize in different cultures? Are there any myths or stories surrounding these birds, and if so, what?

Threats to Albatrosses

WHY CARE?

THREATS

balance the scale!

Drag icons to the scale to understand threat severity

WHAT YOU CAN DO

Drag icons to the scale to understand impact

^Why is it important to know about albatrosses / why should I care about these birds? What dangers/threats does this species face? How can I make a difference in albatrosses' lives?

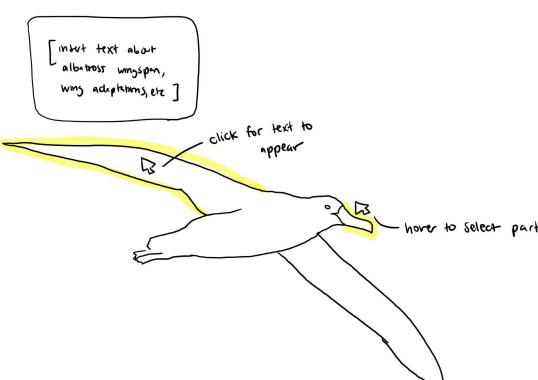
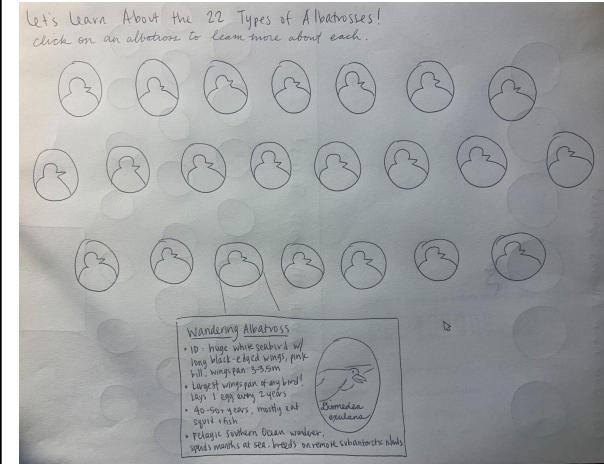
Visualization Selection

Questions:

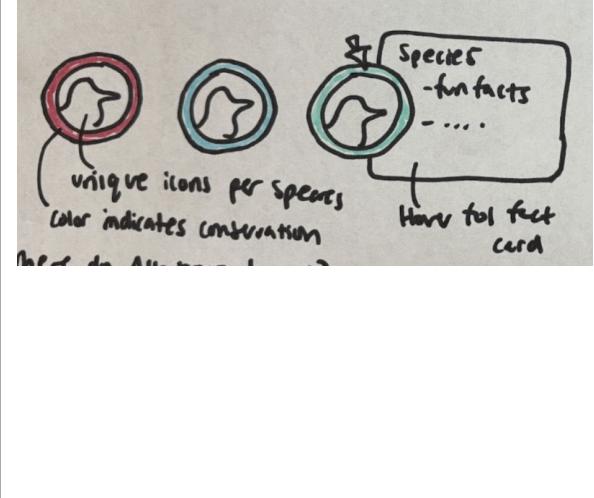
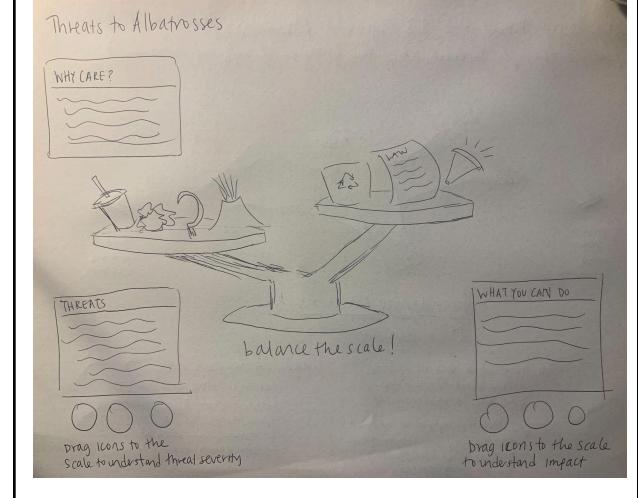
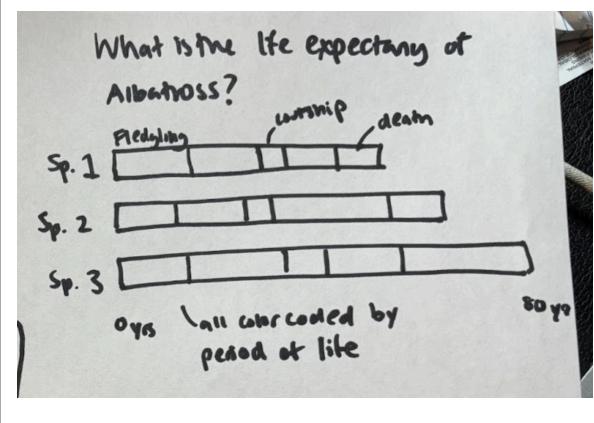
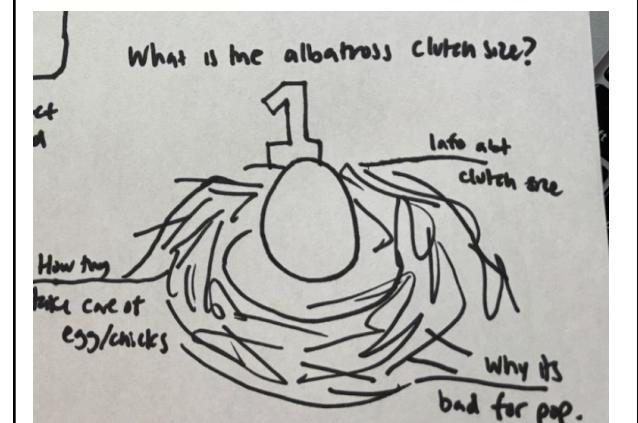
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Sketches/Votes:

