sharkPulseApps

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CS4624: Multimedia, Hypertext, and Information Access

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Outline

01
PROBLEM & CLIENTS

02
REQUIREMENTS

03
FRONT END

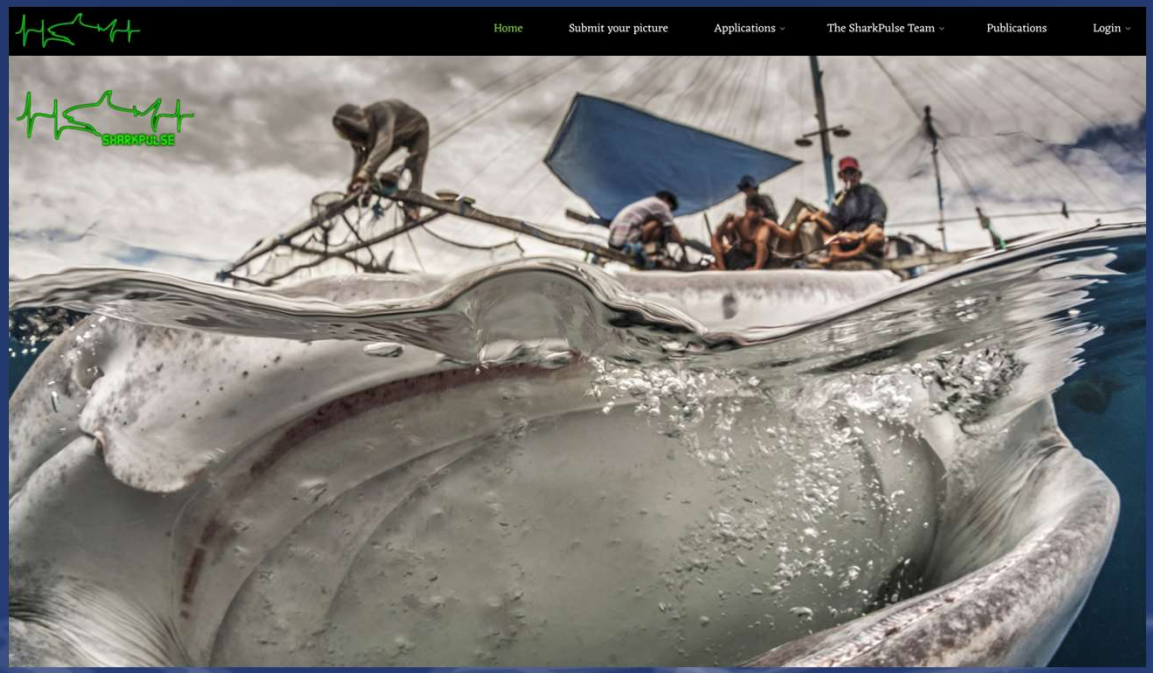
04
BACK END

05
TESTING & CHALLENGES

06
LESSONS & FUTURE WORK

Problem

- Data deficient shark populations
- Difficulty classifying and determining conservation status



Clients

- Jeremy Jenrette – Graduate Research Assistant
- Francesco Ferretti – Assistant Professor
- Department of Fish and Wildlife Conservation

Requirements

ORIGINAL	STRETCH
General UI Improvements	Global Affiliate Map
Data-Informed Visuals	Taxonomical Accuracy Table
PHP Scripting	Improve Picture Submission
Elementor Module	
Cron Job Automation	

Work Completed

FRONT END

- Dynamic Visualizations
- Global Affiliates Map
- UI Improvements

BACK END

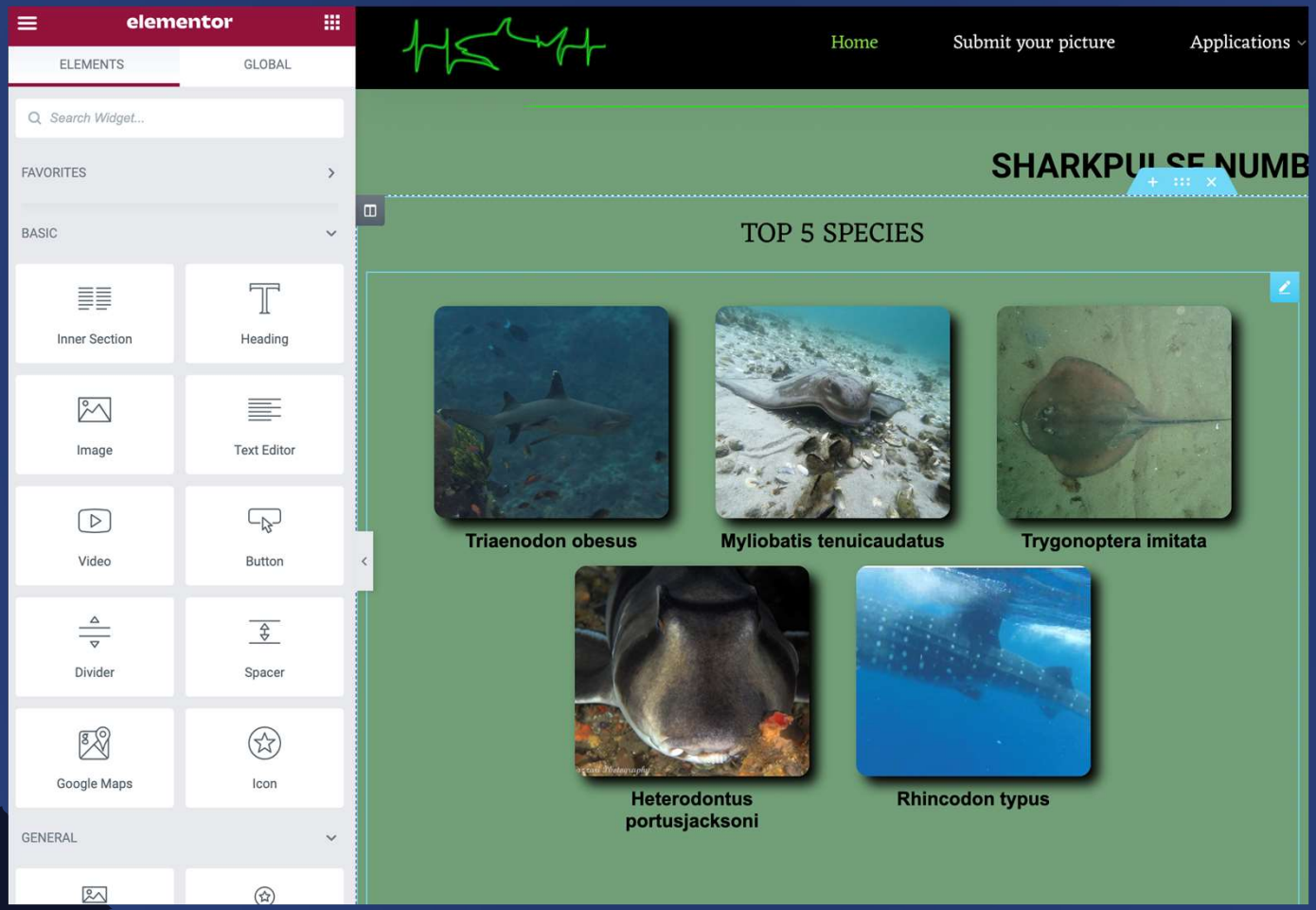
- PHP Scripting
- RShiny Leaflet Map
- DB Changes

