

Logbook CYSF 2026

Section 1: *Title Page, Table of Contents, Acknowledgements, Timeline*

SECTION 2; *Backgrounds and Ideas;*

Nov 14, 2025 So today was the day I realized I had to start working and deciding on my science fair project. I made a list of what I wanted to do, and the ones that stood out to me were either reproductive or environmentally, but more towards the animal side. In the end, I decided to look at some old science fair projects and decided to do something environmental, since that seems to be a big worldwide thing at the moment. Since this year, I seem more interested in the animal side of things, I want to do something more towards the migration of certain species, which I will probably decide tomorrow.

Nov 15, 2025 So today I decided on the 3 species I am going to focus on for this project, since I can't do all of them, I decided on the sea turtle (Chelonia -), the albatross, and the bottlenose dolphin, since these seem like species that are more prominently shown in the media world, like for example, many people talk about how sea turtles are going extinct due to plastic, or like albatrosses can't fly due to their wings being stuck in plastic. Using the principle that I want to do something with animals and microplastics, I created the question: Does plastic influence where these specific species travel and or migrate?

Finally, creating a base paragraph.

plastic pollution → millions of tons in the ocean → floating around every year → endangered species like turtles, seabirds, and dolphins → at-risk species → eat plastic or get tangled → danger to us → low-sea food.

After I figured that question out, I found some datasets that showed how much microplastics were in the world, and a dataset for all the species showing their migration patterns over the years. Then I set up my Notion page where I plan to do all my research and all. Finally done for today!

Nov 16, 2025 I did some research today for the green turtle.

- habitat range (where they travel)

They nest in about 80 countries, and travel to 140 countries

(<https://www.fisheries.noaa.gov/species/green-turtle>)

(<https://californiaherps.com/noncal/baja/bajaturtles/pages/c.mydas.html>)

- migration patterns

They migrate every 2-5 years from their coastal foraging areas to waters off the nesting beaches where they originally hatched to reproduce.

(<https://www.fisheries.noaa.gov/species/green-turtle#:~:text=Adults> migrate every 2 to, herbivorous species of sea turtle.)

often takes hundreds of thousands of miles (<https://www.seeturtles.org/sea-turtle-migration>)

navigation: they are known to heavily rely on the geomagnetic field to find their way through the ocean

(<https://www.thehappyturtlestrow.com/sea-turtle-migration-patterns-navigating-the-oceans-vastness/>)

geomagnetic field? ; is a natural phenomenon in the marine environment that influences marine life for navigation and is recorded in the oceanic crust.

(<https://pmc.ncbi.nlm.nih.gov/articles/PMC9871387/>) Seawater is an electrical conductor, and it interacts with magnetic currents. As the tides cycle around the oceans' basin, the water essentially tries to pull the geomagnetic forces along.

(<https://svs.gsfc.nasa.gov/12450/#:~:text=Seawater> is an electrical conductor, the interaction is relatively weak.)

How do turtles use it? By sensing the fields, they can determine longitude and latitude and head in the right direction.

[https://www.nationalgeographic.com/science/article/turtles-use-the-earths-magnetic-field-as-a-global-gps#:~:text=Nathan Putman has the answer, head in the right direction. \)](https://www.nationalgeographic.com/science/article/turtles-use-the-earths-magnetic-field-as-a-global-gps#:~:text=Nathan Putman has the answer, head in the right direction.)

- feeding grounds Important feeding grounds include Great Barrier Reef, Shark Bay in Australia, the East China Sea, and the Red Sea. However, they are omnivorous and initially forage on drifting oceanic life.

<https://www.dcceew.gov.au/environment/marine/marine-species/marine-turtles/green#:~:text=Green turtles nesting along the, Green turtle carapace>

- breeding areas

They have large global breeding areas, found at Tortuguero (Costa Rica), Colaba Beach (Mexico), and Raine Island (Australia). Other important breeding places are located throughout the Atlantic including the Caribbean and Florida.

<https://www.fisheries.noaa.gov/species/green-turtle#:~:text=Population Status, Islands%2C and American Samoa>

- conservation status

Least Concern - population decreasing

<https://earth.org/green-sea-turtles-no-longer-endangered-species-in-major-conservation-win/>

- reasoning why they're vulnerable to plastic pollution

Sea turtles can ingest plastics by mistaking them for their natural food (for example, plastic can look like jellyfish), or by accidentally eating plastics that are present amongst their food (like a plastic straw on the sea

floor) (<https://www.seaturtlestatus.org/sea-turtles-plastic-pollution#:~:text=Ingestion%3A> Sea turtles can ingest, on the seafloor among crustaceans.)