The below table showcases our sketches and our votes

No.	Sketch	No.	Sketch
1 +RP		2 +RP +AZ	

3 +RP +AZ		4	<p>Let's learn About the 22 Types of Albatrosses !! [scroll through to learn about the lifestyles of different albatrosses]</p> <p>Wandering Albatross <i>Diomedea exulans</i></p> <p>ID: huge white seabird w/ long, narrow black-edged wings, pink bill, 3-3.5m wingspan</p> <p>Unique: largest wingspan of any bird, "ruben-nose" w/ salt glands, great masters of dynamic soaring, one egg every 2 years</p> <p>Lifestyle: 40-50 years, mostly eat squid + fish, travel, can fly pelagic Southern Ocean, spend months at sea, breed on remote Subantarctic Islands w/ both parents sharing care</p>												
5	<p>Albatross species</p> <ul style="list-style-type: none"> Amsterdam albatross Amsterdam albatross Tropic albatross <p>Highlight = range Solid = breeding site</p>	6 +RP +AZ	<p>Albatross Migration Patterns</p> <p>Migrations (choose one to activate migration paths in flight time)</p> <table border="1"> <tr> <td>Jan</td> <td>Feb</td> <td>Mar</td> <td>Apr</td> <td>May</td> <td>Jun</td> <td>Jul</td> <td>Aug</td> <td>Sep</td> <td>Oct</td> <td>Nov</td> <td>Dec</td> </tr> </table> <ul style="list-style-type: none"> Snowy Albatross Antipodean albatross Antipodean albatross Tropic Albatross Northern royal albatross Southern royal albatross Silver Gull Gull-billed Gull Light-mantled Sooty Albatross Waved Albatross Short-tailed Albatross Black-faced Albatross Blue-faced Albatross Wedgetail Albatross Chatham Albatross Indian Yellow-nosed Albatross Short-tailed Albatross White-capped Albatross Black-bellied Albatross Red-tailed Albatross Thick-billed Albatross Buller's Albatross 	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
7	<p>low risk threatened extinct</p> <p>near threatened</p> <p>haven't seen species icons</p>	8 +RP +AZ	<p>Postcard Stories From Around the World</p> <p>The Myth: In Samuel Taylor Coleridge's poem 'The Rime of the Ancient Mariner', the crew of the ship kills an albatross which then causes their ship to remain still. The crew then hung the albatross around the neck of their captain & his fellow crewmen. This was to ensure that the albatross would return to the ship to lead them to safety if ever they became stranded.</p> <p>The Good Doctor: Living, UK</p>												

9 +AZ +RP	 <p>unique icons per species color indicates conservation status do all three</p> <p>Species - fun facts -</p> <p>Have full fact card</p>	10	 <p>Threats to Albatrosses</p> <p>WHY CARE?</p> <p>balance the scale!</p> <p>drag icons to the scale to understand threat severity</p> <p>WHAT YOU CAN DO!</p> <p>drag icons to the scale to understand impact</p>
11	 <p>What is the life expectancy of Albatross?</p> <p>Sp. 1</p> <p>Sp. 2</p> <p>Sp. 3</p> <p>Preening</p> <p>courtship</p> <p>death</p> <p>0 yrs</p> <p>80 yrs</p> <p>all color coded by period of life</p>	12	 <p>What is the albatross clutch size?</p> <p>1</p> <p>Info abt clutch size</p> <p>How long take care of egg/chicks</p> <p>Why its bad for pop. recovery</p>

Sketch ID	Question ID	Author
1, 2, 4	1	AZ, RP
1, 2, 4	2	AZ, RP
2, 4	3	AZ
6	4	AZ, RP
2, 4	5	AZ
2, 4,11,12	6	AZ, RP
6	7	AZ
10,7,9,12	8	AZ, RP
3, 10	9	AZ, RP
10	10	AZ
8	11	AZ