COURSEWORK

- Presentations
- Final Report Draft
- VTechWorks Submission

FRONT END

Elementor

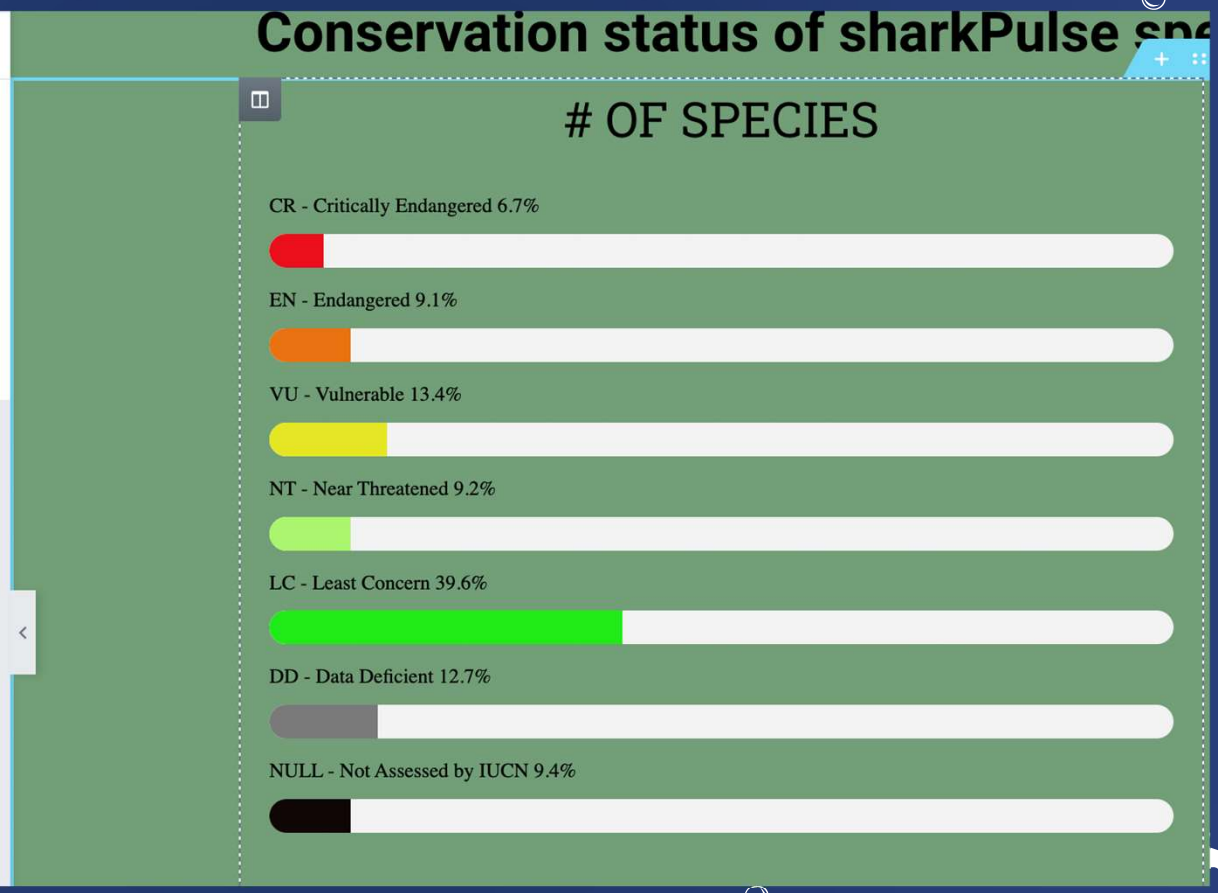

elementor
ELEMENTS
GLOBAL
Search Widget...
FAVORITES
BASIC
Inner Section
Heading
Image
Text Editor
Video
Button
Divider
Spacer
Google Maps
Icon
GENERAL
Home
Submit your picture
Applications
TOP 5 SPECIES
Triaenodon obesus
Myliobatis tenuicaudatus
Trygonoptera imitata
Heterodontus portusjacksoni
Rhincodon typus

