LML Marine Debris Data Visualization

Sponsor
Robin Dunkin

Product Owner
Kaitlyn Liao
Scrum Master
Bridget Chew

Developers
Spencer Fulgham
Noah Cantwell
Zachary Miller

What is LML?

UCSC Long Marine Lab Contributes to scientific research and marine animal conservation by collecting data from living or dead stranded mammals.

Survey Slugs a program under UCSC LML that exposes undergrads to collecting stranded marine mammal carcasses and marine debris data

- Performs data visualization and analysis
- Make data available to educate

Goal: One day use this as a tool to cause interventions on beach/ocean care behavior

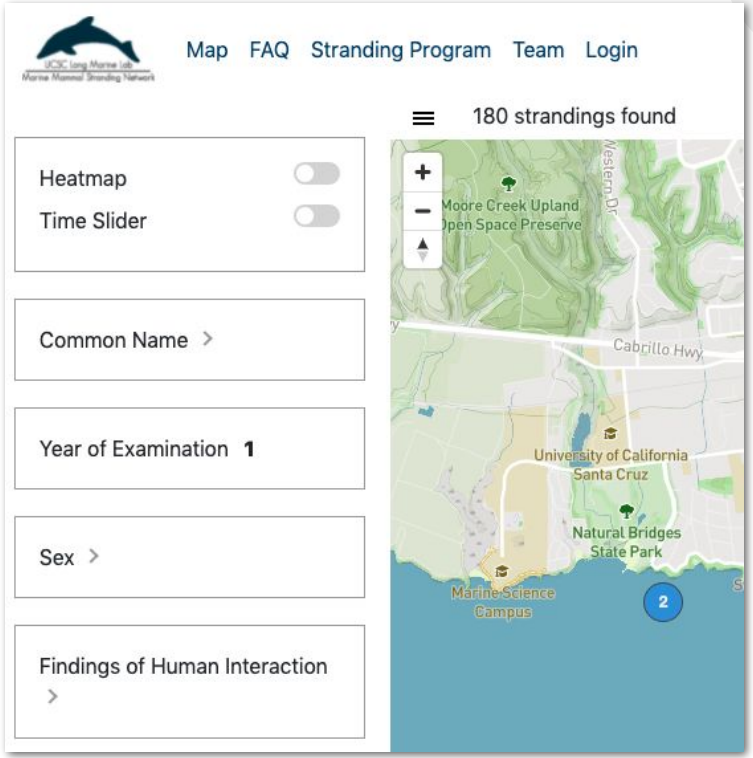
What is Our Role in LML?

As ***PROUD*** developers we are here to make a web application which...

- Educates and spreads awareness
- Informs the general public, local organizers, and marine analysts alike
- Visually displays where/who the data comes from
- Presents a lot of information in a concise format
- Offers a variety of ways to view data

What is Our MVP?

- A layout similar to the Marine Mammal Stranding Map, with key functional differences
  - Should be aesthetically consistent with this previous project.
- Filters for different kinds of debris
- Visualize data about different beaches using graphs
- Pins to locate and select beaches in which data was collected from
- Allow researchers to upload/update data with a login



Marine Stranding Website to draw inspiration from

Release Plan

Sprint 1

Jan 26 - Feb 9

Set up boilerplate code

Set up documentation and groundwork for later sprints

Sprint 2

Feb 10 - Feb 23

Implement the topology of our application

Parsing user files into database

Sprint 3

Feb 24 - Mar 9

Build the foundation of our wireframe

Data Visualization library implementation

Sprint 4

Mar 14 - Mar 30

Complete all static pages for the site

Prep work for start of next sprint

Release Plan

Sprint 5

Mar 31 - Apr 13

Host the web application

Start implementing data visualization and map functionality

Sprint 6

Apr 14 - Apr 27

Finish implementing data visualization and map functionality

Start creating admin profiles

Sprint 7

Apr 28 - May 11

Add security features to protect LML database

Finalize super admin and admin functionality

Sprint 8

May 12 - May 26

“Wrap up” to finish anything MVP-required

Prepare for transfer of ownership

Approach

1. Build an information base to reference
    a. Hosting Options
    b. Organizing Codebase
    c. Needs of the MVP
    d. Requests from the sponsor
    e. Libraries / APIs needed