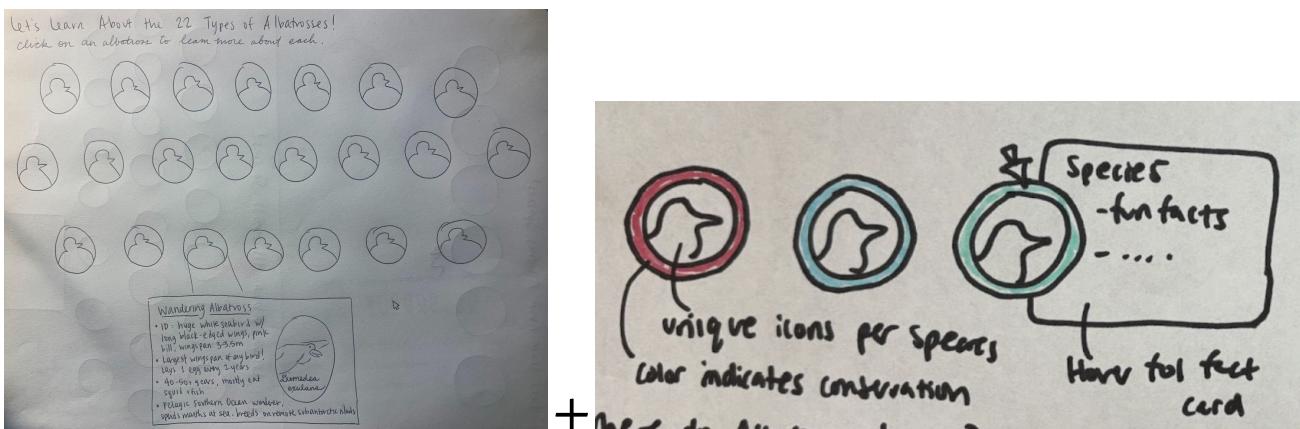
8	12	AZ
5,6	13	AZ, RP

Final Visualizations

Chosen Options

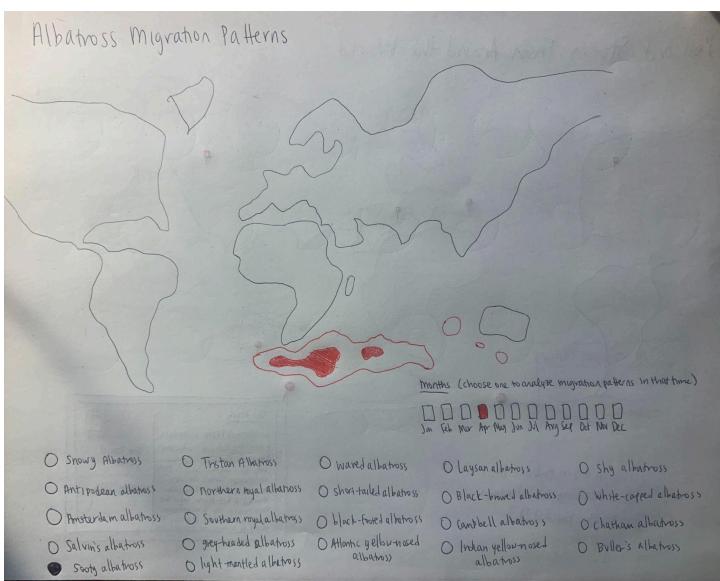
Visualization #1

What do albatrosses look like and how can I identify them? What makes albatrosses unique from other birds? How long do albatrosses live? What do they eat? What is the albatross's lifestyle like?



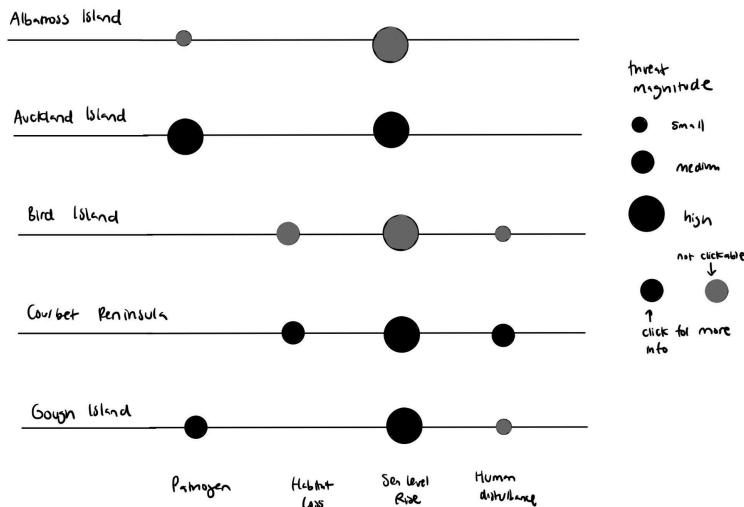
Visualization #2

Where do albatrosses live? What is their migration like? Are there trends or patterns in how albatrosses move?



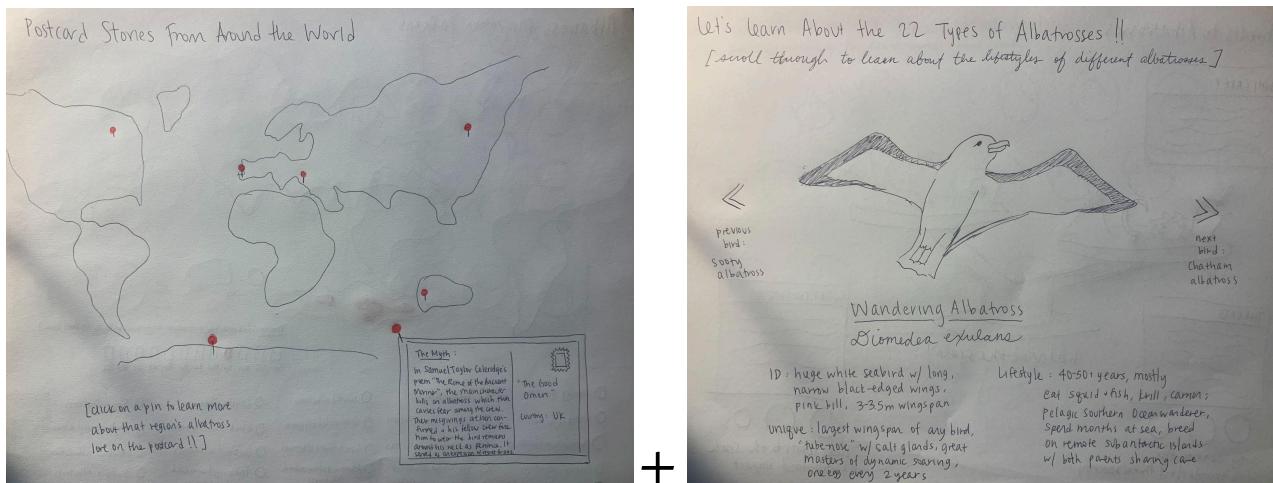
Visualization #3

Why is it important to know about albatrosses / why should I care about these birds? What dangers/threats does this species face? How can I make a difference in albatrosses' lives?



Visualization #4

What do albatrosses symbolize in different cultures? Are there any myths or stories surrounding these birds, and if so, what?