Injecting PHP

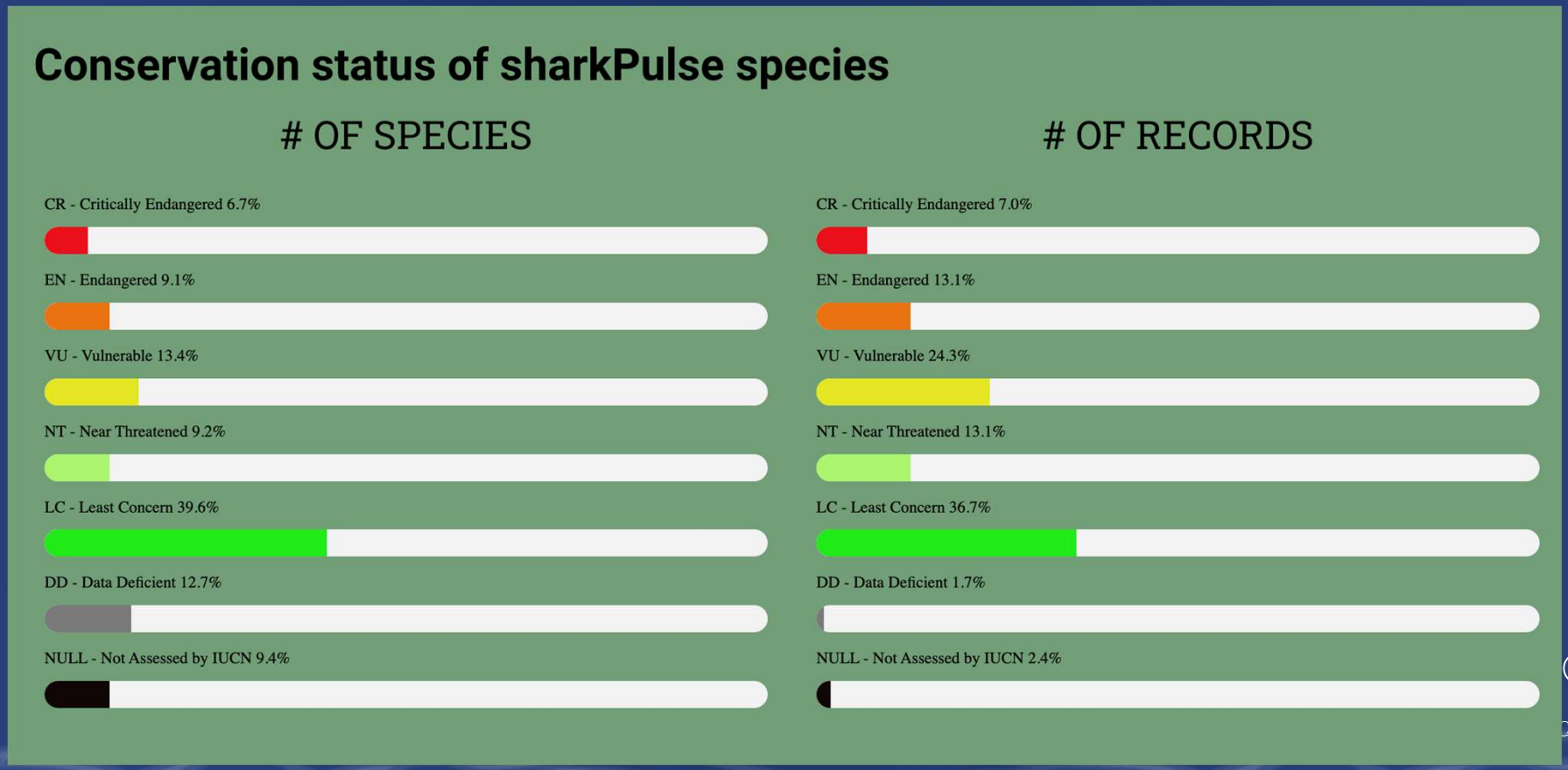
HTML Code

```
<iframe style="border: 0;
    width:100%; height: 700px
    ; overflow: auto;" src
    ="https://sp2.cs.vt.edu
    /dynamic/topfive.php"
    ></iframe>
```

