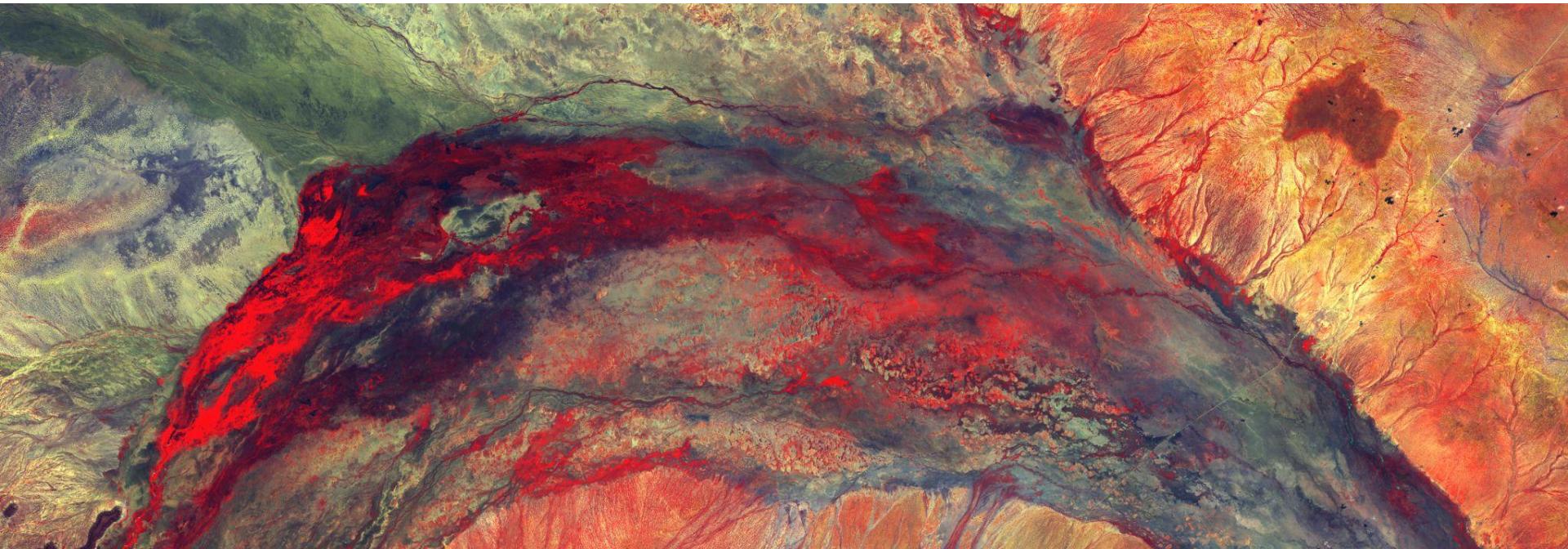


EDS 223: Geospatial Analysis & Remote Sensing

Week 5



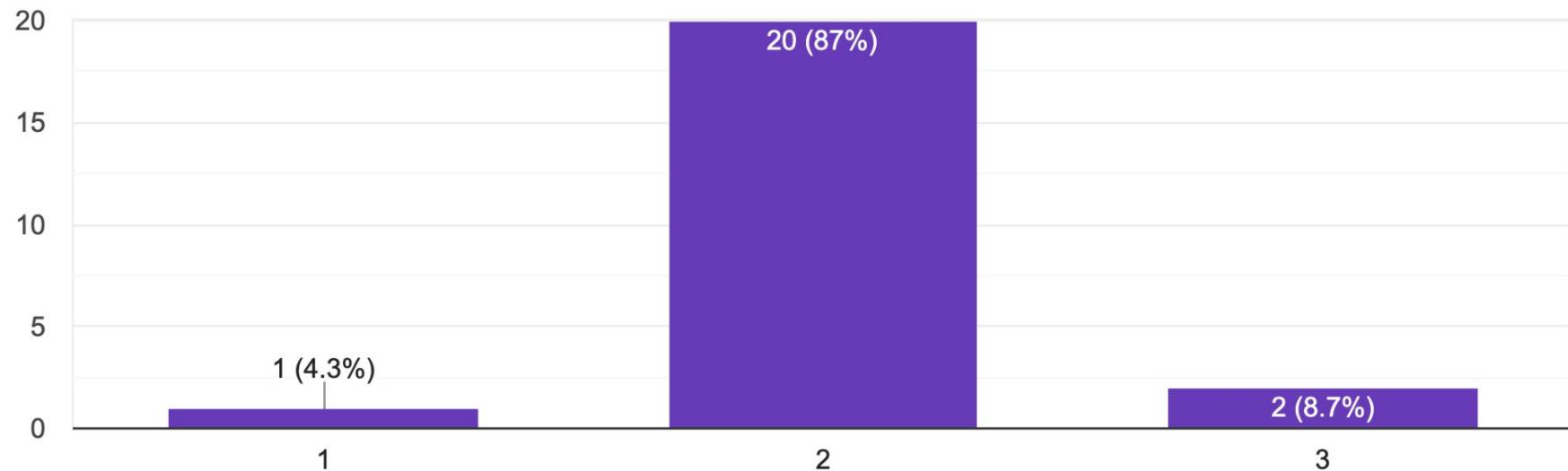
USGS via Unsplash

Welcome

- Report back on mid-quarter survey