Visualization Rationale

We wanted to make sure we covered the most important questions and had a range of visualizations covering different topics. Many of our visualizations actually ended up being combinations of different visualizations which we thought would allow us to draw from the strengths of different visualization approaches. The first visualization we chose answers the questions of: *What do albatrosses look like and how can I identify them? What makes albatrosses unique from other birds? How long do albatrosses live? What do they eat? What is the albatross's lifestyle like? What is the conservation status of different albatross species?* We liked the format of having icons of all the species in an array which the user could select to reveal a popup card with more information instead of having all of the information immediately present to help prevent visual clutter. We also liked the idea of colored rings around icons to indicate conservation status and thus chose to combine these two ideas and add colorful rings to the initial icon array design. We both created very similar visualizations (5 and 6) to represent the migration patterns of albatrosses and answer the questions *What is their migration like? and Are there trends or patterns in how albatrosses move?:* world maps with migration paths of the respective albatross species encoded by color and regional area shading. Since visualization 6 also included information about the time of year that migration occurred for each species, we thought that might be more in-depth and decided to select that one. For the conservation question, we were deciding between 3 or 10, but decided to go with 3. This visualization provides more details on the nuances of different threats, what species they affect, and where the

threats are. Additionally, we were concerned that balancing the scale, while fun, may not make sense for certain combinations of threats and actions and would be hard to implement to take every possible combination into consideration. However, as the current sketch of 3 does not answer the question: *What can we do to help?*, we are thinking of modifying or adding to this design to add more details on what actions can be taken. Finally, we thought it would be an interesting tidbit to discuss the cultural references and myths surrounding albatrosses from around the world, which made the postcard visualization fitting. However, we didn't want to repeat the map motif from the migration visualization, so we decided that we would combine the slide format of one of the not-chosen visualizations such that users could swipe through different postcards and read about the various stories in that manner.

Storyboard

Identifying the Main Message

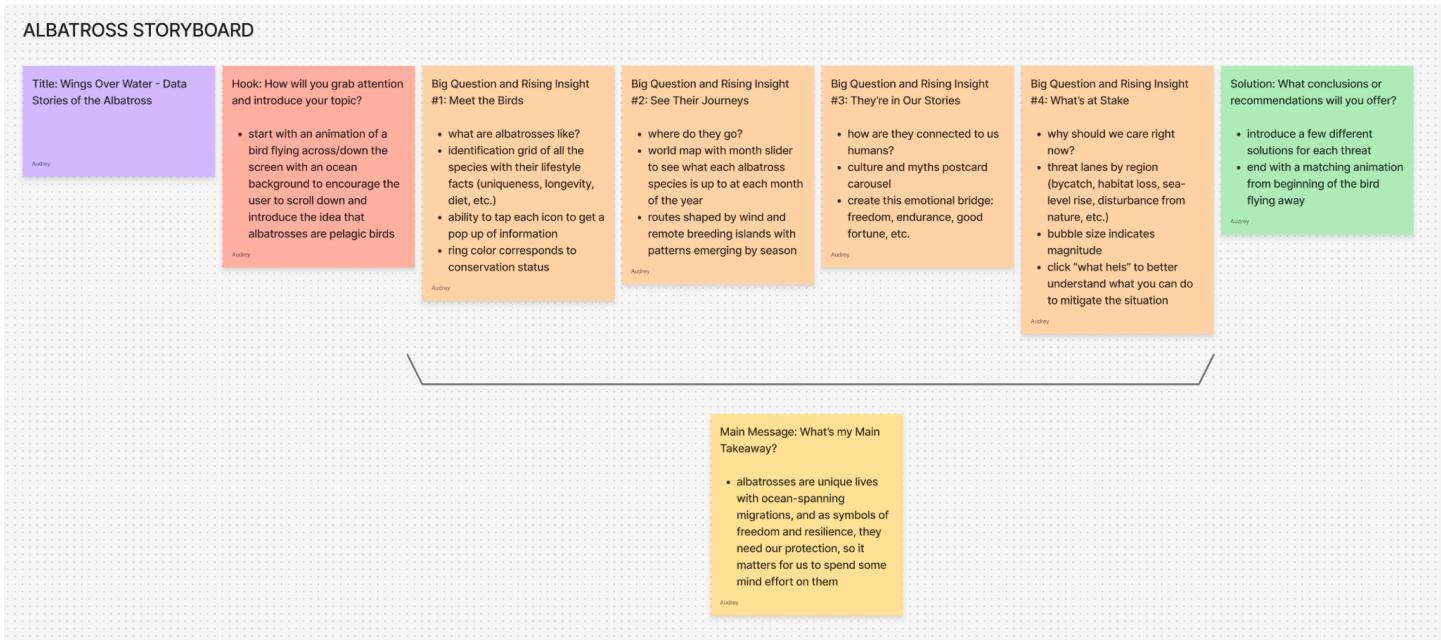
- Robin:
 - Albatrosses have unique life histories compared to many other birds. They mate for life, take up to a decade to reach sexual maturity, and lay just one egg per year, which makes their breeding sites very vulnerable to predators and their populations very slow to recover
 - As albatrosses are known to be excellent seabirds with impressive flying abilities, sailors have centered albatrosses in many of their myths and legends. These vary from believing albatrosses were souls of lost sailors, signs of good fortune, and sacred figures.
- Audrey:
 - Almost all the 22 albatross species are long-distance migrants, which means that they cross many countries and bodies of water throughout the year. Because of that, keeping them safe depends on intercontinental cooperations to reduce bycatch incidents and protect key breeding sites.
 - Albatross species populations vary greatly in number, ranging from 1.6m Laysan Albatrosses to only 92 Amsterdam Albatrosses, which means that certain species are much more vulnerable; that means conservationists can prioritize their efforts accordingly, ensuring focus on the spots where the most declining species overlap.

The Final Chosen Insight

Albatrosses are remarkable seabirds whose unique life histories, adaptations, and ocean-spanning migrations have made them symbols of freedom and resilience. They are fascinating creatures that we hope people can learn more about.