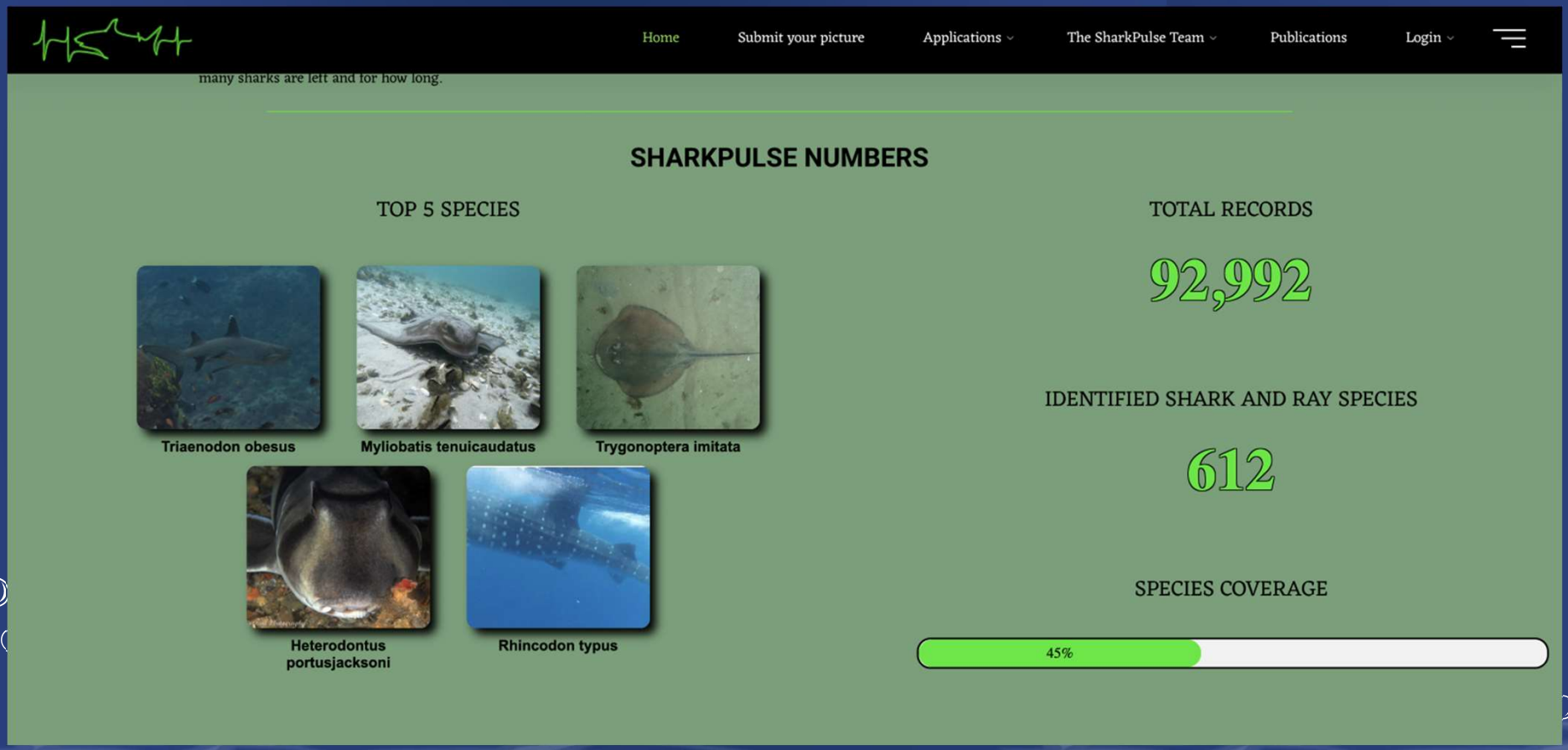
Need Help



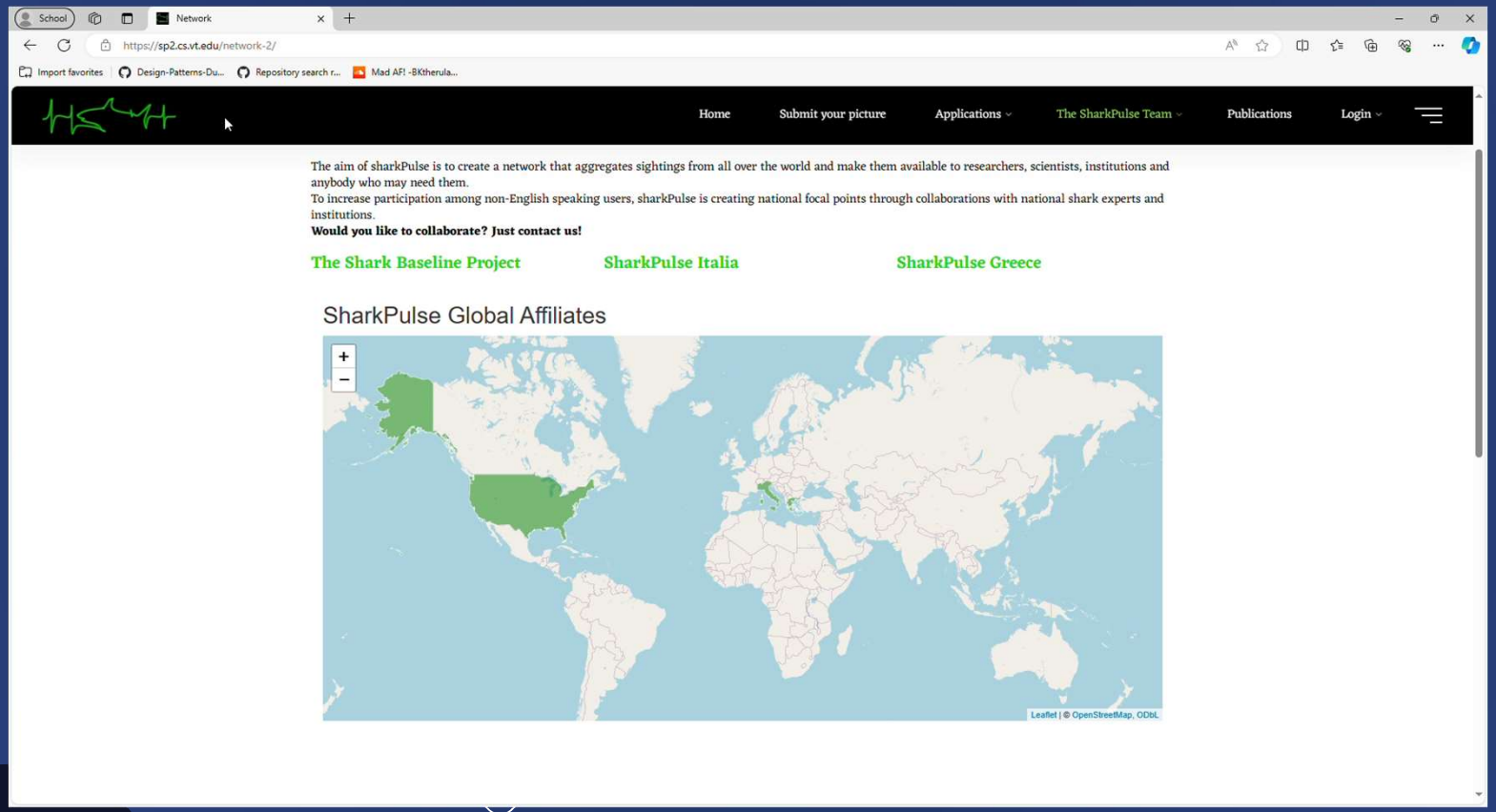
Species Coverage



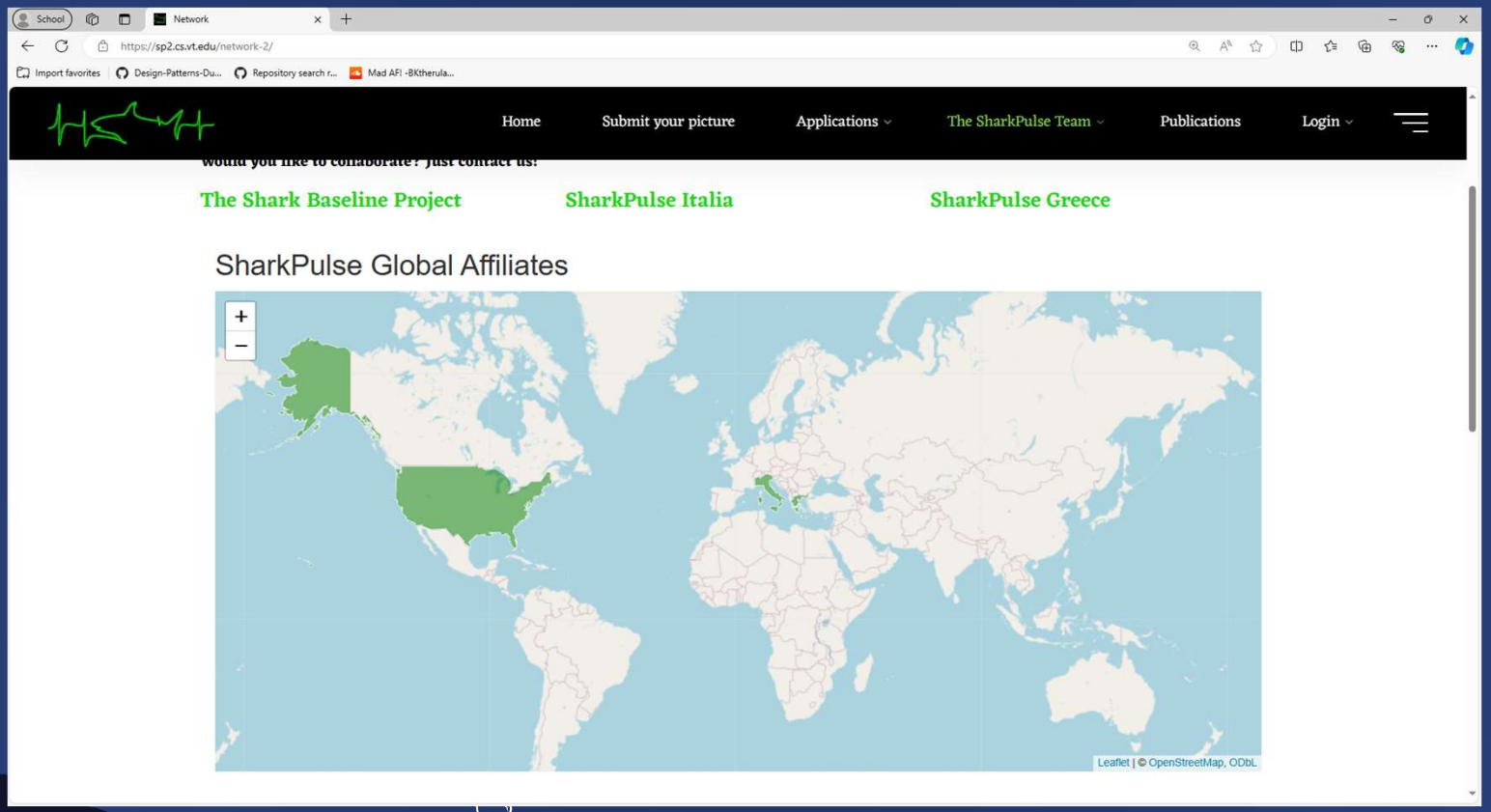
sharkPulse Numbers



Global Affiliate Map



Global Affiliate Map



Taxonomical Accuracy Table

Species	Images(Acc)	Species	Images(Acc)	Species	Images(Acc)
Acroteriobatus		**Gymnura**		**Plesiotrygon**	
A. Acroteriobatus annulatus	199(0.35)	**Halaelurus**		**Pliotrema**	
A. Acroteriobatus leucospilus	7(0.87)	**Haploblepharus**		**Poroderma**	
A. Acroteriobatus variegatus	1(0.90)	**Harriotta**		**Potamotrygon**	
A. Acroteriobatus zanzibarensis	6(0.23)	**Hemigaleus**		**Prionace**	
Aculeola		**Hemipristis**		**Pristiophorus**	
Aetobatus		**Hemiscyllium**		**Pristis**	
Aetomylaeus		**Hemitriakis**		**Proscyllium**	
Alopias		**Hemitrygon**		**Psammobatis**	
Amblyraja		**Heptranchias**		**Pseudobatos**	
Apristurus		**Heterodontus**		**Pseudocarcharias**	
Aptychotrema		**Hexanchus**		**Pseudoginglymostoma**	
Asymbolus		**Hexatrygon**		**Pseudotriakis**	
Atelomycterus		**Himantura**		**Pteroplatytrygon**	
Atlantoraja		**Hydrolagus**		**Raja**	
Aulohalaelurus		**Hypanus**		**Rajella**	
Bathyraja		**Hypnos**		**Rhincodon**	
Bathytoshia		**Hypogaleus**		**Rhinobatos**	
Beringraja		**Iago**		**Rhinoptera**	
Brachaelurus		**Isistius**		**Rhizoprionodon**	
Brevitrygon		**Isurus**		**Rhynchobatus**	
Bythaelurus		**Lamiopsis**		**Rioraja**	
Callorhinchus		**Lamna**		**Rostroraja**	
Carcharhinus					

BACK END

Database

taxonomy3

- row.names text
- species_name text
- order_name.x text
- taxonid integer
- kingdom_name text
- phylum_name text
- class_name text
- order_name.y text
- family_name text
- genus_name text

sharkpulse

- date date
- time text
- users_email text
- species_name text
- latitude double precision
- longitude double precision