2. Test basic “raw” functionality of Database Interactions

3. Complete Static “informational” pages

4. Complete dynamic “interactive” pages

Challenges

This project is full of ‘firsts,’ many of which are challenging us

- This project is many of the team’s first time...
  - Coding with React.js
  - Interacting with an SQL database
  - Meeting a Sponsor’s needs and requests
  - Implementing project management techniques over a longer period of time

Technologies

PostgreSQL

- Relational database
- Marine debris data is stored in the database
- Using node-postgres to interface with the PostgreSQL database

React.js

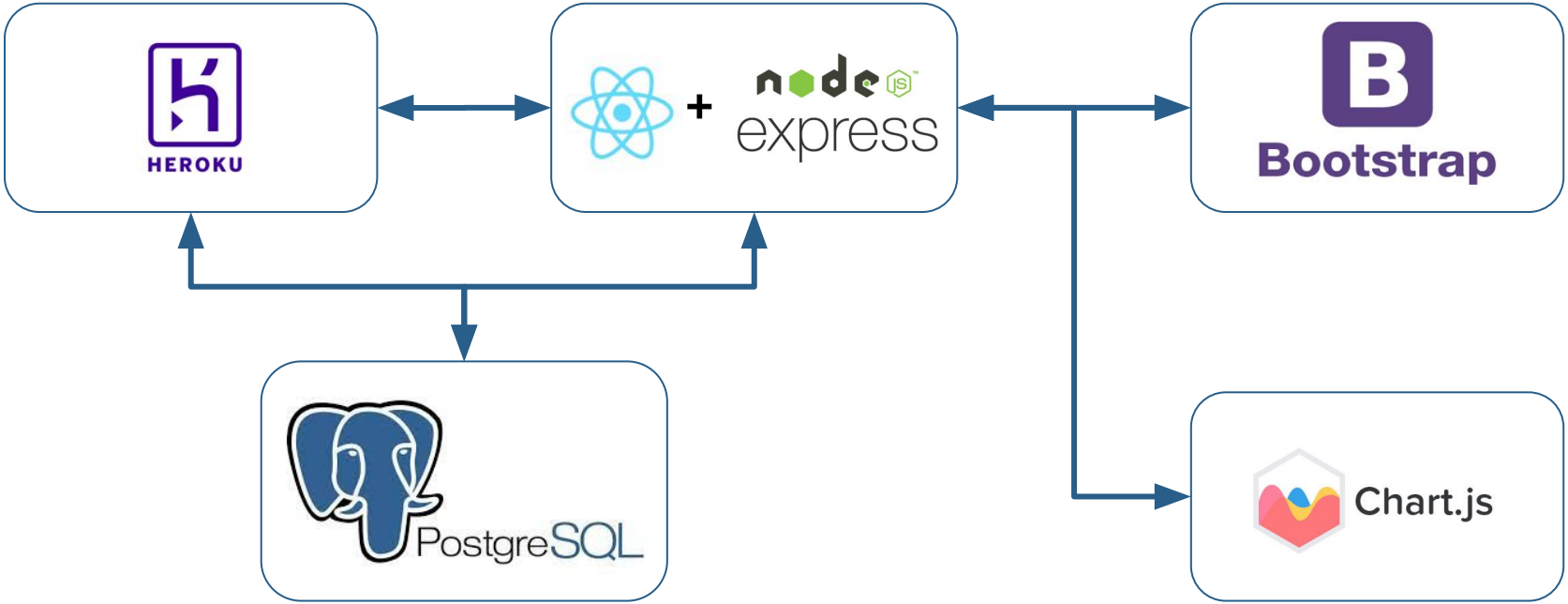
- Javascript framework for creating user interfaces
- Lets us visualize and interact with the debris data

