A Brief Glimpse into Reinvigorating UIs for Citizen Science Apps

A Research Project by Jillian Beck

Defining Citizen Science

- The public masses, regardless of background or education, take on the role of scientists to gather data and aid in specific experiments[1]

- During citizen science projects, the general public has the opportunity to adopt a vital role in the experimentation process

- This immense network of data points helps scientist track otherwise non-feasible projects such as tracking species migration, pollution, or even something as specific as the location and quantity of flowers in a national park.

Case-Study: Marine Debris Tracker App

- **The Problem Space:**
  - Debris on shores is an increasing threat to marine species and coastal wildlife
  - An estimated 8 Million tons of plastic ends up in the ocean each year, with up to 1.8 billion pieces of plastic along the coastal US[2]
  - But what type of debris can be found? Are there coasts with a disproportionate quantity? Most importantly, from where does this debris come?

- **The Design:**
  - An app, developed by NOAA and Georgia Tech, that allows users to 'log' any debris they discover and adds those logs as data points on a larger tracking map.
  - Users can record debris wherever and whenever they discover it.
  - Dedicated users can also opt into the *Marine Debris Monitoring and Assessment Project* (MDAP) where they agree to yield monthly data collection at a single shore location for more consistent data collection and analysis[3]

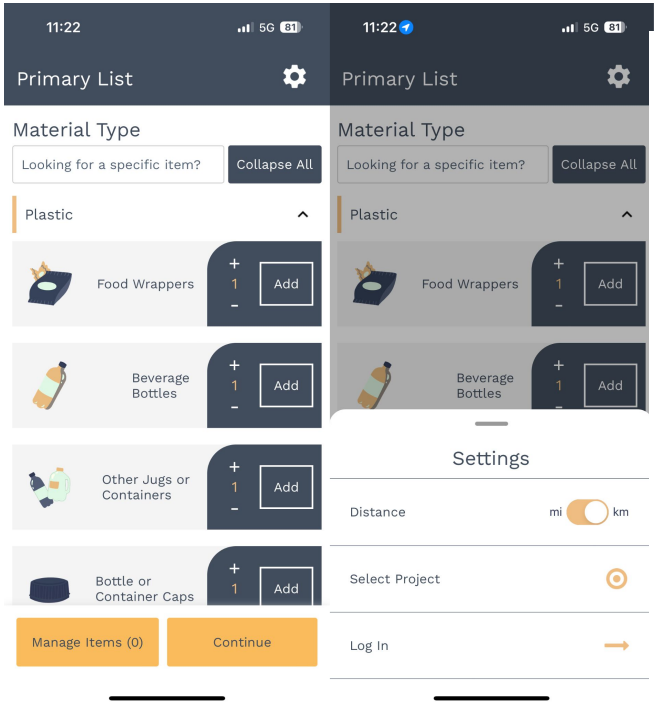
Marine Debris Tracker: Usability Test

Participants: 10 (6F:4M), 5 Caucasian, 3 South Asian, 1 Latin descent, 1 Black. Ages: 22-34
Method: Give participants tasks that involve navigating within the app. Ask them to speak-aloud their thought processes as they navigate. Time process of completion.
Tasks:
(1) Find an item belonging to the “Fishing Gear” category
(2) Add a plastic bag as a found item
(3) Delete the plastic bag from your list of items
(4) Join the CRIPTIC project
Results:

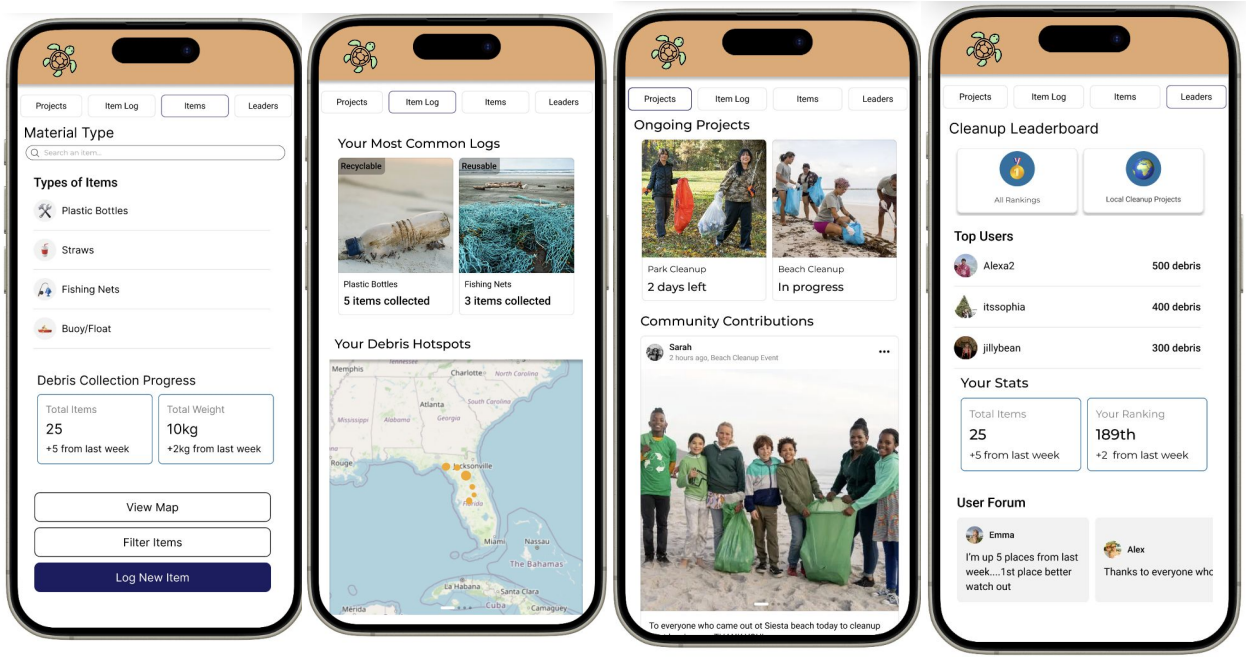
- Object categories should be visible at the top of the page
- Pressing on an item should automatically add it instead of having an add button
- There should be visible feedback like a pop-up notification telling users the item has been successfully added
- Projects page is not visible and hidden behind settings button
- There should be a navigation bar at the bottom of the screen allowing users to access logged items, projects, and maybe some sort of leaderboard.

Redesign Suggestions

Current Design



Suggested Redesign



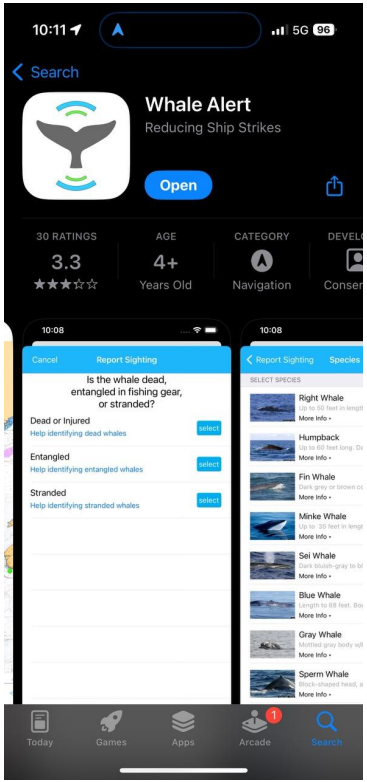
Stakeholder Interviews

- Protocol:
  - Interviewed the same participants as within the usability test
  - Asked participants questions regarding visual design and integration of Marine Debris Tracker in their life
- Insights:
  - Contrast between the blue and orange is visually appealing
  - Leaderboard would be an incentivizing feature
  - Could add a live map that allows users to collect rewards like Pokemon Go
  - Social connections through the app could incentivize users to team up and track together
  - Diary feature should allow users to few the number of items logged throughout app use