- img_name text
- notes text
- device_type text
- given_name text
- common_name text
- location text
- given_date text

training_copy

- img_name character varying(300)
- genus character varying(100)
- species character varying(100)
- class character varying(100)
- tt_id integer
- sp_id integer
- validated_confidence numeric(5,4)
- comment text
- img_bucket character varying(255)
- source character varying(255)

Querying the Database

```
async function queryConservation(cons_statuses) {
    const total_sql = "SELECT COUNT(*) FROM taxonomy3"
    const total_res = await client.query(total_sql)
    const total_count = Number(total_res.rows[0].count)

    const cons_percentages = []
    percentage_sum = 0
    for(const status of cons_statuses) {
        const conservation_sql = "SELECT SUM(CASE WHEN category LIKE " + "'" + status + "' THEN 1 ELSE 0 END) FROM taxonomy3"
        const conservation_res = await client.query(conservation_sql)
        const conservation_count = Number(conservation_res.rows[0].sum)
        cons_percentages.push(Number((conservation_count/total_count) * 100).toFixed(1))
    }
    return cons_percentages
}
```

Visuals Scripting

```
function generateProgressBar(percentage, label) {
    return `
      <!DOCTYPE html>
      <html lang="en">
      <head>
          <meta charset="UTF-8">
          <meta name="viewport" content="width=device-width, initial-scale=1.0">
          <title>Dynamic Progress Bar</title>
          <style>
              .progress-bar {
                  width: 100%;
                  background-color: #f2f2f2;
                  border-radius: 15px;
                  border: 2px solid black;
                  margin-top: 20px;
                  overflow: hidden; /* Hide overflowing content */
              }
              .progress {