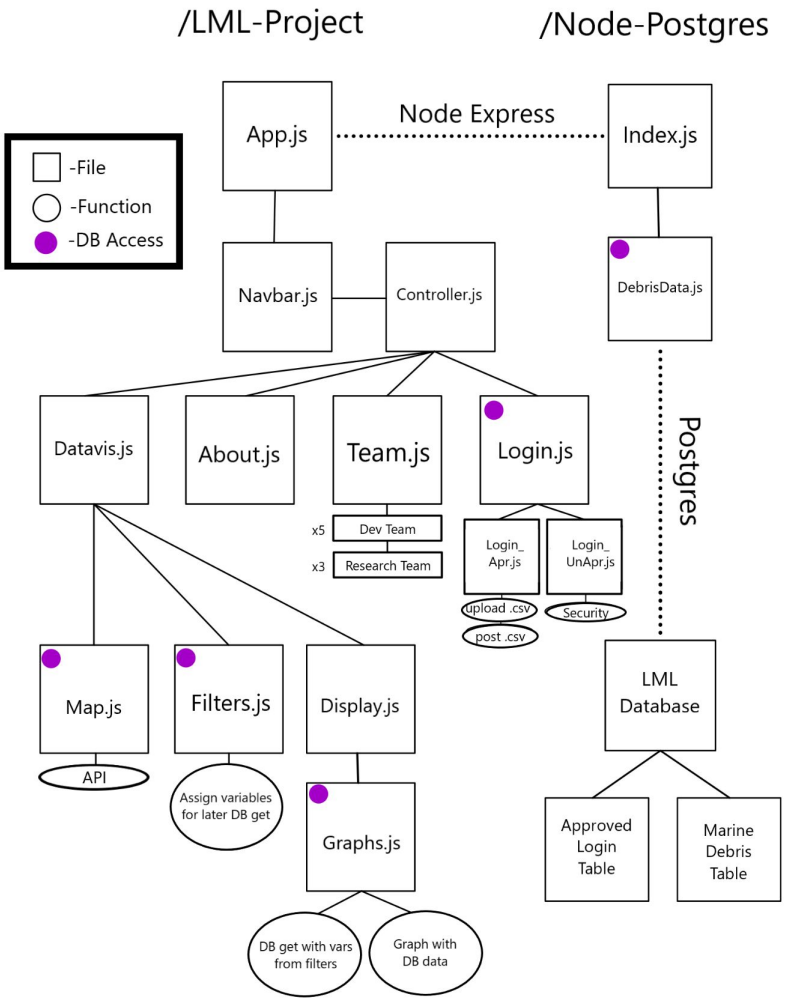
Bootstrap

- CSS framework for our website design
- Using the same CSS framework as the previous LML team for design consistency

- Libraries also in use: ***Chart.js***, ***Papaparse***
- Still researching ideal map APIs and hosting options