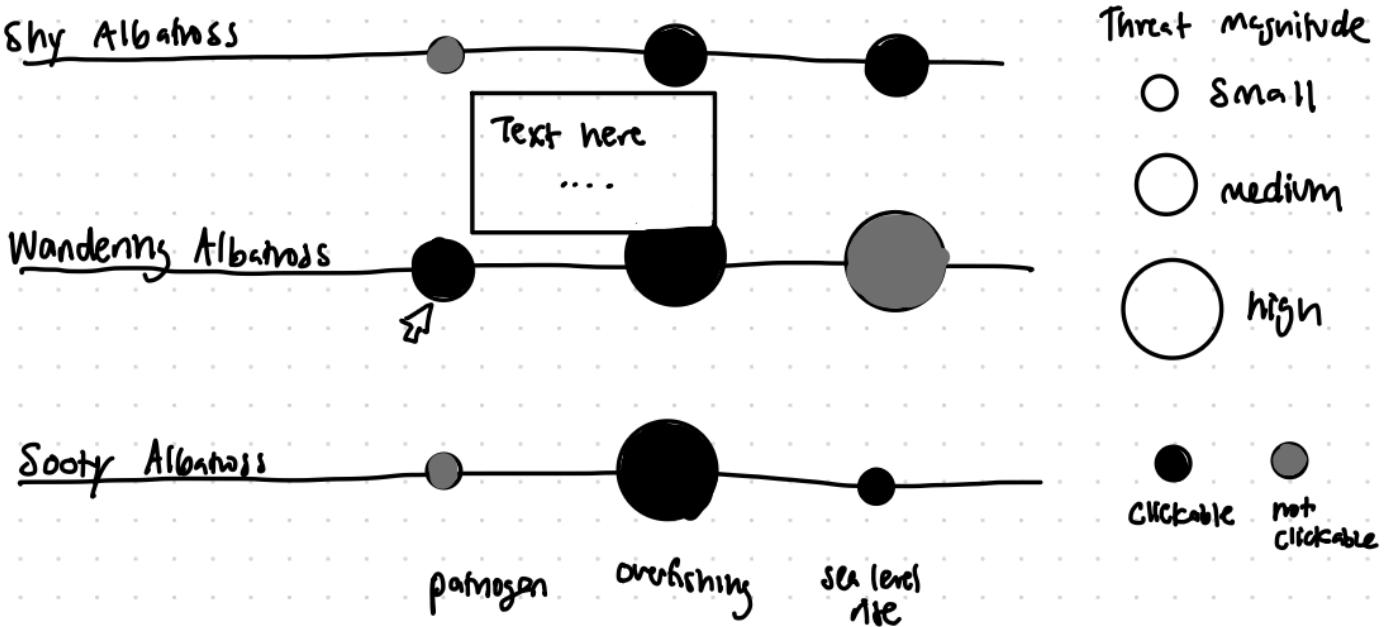
We chose this final insight because it captures the essence of what we discovered through our data exploration, that albatrosses are extraordinary birds, both biologically and culturally. From their lifelong partnerships and slow reproduction to their incredible ability to travel vast distances across the oceans, every piece of data we examined highlighted how unique and awe-inspiring they are. Rather than focusing solely on threats or statistics, we wanted our visualization to celebrate these qualities and share a sense of wonder with our audience. Since our target viewers are general audiences rather than experts, we aimed for a message that is light, engaging, and accessible. We wanted to create something that sparks curiosity and appreciation for albatrosses and the importance of understanding and protecting them.

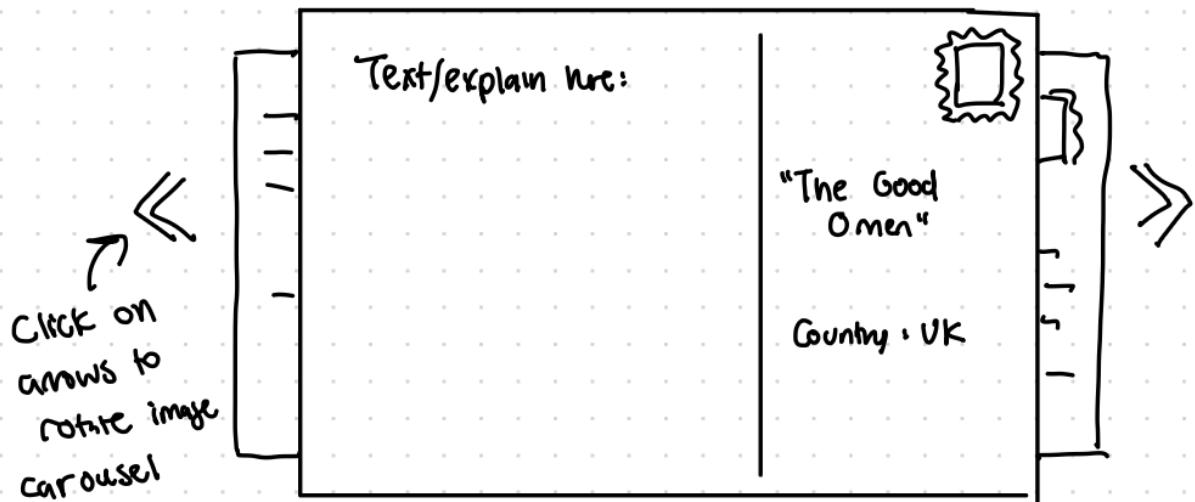
Storyboard Visualization



Prototype I

As the initial draft of our prototype, we coded and implemented several webpages based on the visualizations detailed above; they can be found in the albatross-proto zip file. Below we have also attached our in-depth designs for 2-3 more visualizations that have not yet been implemented, including interactivity and innovative design approaches.