                  width: 0%;
                  background-color: #21E91B;
                  height: 30px;
                  border-radius: 15px;
                  text-align: center;
                  line-height: 30px;
                  color: black;
                  transition: width 4s ease; /* 75% slower sliding */
              }
          </style>
      </head>
      <body>
          <h2>${label}</h2>
          <div class="progress-bar" id="progressSection">
              <div class="progress" id="${label}">${percentage}%</div>
          </div>
```

RShiny App

```r
# Create leaflet map
output$map <- renderLeaflet({
  leaflet() %>%
    setView(lng = 0, lat = 30, zoom = 2) %>%
    addTiles() %>%
    addMarkers(
      lng = c(-95.7129, 12.5674, 21.8243), # Longitude for US, Italy, and Greece respectively
      lat = c(37.0902, 41.8719, 39.0742),  # Latitude for US, Italy, and Greece respectively
      popup = c(
        "Shark Baselines (US)<br><a href='https://www.facebook.com/sharkbaselines/' target='_blank'>Visit Facebook Page</a>",
        "Sharkpulse Italia (Italy)<br><a href='https://www.facebook.com/SharkpulseItalia/' target='_blank'>Visit Facebook Page</a>",
        "SharkPulse Greece (Greece)<br><a href='https://www.facebook.com/SharkPulseGreece/' target='_blank'>Visit Facebook Page</a>"
      )
    )
})
```

GeoJSON Data

```r
library(rnaturalearth)
library(sf)

# Load country boundaries
world <- ne_countries(scale = "medium", returnclass = "sf")

# Filter country boundaries for United States, Italy, and Greece
countries <- world[world$name %in% c("United States of America", "Italy", "Greece"), ]

# Convert to GeoJSON format
countries_geojson <- st_as_sf(countries)

# Write GeoJSON data to a file
sf::st_write(countries_geojson, "countries.geojson")
```