Usability Test - Marine Debris Redesign

- Protocol:
  - Recruited participants to navigate on my redesign wireframes
  - Time process of completion.
  - Asked them to complete the following four tasks:
    - (1) Find an item belonging to the “Fishing Gear” category
    - (2) Add a plastic bag as a found item
    - (3) Delete the plastic bag from your list of items
    - (4) Join the CRIPTIC project
- Participants:
  - Ten participants; 4M&6F; Age:18-31; 4 White, 2 Black, 3 South Asian, 1 Hispanic
- Time Insights:
  - Time to complete tasks increased by 54%

Case-Study: Whale Alert



- **Problem**: Maritime activities lead to whale ship strikes, endangering local whale communities
- **Solution**: Whale Alert app shows areas with high-count of whale activity and allows users to track sightings of their own.
- **Users**: Intended audience is Mariners who seek to avoid any whale strikes or record their sightings

Vessel strikes are a leading cause of whale mortality.

Large whales are vulnerable to collisions with all vessel types, sizes, and classes throughout the world's oceans. As our waterways become increasingly congested, high-traffic areas often intersect key marine mammal habitats. In California, gray whales are the most commonly reported vessel strikes. Along the Atlantic coast, it's the critically endangered North Atlantic right whale. Regardless of location, these strikes are often deadly for whales and cause significant damage to vessels.

Luckily, we know the solution - slow vessels down! Public whale sightings submitted via Whale Alert help establish speed zones, warnings, and other measures to reduce vessel speeds and reduce risks to whales.

Usability Test - Whale Alert

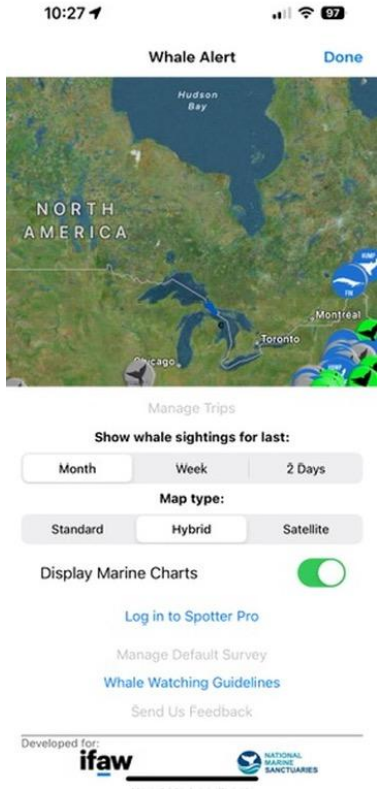
- Participants: Ten, 4M, 6F; 4 Caucasian, 3 Hispanic, 2 South Asian, 1 Black; Age 19-24
- Time process of completion.
- Tasked participants to perform the following:

    (1) Log a whale sighting
    (2) Find most recent Logs
    (3) Locate leaderboard

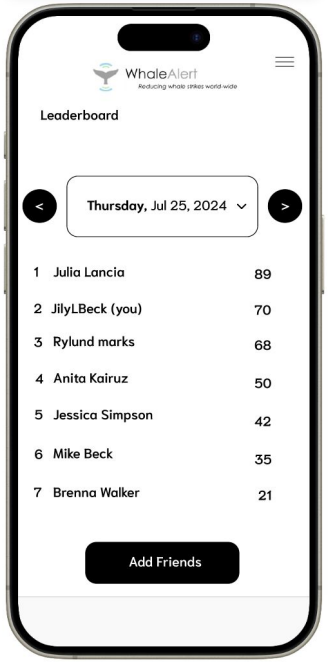
- Results:
    - Accessing guidelines requires pressing the (i) button which many users struggled with
    - UI is far too minimalistic, there are relatively few to no buttons for users to navigate through which reduces user agency
    - The ‘report sighting’ feature is detailed and intuitive
    - The different map features are difficult for users to interpret and interact with