- Expert speaker: Dr. Millie Chapman
- Dissecting answers
- Spatial Data Science Professional Expert Panel

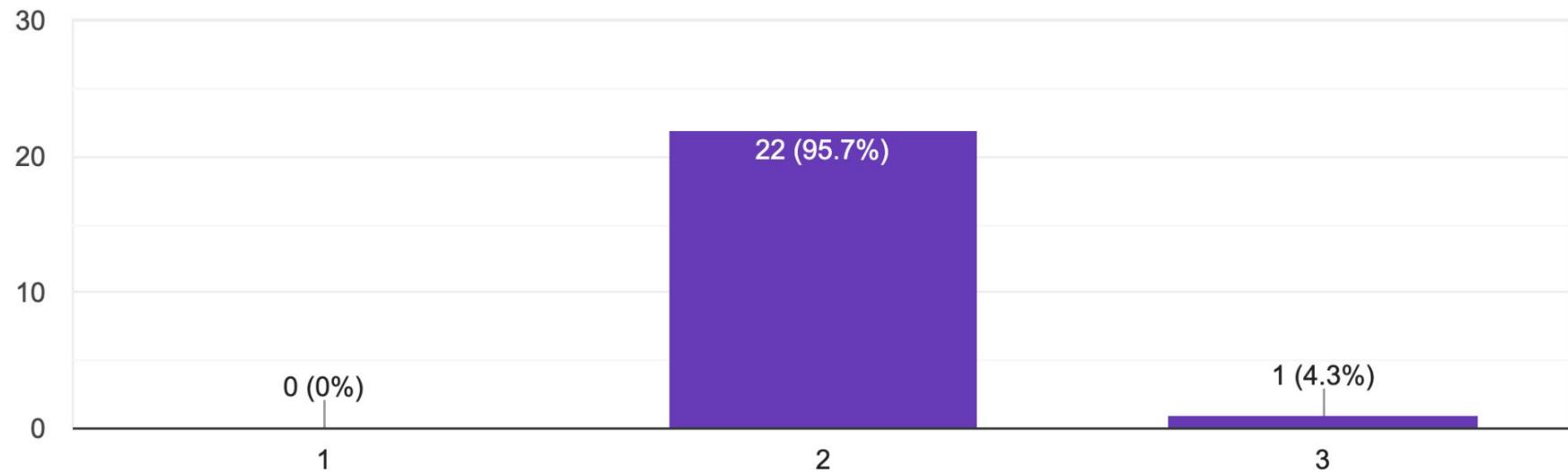
How is the pace of the lecture material so far?