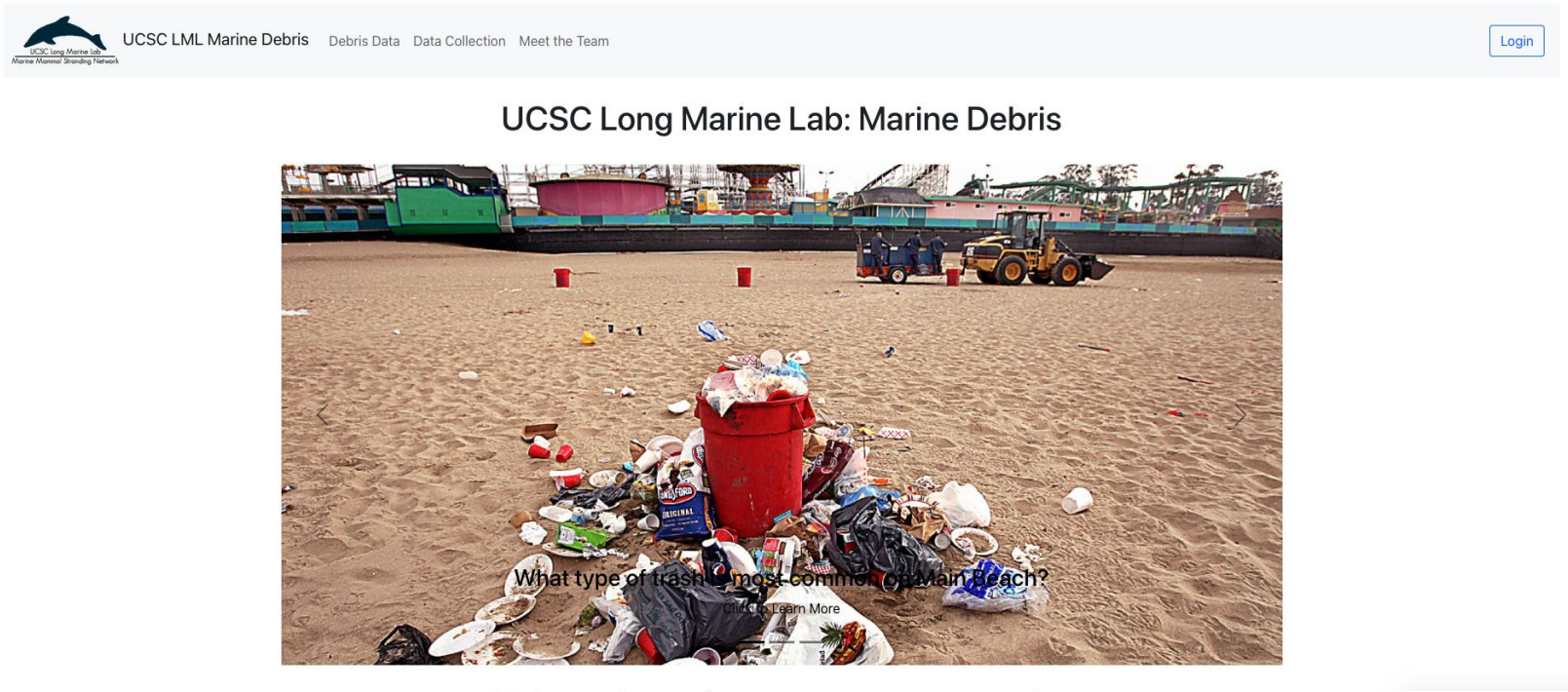
Architecture




/LML-Project
/Node-Postgres
-File
-Function
-DB Access
App.js
Node Express
Index.js
Navbar.js
Controller.js
DebrisData.js
Postgres
Datavis.js
About.js
Team.js
Login.js
x5
Dev Team
x3
Research Team
Login_ Apr.js
Login_ UnApr.js
upload .csv
post .csv
Security
Map.js
Filters.js
Display.js
LML Database
API
Assign variables for later DB get
Graphs.js
Approved Login Table
Marine Debris Table
DB get with vars from filters
Graph with DB data

DEMO/SCREENSHOTS

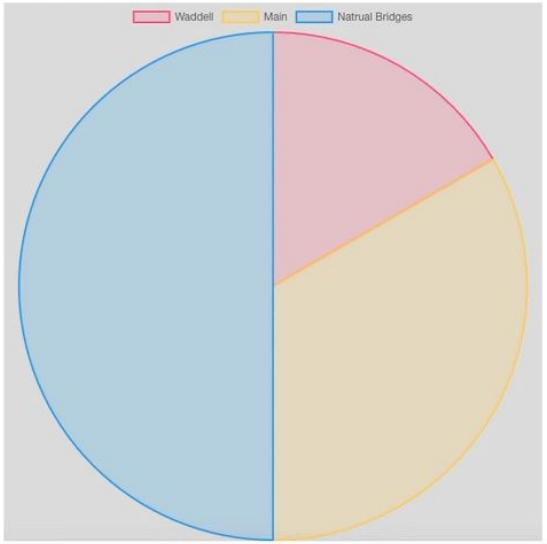
Redesigned Home Page



Map/Data Visualization

What we have so far:

- A variety of charts (Pie, Bar, Stacked Bar)
- Database
- Foundation for interactive charts using controls and inputs outside Chart.js



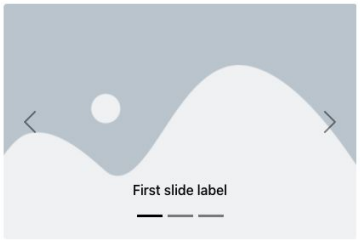
Methodology

UCSC LML Marine Debris Debris Data Data Collection Meet the Team Login

Marine Debris Collection Methodology

How is data collected?