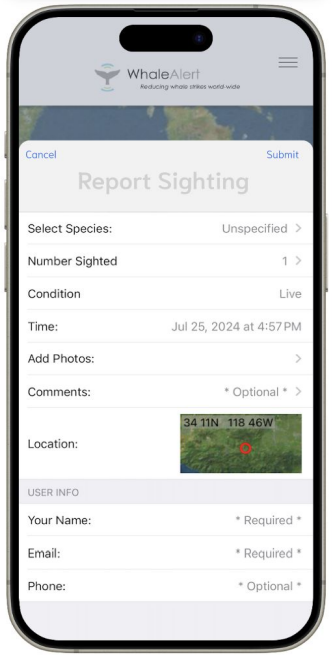
Figma Redesign: Whale Alert App

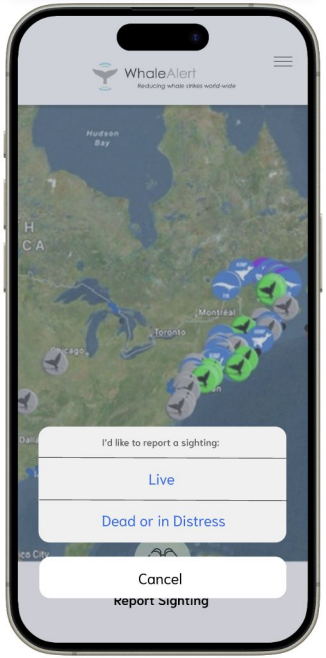
Current Design on Whale Alert App



Figma Redesign: Whale Alert App







Usability Test - Whale App Redesign

- Protocol:
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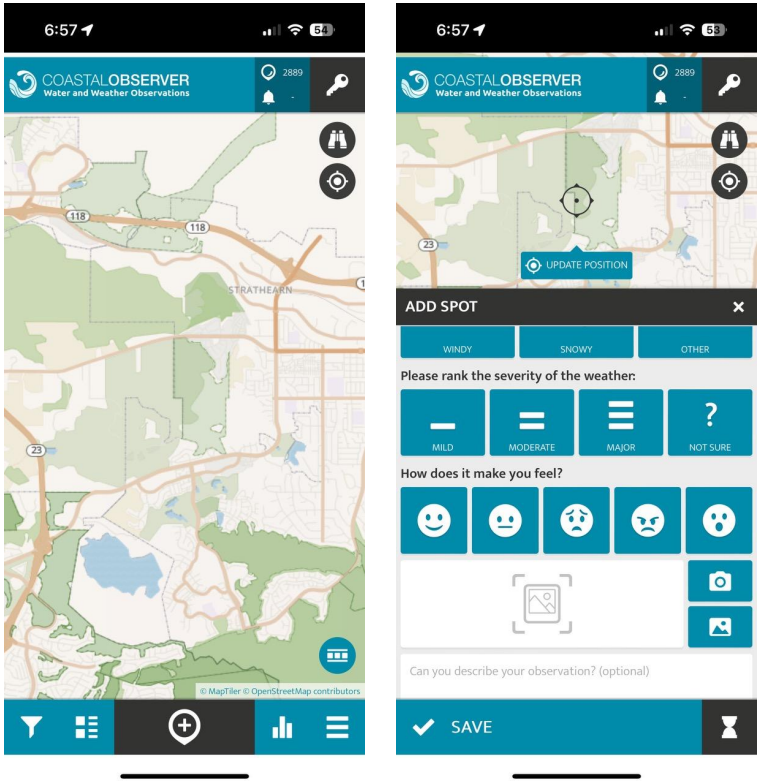
  - Time process of completion.
  - Asked them to complete the following four tasks:
    - Log a whale sighting
    - Find most recent Logs
    - Locate leaderboard
- Participants:
  - Ten participants; 2M&8F; Age:18-31; 5 White, 1 Black, 3 South Asian, 1 Hispanic
- Time Insights:
  - Completion of tasks improved by 40%

Case-Study: Coastal Observer



- **Problem:** Climate change will impact where and how humans live. As tides rise and storms intensify, humans will be forced to adapt to the changing environment and increase resiliency by learning more about local impacts of rising tides and intensified storms.
- **Solution:** The Coastal Observer App encourages citizens to become active in monitoring weather and water locally and will help researchers build a pathway for a sustainable future.
- **Users:** Geared toward the general public to report any interesting weather or water levels.
- How it differs? Allows users to consider and log their emotions for each weather entry