(on the my notion

website; <https://www.notion.so/research-terms-2acd2334e05281658abed078121c48cd>)

done 1/4 of the research.

Nov 17, 2025 since yesterday i finished the green sea turtle one i decided to do the albatross today:

- habitat range (where they travel)

https://en.wikipedia.org/wiki/Laysan_albatross

- migration patterns

Albatross leave their breeding grounds from July to October to forage across the northern Pacific; they tend to go northwest towards Japan and Alaska.

- feeding grounds

feed mainly on squid, but fish, fish eggs, and crustaceans are also a source of food.

spend the rest of the month (July to November); on the Pacific Ocean

<https://birdsoftheworld.org/bow/species/layalb/cur/introduction>

- breeding areas

first breed when they are 7-9 years old

mostly breed on the Hawaii archipelago

<https://birdsoftheworld.org/bow/species/layalb/cur/introduction>

breeding either on the northern hawaii islands, or off the coasts of japan and alaska

[https://wildlife-species.canada.ca/bird-status/oiseau-bird-eng.aspx?sY=2019&sL=e&sB=LAAL&sM=a#:~:text=LaysanAlbatrosses breed on the,2009\).](https://wildlife-species.canada.ca/bird-status/oiseau-bird-eng.aspx?sY=2019&sL=e&sB=LAAL&sM=a#:~:text=LaysanAlbatrosses breed on the,2009).)

- Conservation status: near threatened

many of the albatross were decimated around the beginning of the 20th century, but over the years they've been recovered

before they died by being caught in fish net, but now they died by ingesting plastic items

<https://www.audubon.org/field-guide/bird/laysan-albatross>

- reasoning to why they're vulnerable to plastic pollutions

Many birds accidentally eat plastic, because they eat fish; they skim the surface, accidentally catching many plastic items along the way, which they feed to the younger generation. Many adults can regurgitate the plastic, but the children cannot. If they don't vomit it out, it either cuts their stomach or gives the feeling that they're full.

Section 3: *Scientific Question and Purpose*

question; does plastic influence where these specific species travel or migrate?

purpose; the purpose of this experiment is to figure out whether plastic pollution is affecting animal migration, and not just harming animals physically.

Section 4: *Experimental design/ Analysis*

Nov 27, 2025 I've been truly busy with school homework and working so I totally forgot about his, until Ms. Lai finally gave us the invite to the cysf website, and i was looking through the different like types of projects because usually i do research or innovation but i'm not too sure what category should be, and putting my problem and idea into chatbot, and it said that if my project is a tool to prove a point i should do research but i dont have a certain hypothesis so i dont believe its research therefore im choosing innovation, which makes me wonder where will all my research that i did go, it might just have go in the extra portion. I'm glad I figured that out though

Nov 28, 2025 Today I started working on my methodology< which I kinda looked at other people's and grabbed snippets from each one. And this is how far I got:

1.0 methodology (outline)

1.1 abstract

this project builds an interactive map -> shows animals migration patterns + global plastic pollution -> see if these certain animals change the way they travel

innovation; a website that allows you to track real-life data with plastic pollution heatmaps -> let the users explore this visual

This website allows

- layers to be turned off or on
- compare migration paths of certain animals to pollution ones

This tool can help researchers and conservation groups understand -> how pollution visually affects marine animals.

1.2 board views

plastic pollution -> enters yearly, millions and millions.

We have the data, but there is no way to compare them all together

innovation goal: make a simple website where people (judges) can discover the relationship between animals and plastic

1.3 ecological and biological background

animals migrate for -> food, breeding, and climate change

Pollution affects feeding and survival

Pick these animals

research:

of all the animals (breeding grounds and whatnot)

why these animals:

turtles follow sea currents -> same currents plastics move in

dolphins; follow temperature patterns -> those sometimes overlap with trash

Sea birds; follow sea boats -> boats leave plastics

1.4 technology

Tools that I plan to use:

- Python to clean/merge datasets
- geojson / csv for tracking the species
- plastic heatmap layers from global databases
- a web map (leaflet, mailbox, or streamlit-map) for visualization

tech idea ->

stacking (putting layers together) “layers” so users can compare data

layers:

- s paths (lines)
- plastic density
- species info

1.5 knowledge gap

right now -> migration data exists, pollution data exists, but they're in separate places.

species sightings (points)

- migration data, and the pollution data are things -> aren't found together

purpose:

create a visual that helps people -> help see how species avoid or move through the pollution a lot of plastics

2.0 development

2.1 Research Questions

- does plastic pollution change where these species travel?
- do they avoid areas with high pollution zones or pass through them?