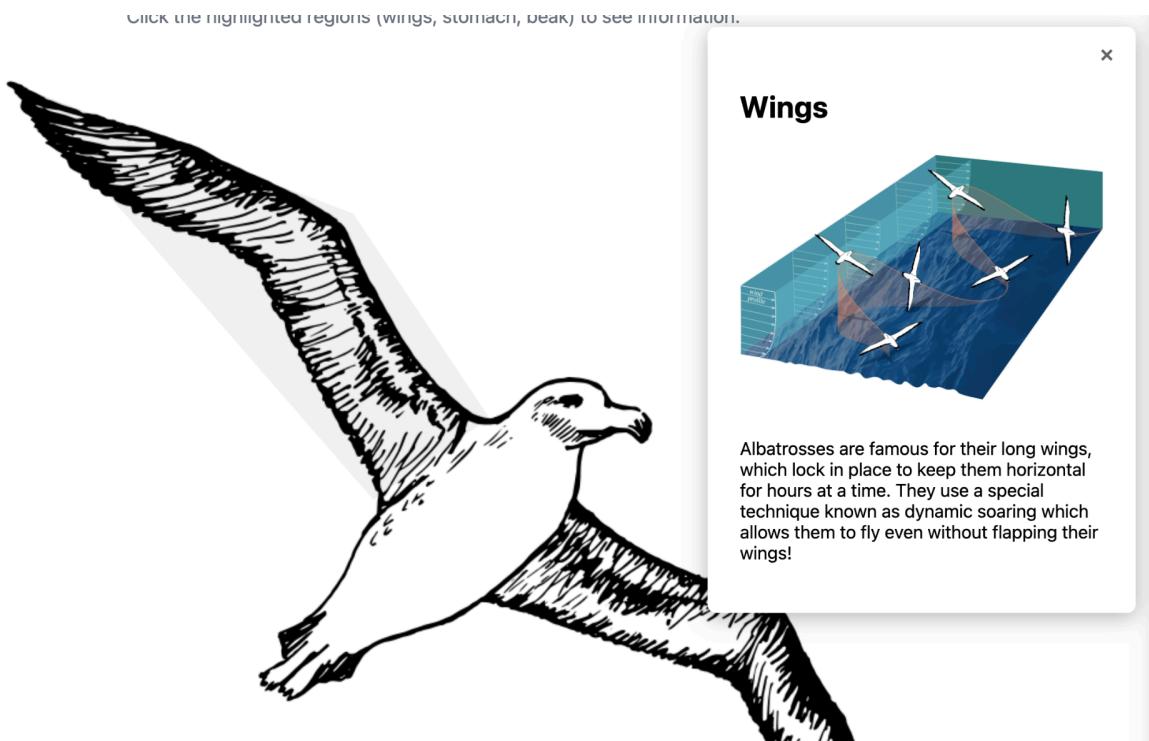


Prototype II

As the next draft of our prototype, we finished implementing interactivity in every webpage. Next steps involve further refinement.

Prototype III

All interactivity is complete. We will work on adding aesthetic and finishing touches. A few sample visualizations:



Popups when click on certain parts of the bird and ability to X out

Exploring By The Species

Click on each species for more information!

● Critically Endangered ● Endangered ● Vulnerable ● Near Threatened



Northern
Royal Albatross



Southern
Royal Albatross



Wandering
Albatross



Antipodean
Albatross



Antarctic
Albatross



Sooty Albatross



Light-mantled
Albatross



Waved Albatross



Black-footed
Albatross



Laysan
Albatross

Wandering Albatross (*Diomedea exulans*) ✖



Conservation Status: Vulnerable

Population: 20,100 mature individuals

Population Trend: Decreasing

Range: 128,000,000 km²

Lifespan: >50 years

Wingspan: 250–350 cm

Length: 107–135 cm

Weight: 5.9–12.7 kg

Colony locations: Macquarie Island, Australia; Ile de la Possession, France; Iles Crozet, France; Iles

Clicking on a species grays out everything else and brings up a side bar pop up with further information about the species

Albatross



Black-footed
Albatross



Black-browed
Albatross



A
Laysan

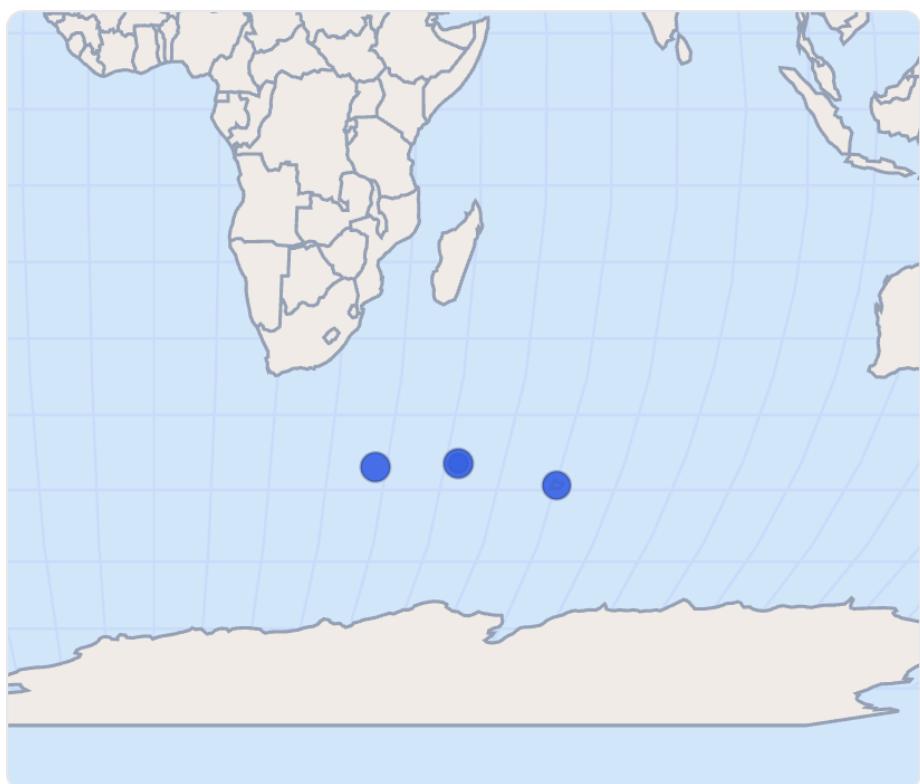
Wingspan: 250–350 cm

Length: 107–135 cm

Weight: 5.9–12.7 kg

Colony locations: Macquarie Island, Australia; Ile de la Possession, France; Iles Crozet, France; Iles Kerguelen, France; Marion Island, South Africa; Bird Island (SGSSI (IGSIISS)), South Georgia and the South Sandwich Islands

Colony Locations



Ivin's Albatross

Sidebar includes map that users can zoom in/out and move around

Threats

Each circle represents a threat affecting a species. Hover for details.