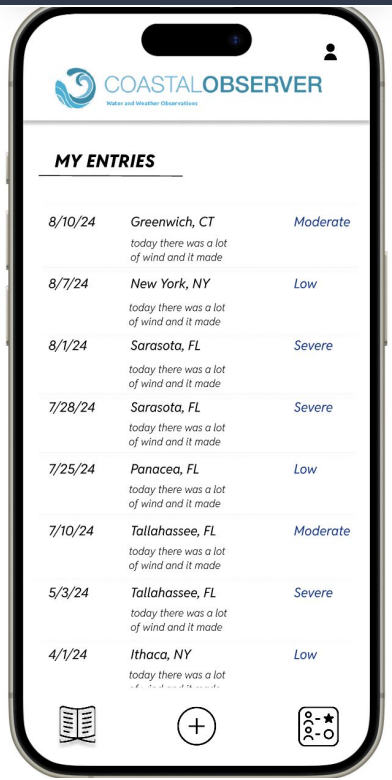
Usability Test: Coastal Observer

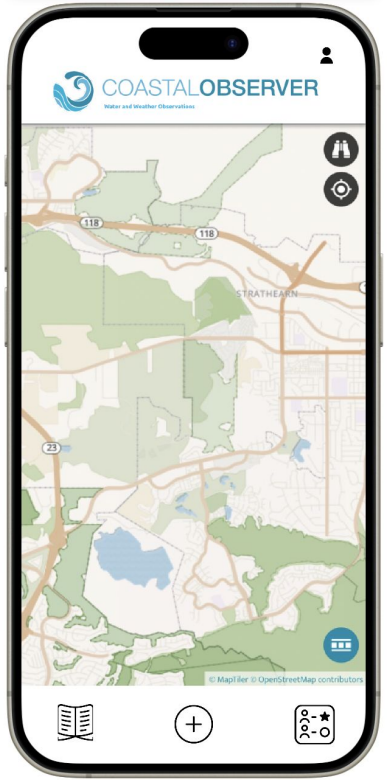
- Participants: Ten, 6M, 4F; 5 Caucasian, 2 Hispanic, 1 South Asian, 2 Black; Age 19-24
- Time process of completion.
- Tasked participants to perform the following:

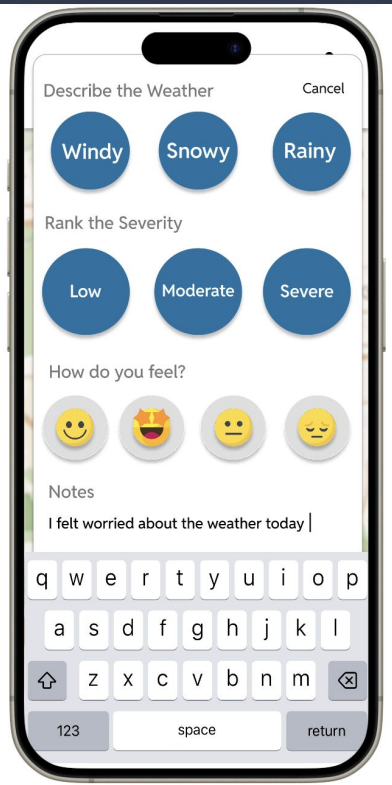
    (1) Log the weather
    (2) Locate an upcoming event
    (3) Check the user leaderboard for the year

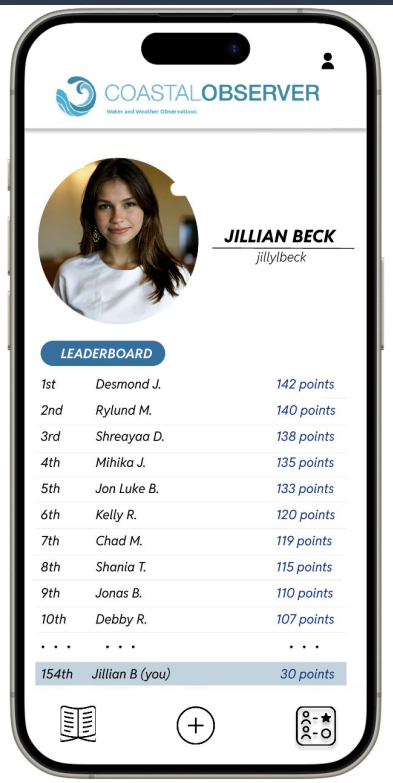
- Results:
    - App has almost too many features, participants appeared to be overwhelmed with the agency provided to them on the home screen
    - Upcoming events are not prominently displayed
    - The user leaderboard is a great incentive but is hidden behind a stats icon which does not follow traditional design norms and traditions