The way that our team collects this Marine Debris data is relatively simple. First, volunteers will lay out a 100 meter transect across the beach, horizontal to the shoreline. Next, volunteers will place a 2 meter by 2 meter quadrat at 3 distances along the 100 meter transect. These distances are randomly generated numbers between 1-100 and change each month to prevent any biases. At each of the three distances, two quadrats are sampled (6 quadrats in total). One on the high tide line, and the other one 5 meters above the high tide line for each number. During each sampling, volunteers will examine the quadrat and collect debris laying on top of the sand, then record their findings on the Stranding Network Marine Debris Data Sheet. Additionally, volunteers will then rake their fingers into the sand approximately 2 cm deep and survey for buried debris. These will also be collected and recorded on the Stranding Network Marine Debris Data Sheet in the proper size region.



Study Region

12 beaches along the Monterey Bay Peninsula in the Central Coast of California were selected as survey locations and were subsequently surveyed multiple times over a two year period. Eight of these beaches (Main Beach, Seaside, Sea Bright, Twin Lakes, Capitola, Sunset, Waddell, Live Oak, and Natural Bridges) were located in Santa Cruz county. The remaining four beaches (Del Monte, Zmudowski South, Marina, Zmudowski North) were located in Monterey County. Each beach was classified as either a rural beach or an urban beach based upon its proximity to a major city. Beaches were all sandy municipal beaches with public access.

Data Collection

Team Page

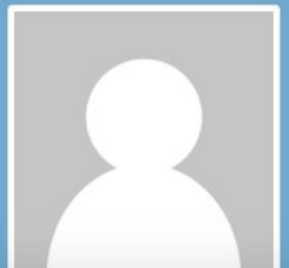
Meet the Software Team

We are a team of five computer science students at UCSC.

Kaitlyn Liao

Product Owner and Software Engineer, Computer Science student at UCSC

Noah Cantwell



Developer and Software Engineer, Computer Science student at UCSC

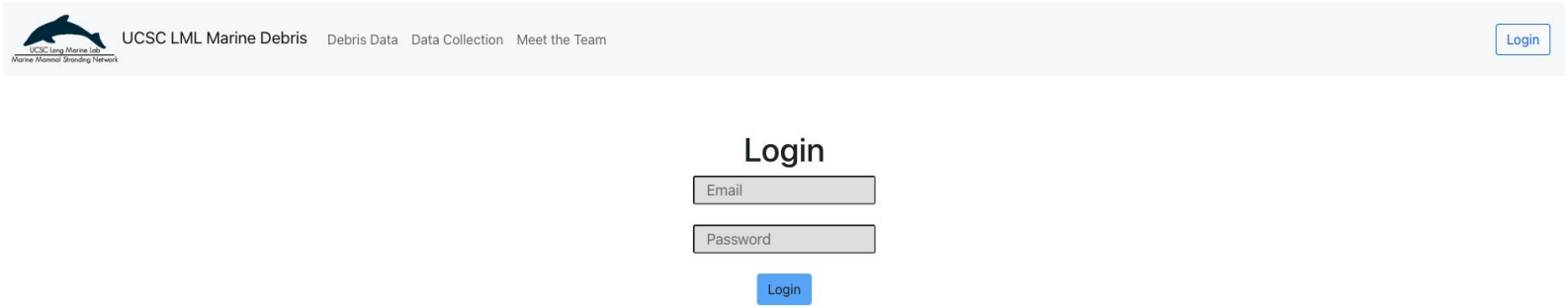
Meet the LML Team

From the UCSC Long Marine Lab.