Amsterdam Albatross (*Diomedea amsterdamensis*)



Conservation Status: Endangered

Fun Fact: This species is among the rarest albatrosses—breeding only on Amsterdam Island in the southern Indian Ocean.

Population: 92 mature individuals

Population Trend: Increasing

Range: 11,900,000 km²

Wingspan: 280–340 cm

Length: 107–122 cm

Weight: 4.8–8 kg

Users can also select species from the threats visualization

Threats visualization is also color coded to match the conservation color coding from species

Albatross • Folklore & Superstitions

Flip through famous appearances of the albatross in literature and history.

MYTH & ETYMOLOGY • ADRIATIC • CLASSICAL

Ancient tales tie the albatross to the warrior Diomedes. In one strand, his grieving companions are transformed into birds—the Diomedae—keeping vigil by their king's tomb on an Adriatic isle. In another, the birds defend the sanctuary, harrying strangers who profane the place.

From such stories came the scientific names: family Diomedeidae, and the great albatrosses' genus *Diomedea*. The myth recasts the birds as faithful guardians of the dead and of sacred shores—coastal custodians whose calls echo memory and duty along the Mediterranean world.

When Diomedes were turned into birds, keeping watch beside their fallen king.

Classical tradition & Tremiti Archipelago legend

"Why 'Diomedea'? The Greek Legend"

Greece / Italy (Tremiti) - Mediterranean

Etymology of Diomedeidae / *Diomedea*



Arrows let us toggle between cards about each myth

Not visualized (because it disappears when screenshotted) but we also changed the pointer to a flying albatross that becomes a standing albatross when the user clicks!

Think Aloud Study

For each think-aloud session, create a new copy of the feedback table below in your process book. During the session, one team member should carefully listen to the tester and document their observations and feedback in the "Notes" column.

Ensure that all sections of the table are completed for each tester. If your group has 3 or more members, you must conduct at least two independent think-aloud sessions and document feedback for both.

Notes (To be filled by project leads)	
Tester Name	Rain YeYang (xyeyang@college.harvard.edu)
Describe any usability issues or confusion the tester encountered while using the prototype.	<ul style="list-style-type: none">- x out button a little off for x-ing out popup- hover is broken for threats
Was the tester able to understand the main message of the data story? (e.g., Yes/No + why/why not?)	<ul style="list-style-type: none">- yes, about the albatross and conservation
What parts of the interface or visualization did the tester find most engaging or effective?	<ul style="list-style-type: none">- liked the mouse/click icons- like popup, anatomy, region highlights for the intro page- like the conservation color coding scheme- species page is neatly organized- liked the map and zoom in- title can be shifted down a bit for the sidebar pop up- liked the info in the sidebar pop up- thought threats diagram was cool -> very sad- liked the folklore section thought it was interesting
What parts did the tester find confusing or less effective?	<ul style="list-style-type: none">- n/a
Did the tester encounter any inconsistencies in design, data, or narrative?	<ul style="list-style-type: none">- data is clear- the flow from threats to folklore and superstitions isn't super clear, wished there was a section in between and a conclusion- like the simple design and consistent colorscheme
Were there any unexpected interactions or insights that emerged during the session?	<ul style="list-style-type: none">- didn't click on species for threats (perhaps we can include this in instructions/prompts somewhere)
What specific improvements or changes did the tester suggest for the prototype?	<ul style="list-style-type: none">- a way to click side/up/down through each species- move the arrows to the side of the cards so it doesn't obstruct any information
Did the tester suggest any additional insights or visualizations to include?	<ul style="list-style-type: none">- a way to compare the different species to each other/view them at a glance/bigger picture connections
General observations or comments from the tester.	<ul style="list-style-type: none">- the sizes of the circles in threats are a bit too similar to each other - make the high impact circles a bit bigger

	Notes (To be filled by project leads)
Tester Name	Iris Zhang (iriszhang@college.harvard.edu)
Describe any usability issues or confusion the tester encountered while using the prototype.	<ul style="list-style-type: none"> - no button on intro slide, so thinks that you need to click on something - not clear that it's a scroll page - maybe add that if you click you can move to the next page - make the highlight more prominent on the intro albatross part - highlight the wings together since they're the same - when you scroll to next species page, make the pop out disappear so the user doesn't have to click out manually - map not immediately visible in the species pop out - could have a single map where you can see all the birds' colonies - be careful with some of the words overlapping in some areas - map: for when the user sees the map (scroll down in panel to see the map) then the map automatically zooms into that specific location - for the lore part: maybe it could be like a bird narrating a story "let me tell you about my ancestors" or something like a picture book vibe (include a picture of a bird), like the albatross talking about their own history
Was the tester able to understand the main message of the data story? (e.g., Yes/No + why/why not?)	<ul style="list-style-type: none"> - yes
What parts of the interface or visualization did the tester find most engaging or effective?	<ul style="list-style-type: none"> - liked the bird cursor - likes the colors - smooth carousel of the lore
What parts did the tester find confusing or less effective?	<ul style="list-style-type: none"> - a bit confusing when clicking names on the threats page because the cursor is too big-ish - maybe legend on threats isn't obvious enough? for the size of the circles
Did the tester encounter any inconsistencies in design, data, or narrative?	<ul style="list-style-type: none"> - there is a story but maybe take through the life of a bird, like where the ancestors came from and where it is today and then user can explore more - maybe include info about the origins of the bird so there's like a beginning and end to the story
Were there any unexpected interactions or insights that emerged during the session?	<ul style="list-style-type: none"> - n/a
What specific improvements or changes did the tester suggest for the prototype?	<ul style="list-style-type: none"> - maybe a quiz like which albatross are you most like? that could add more engagement; e.g., if someone likes warmer climate then they're like a species that is close to a warm location - game where you can raise an albatross chick LOL