My Redesign of Coastal Observer





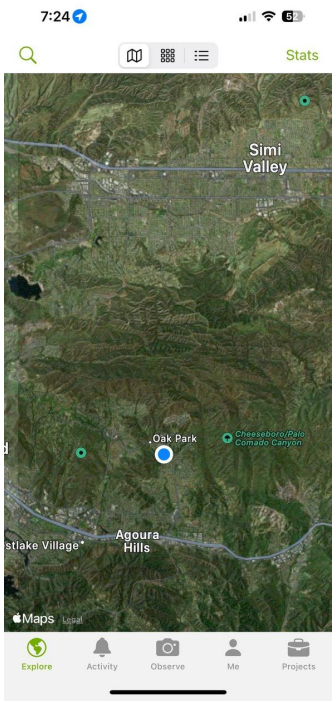


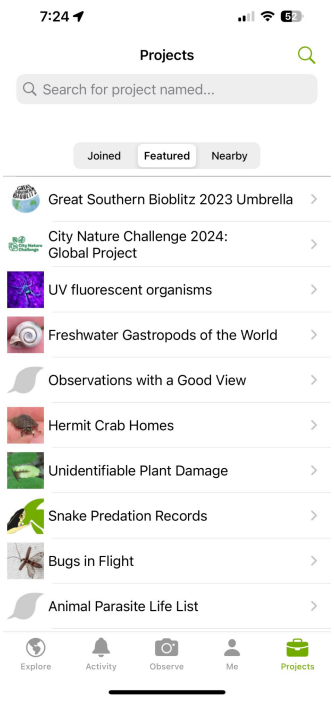


Usability Test – Coastal Observer Redesign

- Protocol:
  - Recruited participants to navigate on my redesign wireframes
  - Time process of completion.
  - Asked them to complete the following four tasks:
    - Log the weather
    - Locate an upcoming event
    - Check the user leaderboard for the year
- Participants:
  - Ten participants; 5M&5F; Age:18-31; 3 White, 2 Black, 4 South Asian, 1 Hispanic
- Time Change:
  - Tasks showed an increase time in completion by 34%

Case-Study: iNaturalist





- **Problem:** Hikers and nature enthusiasts struggle to identify plants and animals they encounter in the wild
- **Solution:** iNaturalist helps you identify the plants and animals around you while generating data for science and conservation.
- **Users:** It's for any individual interested in identifying something out in nature.
- **How it differs:** iNaturalist is an online social network of people sharing biodiversity information to help each other learn about nature.