Taxonomical Accuracy Query

```php
try {
    $pdo = new PDO($dsn);
    $pdo->setAttribute(PDO::ATTR_ERRMODE, PDO::ERRMODE_EXCEPTION);
    //echo "Connected to PostgreSQL database\n";

    // Query to get all non-null species + genus combinations
    $query = "
        SELECT species, genus
        FROM training_copy
        WHERE species IS NOT NULL AND genus IS NOT NULL
        ORDER BY genus, species;
    ";

    // Execute the query
    $result = $pdo->query($query);
    $rows = $result->fetchAll(PDO::FETCH_ASSOC);
    //echo "All non-null species + genus combinations:\n";

    // Create a dictionary to map genus to unique species and count
    $genusSpeciesMap = array();

    foreach ($rows as $row) {
        $genus = $row['genus'];
        $species = $row['species'];

        if (!array_key_exists($genus, $genusSpeciesMap)) {
            $genusSpeciesMap[$genus] = array(
                'speciesSet' => array(),
                'speciesCount' => array()
            );
        }

        $genusSpeciesMap[$genus]['speciesSet'][] = $species;
        $genusSpeciesMap[$genus]['speciesCount'][$species] = isset($genusSpeciesMap[$genus]['speciesCount'][$species]) ? $genusSpeciesMap[$genus]['speciesCount'][$species] + 1 : 1;
    }
```

Taxonomical Accuracy Visual

```php
// Generate HTML for each third of the page
$tableCount = 3;
$numRows = ceil(count(array_keys($genusSpeciesMap)) / $tableCount);

$htmlTable = '<div style="width: 100%; display: flex;">';

for ($i = 0; $i < $tableCount; $i++) {
    $start = $i * $numRows;
    $end = min($start + $numRows, count(array_keys($genusSpeciesMap)));

    $htmlTable .= '<div style="width: 33.33%;"><table style="width: 100%;"><tr><th style="width: 50%;">Species</th><th style="width: 50%;">Images(Acc)</th></tr>';

    foreach (array_slice(array_keys($genusSpeciesMap), $start, $end - $start) as $genus) {
        $htmlTable .= '<tr><td colspan="2" style="text-align: center;"><b style="display: block; text-align: left; cursor: pointer;" onclick="toggleSpecies(\'' . $genus . '\')">' . $genus . '</b></td></tr>';
        $htmlTable .= '<tr><td colspan="2"><div id="' . $genus . '" style="display: none;">';

        foreach ($genusSpeciesMap[$genus]['speciesCount'] as $species => $count) {
            $acc = number_format(mt_rand(1, 100) / 100, 2); // Random accuracy for demonstration
            $genusInitial = substr($genus, 0, 1); // Get the initial of the genus
            $htmlTable .= '<div> <i>' . $genusInitial . '</i>. ' . $species . '     ' . $count . '(' . $acc . ')</div>';
        }

        $htmlTable .= '</div></td></tr>';
    }

    $htmlTable .= '</table></div>';
}
```

File Extension Script

- Adds appropriate extensions to images
- Filters out duplicates extension tag

```python

# Set up database connection
try:
    connection = psycopg2.connect(
        database="pelagic",
        user="spr",
        password="spr_pass",
        host="localhost",
        port="5432"
    )
    cursor = connection.cursor()

    # Execute query to get the names of images to be copied
    query = """
    SELECT img_name FROM instagram
    WHERE date > '2023-12-23'
    AND validated = 't'
    AND shark = 'shark'
    AND repost IS NOT NULL;
    """
    cursor.execute(query)
    img_names = [row[0] for row in cursor.fetchall()]

    # Paths for source and destination directories
    source_dir = '/home/spr/instaval_images/shark'
    dest_dir = '/home/spr/sp_images/www'

    # Copy each image from the source to the destination directory
    for img_name in img_names:
        source_path = os.path.join(source_dir, full_img_name)
        dest_path = os.path.join(dest_dir, full_img_name)
        if os.path.exists(source_path):  # Check if the source file exists before copying
            shutil.copy(source_path, dest_path)
            print(f"Copied {full_img_name} to {dest_dir}")
        else:
            print(f"File {full_img_name} does not exist in {source_dir}")

except (Exception, psycopg2.DatabaseError) as error:
    print("Error while accessing database or copying files:", error)
finally:
    if connection is not None:
        cursor.close()
        connection.close()
        print("Database connection closed.")
```