	<ul style="list-style-type: none"> - openGL of a bird growing up
Did the tester suggest any additional insights or visualizations to include?	<ul style="list-style-type: none"> - n/a
General observations or comments from the tester.	<ul style="list-style-type: none"> - see all above

Evaluation and Implementation of Feedback

Based on the results of your ‘think aloud’ study, what would you improve in your data story?

Based on the above feedback, we realized that one of the largest problems with the data story was that there was no story. What we thought produced a narrative was really just a few different sections slapped together in a reasonably logical way. Thus, in our mission to improve the overall project, we strove to add transitional slides, change specific wording, and add elements that would contribute to an overarching message centered around the flight of albatrosses. The other large problem was a lack of thoroughness in the information we were presenting to audiences; we felt that while we compiled a decent amount of research and created fun visualizations, there was more potential for our project. Hence, in our updated version, we have added quite a few more interactive aspects.

Are there any additional insights and visualizations you would use? Would you amplify or change your message? Did your narrative work? Did the tester get your takeaways?

As mentioned in the previous response, we decided to add more visualizations related to the wondrous flight capabilities of albatrosses (indeed, that became one of the themes of the whole narrative), as well as conservation efforts to round out the threats portion and provide a more complete story. The result was that, where previously the message of “albatrosses are cool” certainly was communicated (and the testers did agree that that was a main takeaway), the newly enhanced version highlights the messages of “albatrosses have incredible flight capabilities and physical adaptations” and “unfortunately, they face threats to the sustenance of the entire species, so here are ways that you can help”, which we believe are much more meaningful for users to take away.

Decide as a team which of these improvements you will implement and write down your decisions and why you made them in your process book as a numbered list.

We decided to implement all of the above improvements:

1. Include more interactive elements – this will make it easier for users to make connections to their daily lives and develop a more personal affinity for this project – **DONE**
2. Add a new page covering the flight patterns of albatrosses – this will connect back to that central message about how albatrosses are amazing fliers – **DONE**
3. Add transition pages that follow a more cohesive narrative – this will contribute to making the project actually follow a strong data story – **DONE**
4. Improve the overall aesthetics of the project so that it’s consistent throughout and nice to look at – this will also contribute to that strong data story because everything will come together nicely visually – **DONE**
5. Add a new page covering the current conservation efforts to save albatrosses – this will connect back to that central message about how albatrosses need to be saved – **DONE**

6. Add a new page on how the average Joe Schmoe can help (including a donation link) – this will also connect back to that central message about how albatrosses need to be saved – **DONE**

Implement the intended changes and check them off your list (e.g., adding “done”). You can distribute the tasks among your team members. If you are unable to implement specific changes, please explain why and describe the expected results in your process book.
See above; we were able to implement all the changes we described.

Sources

- <https://www.seabirdtracking.org/species/albatrosses/>
- <https://data.acap.aq/>
- <https://datazone.birdlife.org/species/factsheet>
- <https://www.birdlife.org/news/2023/06/19/albatrosses-inspiring-legends-myths/>
- <https://www.sciencedirect.com/science/article/pii/S0006320725000023>
- <https://www.int-res.com/articles/meps oa/m672p205.pdf>
- https://www.allaboutbirds.org/guide/Laysan_Albatross/id
- <https://www.birdlife.org/campaigns-appeals/albatross-sos/#donate-form>
- <https://www.fisheries.noaa.gov/feature-story/6-ways-us-fisheries-reduce-albatross-bycatch>
- <https://www.allaboutbirds.org/news/7-ways-you-can-help-albatrosses/>
- <https://www.birdlife.org/news/2022/11/03/taking-action-for-albatrosses/>
- <https://www.oceansociety.org/adopt/adopt-an-albatross/>
- <https://www.whoi.edu/press-room/news-release/new-research-unlocks-clues-about-the-iconic-flight-of-the-wandering-albatross/>
- <https://poseidonexpeditions.com/about/articles/wandering-albatross/>
- <https://www.nathab.com/know-before-you-go/antarctica/wildlife-guide/albatrosses>
- <https://spectrum.ieee.org/the-nearly-effortless-flight-of-the-albatross>

Images:

- Wings:
https://acap.aq/images/stories/acap/Birds/Albatrosses/rsos_WA_Dynamic_Soaring_Philip_Richards_Paper.jpg
- Tubenose:
[https://substackcdn.com/image/fetch/\\$s_!G_5I!.f_auto,q_auto:good,fl_progressive:steep/https%3A%2F%2Fsubstack-post-media.s3.amazonaws.com%2Fpublic%2Fimages%2Ff75c1966-b50c-4347-bba5-bc0191b7dbae_538x388.gif](https://substackcdn.com/image/fetch/$s_!G_5I!.f_auto,q_auto:good,fl_progressive:steep/https%3A%2F%2Fsubstack-post-media.s3.amazonaws.com%2Fpublic%2Fimages%2Ff75c1966-b50c-4347-bba5-bc0191b7dbae_538x388.gif)

Final Website:

<https://audreyzhangg.github.io/albatrosses/albatross-proto/>