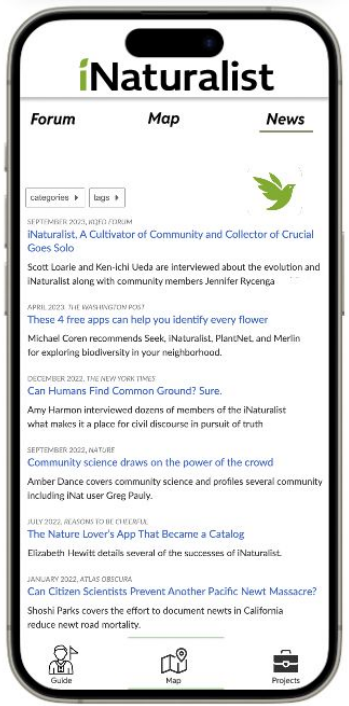
INaturalist - Usability Test

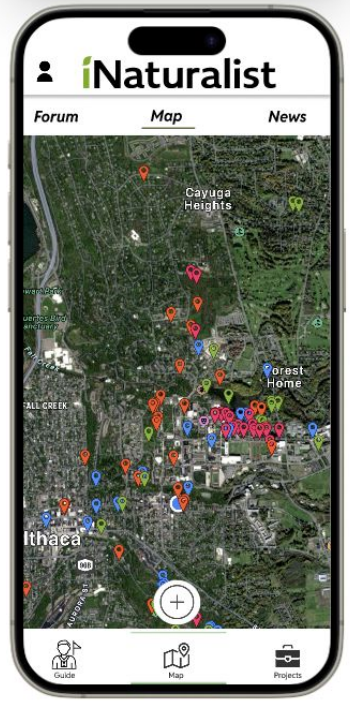
- Participants: Ten, 3M, 7F; 6 Caucasian, 3 Hispanic, 1 South Asian; Age 19-24
- Time process of completion.
- Tasked participants to perform the following:

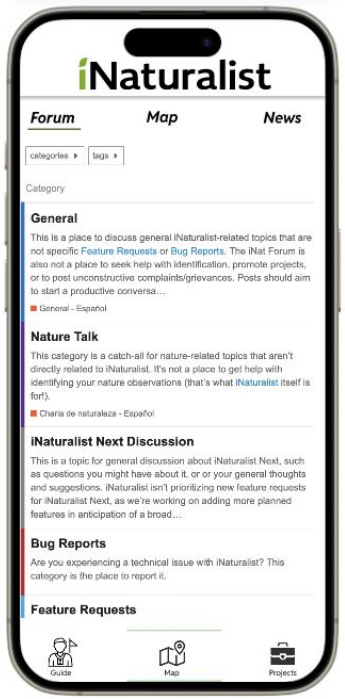
    (1) Log an unidentified flower sighting
    (2) Open the most recent INaturalist news article
    (3) Open the INaturalist user guide

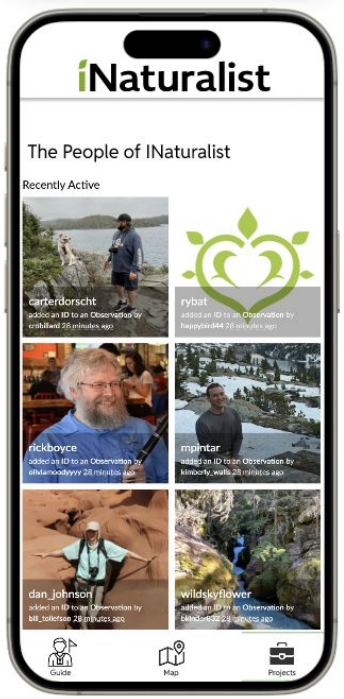
- Results:
    - Some of the headers on the app overlap with user's phone screens so the text goes beyond the visible borders.
    - News articles are hidden behind the activity icon which is not intuitive
    - No gamified incentive available to maintain user interest
    - Projects are not displayed in an aesthetically pleasing manner

My Redesign: INaturalist









Usability Test - INaturalist Redesign

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  - Asked them to complete the following four tasks:
    - Log an unidentified sighting
    - Open the most recent INaturalist news article
    - Open the INaturalist user guide
- Participants:
  - Participants: Ten, 4M, 6F; 6 Caucasian, 4 South Asian; Age 19-24
- Time Increase:
  - Improvement in completing tasks by 54%

Research Takeaways and Reflection

- While every case provided a new aspect of environmental observation to consider, there were always several UI flaws that were consistent in all of them:
  - Outdated Icons and Palettes
  - Non-intuitive User Flow
  - Lack of visibility for key features
  - Lack of incentives/gamification for user-retention
- Results:
  - After re-running usability tests on my redesigns of each app, and comparing the timing results to those of the initial usability tests on the initial app design, I found a total average increase of 45.5%
  - This is significant improvement in efficiency through the user flows
- Takeaways:
  - Simple UI's can be more effective than complex and crowded ones
  - Gamification appeals to users and can help compensate for data disparity in tracking apps
  - Social integration on apps allows users to join groups and incentivizes data collection
  - Modern app aesthetics incline users to utilize these apps at a higher frequency