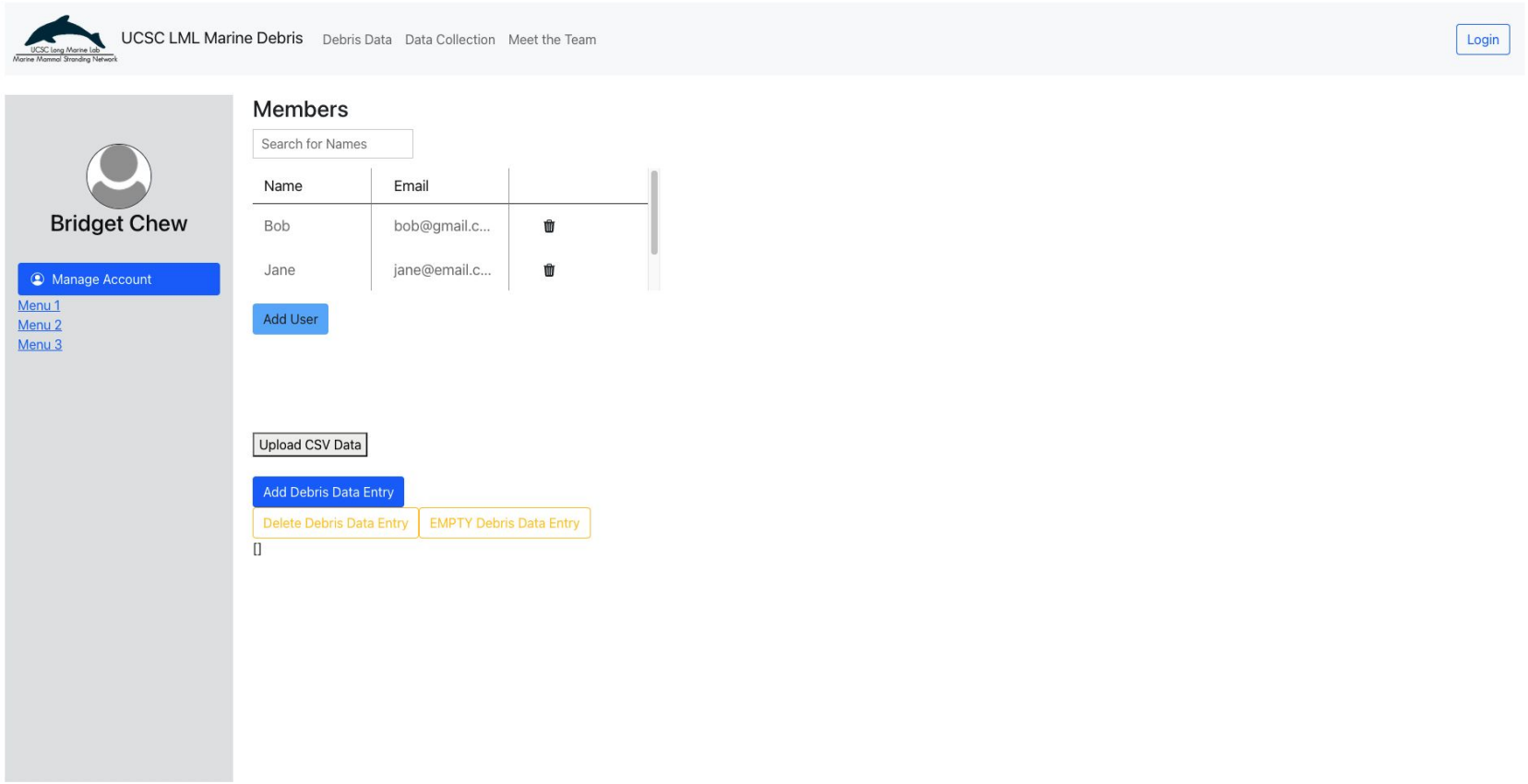
Robin Dunkin

Dr. Robin Dunkin is the Marine Mammal Stranding Operations manager for The Long Marine Lab Stranding Network and has worked in this role since 2005. Robin completed her Ph.D. in the lab of Dr. Terrie Williams in 2012 but first began learning about marine mammal stranding response while completing her master's degree in the lab of Dr. Ann Pabst and Bill McLellan at the University of North Carolina Wilmington in 2001. As an undergraduate at U.C. Santa Cruz, Robin volunteered as a docent at Long Marine Lab and worked for the

Login Page (logged out)



Login Page (logged in)



Leaving Winter Quarter...

- Feeling more confident with React and PostgreSQL!
- Choosing technologies and integrating them with each other
- Constructed detailed wireframes for each page of the web application
- Every static / informational pages built
- User ability to upload CSV file to SQLbase, and have data shown on page
- Familiarizing ourselves with data visualization tools and methods
- A great relationship with our sponsor and research team

Goals For Spring Quarter...

- Finding and implementing restrictive map API
- Adding admin-based functionality and security
- Building a user-friendly data-visualization interface
- Hosting
- Handing off the “keys” to our sponsor

Thanks for Listening!