2.2 data & processing

collect pieces tracking data

get plastic pollution maps

clean the data → keep lat, long, date, species

Combine into one dataset

export to map layers

2.3 Building the map

- set up a base map
- add species tracking layer
- add plastic heatmap
- Add filtering tools
- Add pop-ups with simple species info
- add legend + instructions

2.4 analysis (simple)

look for;

- overlap zones
- times of year with higher risk

take screenshots, lots of screenshots

2.5 conclusion?? (i dont know what to add here.)

Nov 29, 2025 So today I started the coding part of my project before I go to hawaii, and I did come across some problems where i had to troubleshoot, the first problem was vscode kept saying no file existed and i was so confused until i realized there was extra space in the name and i felt so stupid, because it took 30 minutes to figure it out and it was not cool. This process was just cleaning up the data and clearing the tables we don't need:

snippet of data**

Jan 5, 2026 I finally got back home, and tried to do some of my code, the clean of the data finished, and all I had to do was get started on making the website. For the map, I used a map from Leaflet, and I got it to show, so now I have to put them all together. This science fair project is due in 22 days, so I am kind of stressed, but I think I have enough time to finish:

To-do list;

- Add all the datasets together (Jan 14 2026)
- Do an analysis (Jan 16 2026)
- Start piling all the information into the CYSF website, and making it into paragraphs, and put it into a 5-page report (Jan 20 2026)
- Create a 5-minute video
- And create my trifold.
- Practice my speech. Create notes on the side of my code.
- Format my logbook properly

All of this done by Jan 27 2026 11:59 pm

** here are what the data looks like in a map

Jan 7, 2026 This day I came across some problems, where my data that I got from a geojson file (file that has encoding geographical data) does not appear on my html website, so at first I use the web to get a solution for my problem but it didn't give me a single clue, it kept hinting at the fact that when I cleared my data, I cleared everything, so I made sure to put a code saying how many columns were dropped;

```
before = len(df)

df = df.dropna(subset=['decimalLongitude', 'decimalLatitude'])

print(f"[{label}] Dropped {before - len(df)} rows without coordinates")
```

if 'eventDate' in df.columns:

```
    before = len(df)

    df['eventDate'] = pd.to_datetime(df['eventDate'], errors='coerce')

    df = df[(df['eventDate'].isna()) | (df['eventDate'] >= '1950-01-01')]

    print(f"[{label}] Dropped {before - len(df)} rows with invalid dates")
```

The output I got was;

[Dolphin] Dropped 0 rows without coordinates

[Dolphin] Dropped 0 rows with invalid dates

[Dolphin] Cleaned dataset contains 160011 rows

[Turtle] Dropped 0 rows without coordinates

[Turtle] Dropped 0 rows with invalid dates

[Turtle] Cleaned dataset contains 213634 rows

[Seabird] Missing required columns: ['species', 'decimalLongitude', 'decimalLatitude']

Which made me see this could be the problem, but when I ran it again, I was still getting nothing. Additionally, when I saw this, I saw that the seabird was giving me 0 data, so I decided to try to find another dataset. I couldn't find one without coming from an organization, so I decided to move on to a different organization. I chose the whale, so tomorrow I'll find a dataset and implement it. Back to the original problem, I used some help from a chatbot; I cited this in my sources, and it told me that the issue could be that the GeoJSON files can't be loaded into the website. So I inspected the website, and I saw that my GeoJSON files are all blocked. Therefore, I installed a live server to provide local development for webpages, enabling instant uploads and changes.

Jan 14, 2026 Today I figured out the sea bird data wasn't truly reliable, so I had to switch pace to a whale. I easily found a whale dataset from the same website I found the other ones. And easily implied that into my code.

January 16, 2026, I worked on the website today, and I had a problem with implementing the implmeanting the mircoplastic dataset. But it worked out, and from there we got my website going, which was super fun!!

Jan 23, 2026 All my exams are finished, so back to the science fair, all I have remaining is the video 5-page report, the actual CYSF portions, and making my trifold. I started with the online Cysf portions, for which I had all my information written down, but unfortunately, it takes quite a bit of time to turn them into paragraph so I also spent January 24 doing that.

Jan 27, 2026 Today I thought it was the last day to hand everything in, but I asked Lai for an extension, so it all worked out. But I haven't been focused on this that much, so I started with my 5-page report, and just combined all the information that I put in the CYSF and added some transition sentences to finish it, and then I came across a problem, which was my website was on the pc, and I cant take that to school so I tried doing the thing that the internet has mentioned by finding a local ip address, but unfortunately it didnt work, so I had to do with taking pictures.

Feb 10, 2026 Today I found out if I got into the science fair or not, and I DID!