Testing

- Local testing
- Evaluations from clients
- User experience survey

sharkPulse Website Feedback

* Required

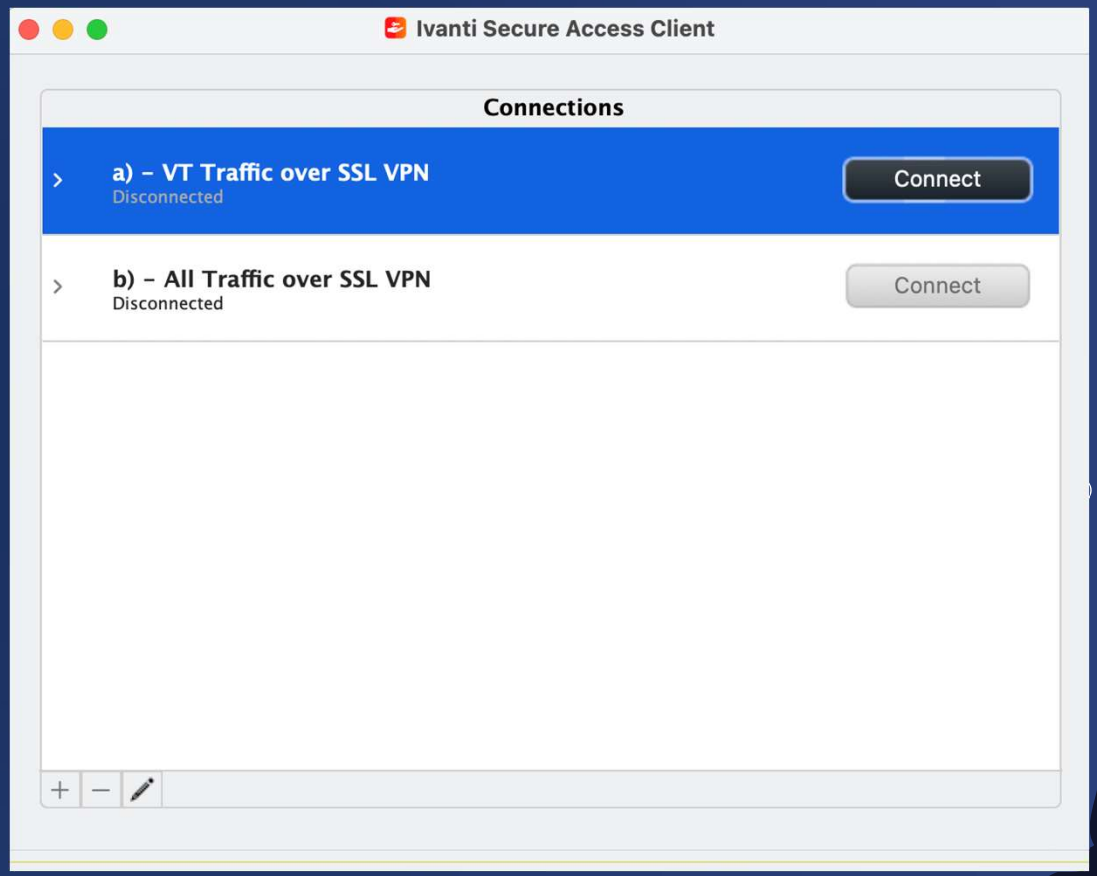
Feedback

1. Read each statement and mark your level of agreement: *

	Agree strongly	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
I would use this website again	○	○	○	○	○
I found the website unnecessarily complex	○	○	○	○	○
I thought the website was easy to use	○	○	○	○	○
I think I would need technical background or support to be able to use the website	○	○	○	○	○
I found the various functions in this website were well integrated	○	○	○	○	○
I thought there was too much inconsistency in the website	○	○	○	○	○
I believe that most people could learn to use this website quickly	○	○	○	○	○
I found the website very cumbersome to use	○	○	○	○	○
I felt very confident using the website	○	○	○	○	○
I needed to learn a lot of things before I could comfortably use the website	○	○	○	○	○

Challenges

- VPN issues
- RShiny and Elementor
- Integrating visuals

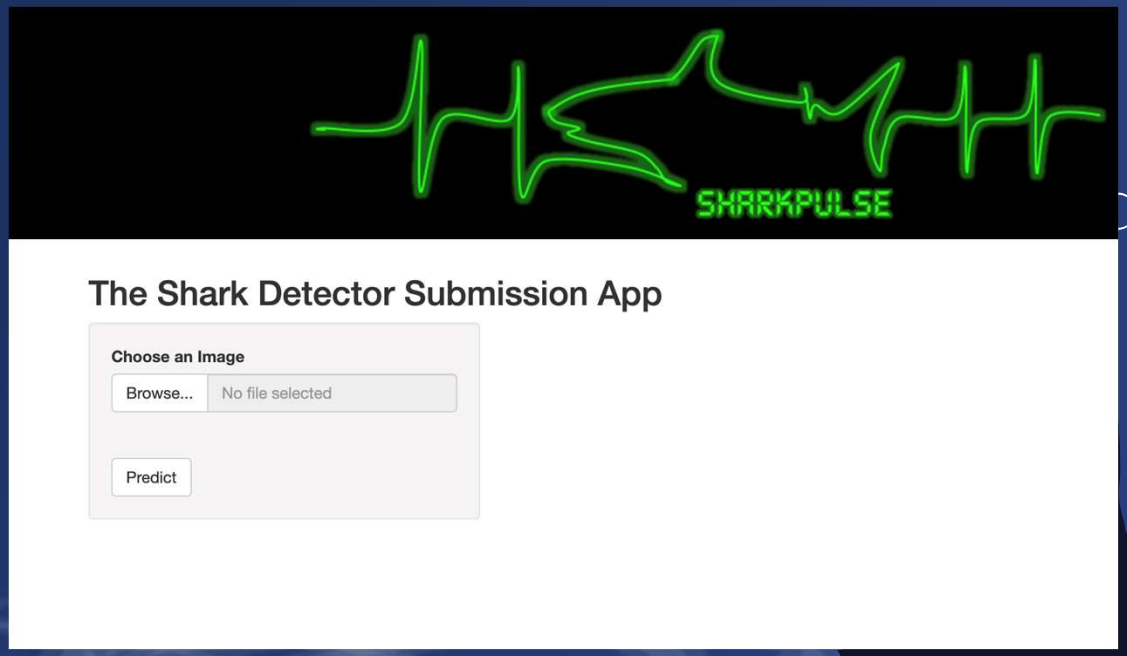


Lessons Learned

- Learned how to use RShiny and Elementor
- Applying agile methodology
- Learned lots about sharks!

Future Work

- Disseminate Feedback Survey
- Picture Submission Page
- Inject Taxonomy Table



ACKNOWLEDGEMENTS

- Professor Francesco Ferretti
- Jeremy Jenrette
- Professor Dr. Edward Fox
- GTA Satvik Chekuri
- Fish and Wildlife Conservation

References

Betteridge, K. (2024). What Every UXC Client Should Know about SUS Scores. Bentley University. Retrieved April 16, 2024, from https://www.bentley.edu/centers/user-experience-center/what-every-client-should-know-about-sus-scores

sharkPulse. (2024) Retrieved April 23, 2024, from https://sp2.cs.vt.edu/

THANK YOU!

QUESTIONS?