23 responses



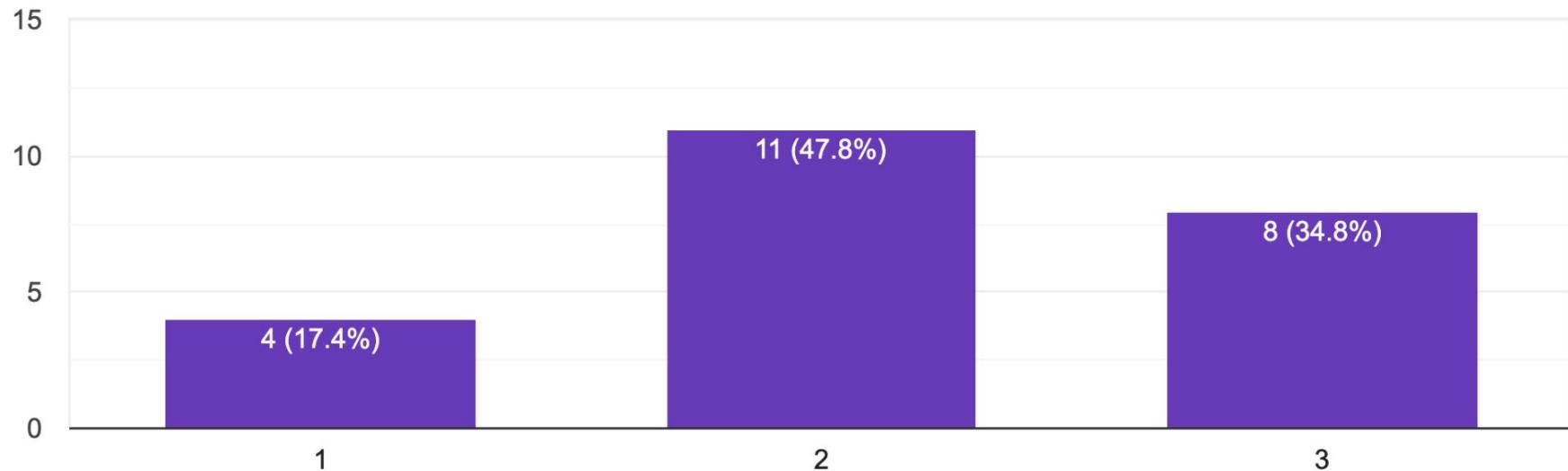
How is the pace of the lab material so far?

23 responses



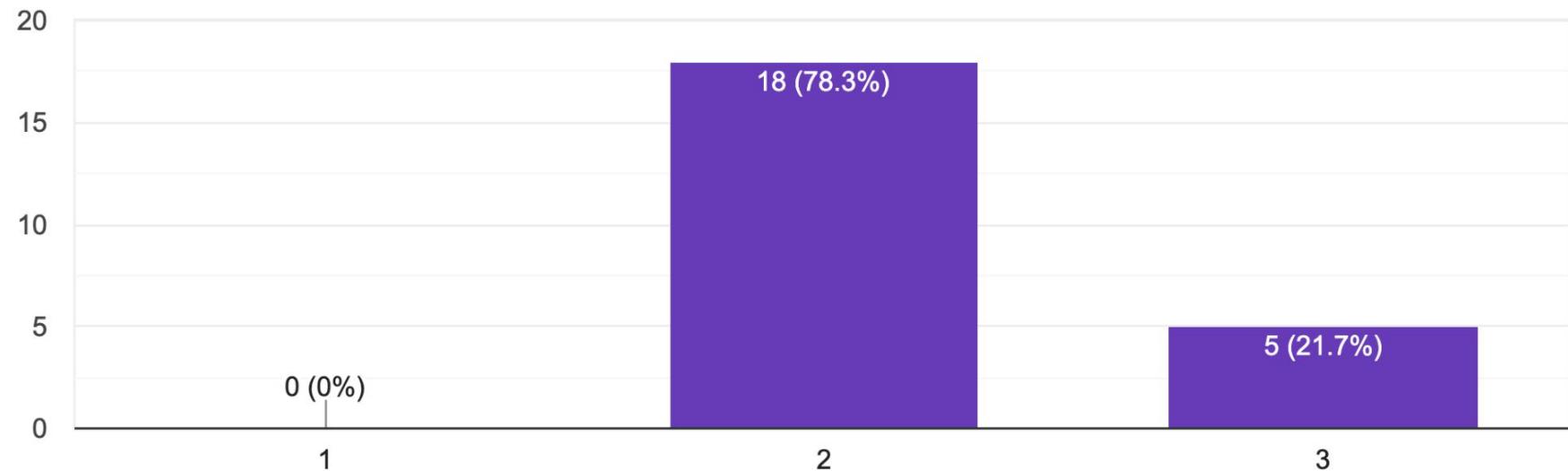
How useful are discussion sections for this course?

23 responses



How are the homeworks going?

23 responses



Comments

- Request for 223 in Python
- 3 hour class is long, but could use another 3 hours
- Discussion sections are redundant with class, would be helpful to cover homework questions
- Clarification on homework doesn't make it to all students
- Like focus on environmental justice

Comments

- **Request for 223 in Python**
 - Proposed solution: Sorry! That's the plan for having cohesion with 220
- **3 hour class is long, but could use another 3 hours**
 - Proposed solution:
 - Build in more “mental” breaks through hands-on activities
- **Discussion sections are redundant with class, would be helpful to cover homework questions**
 - Proposed solution:
 - Build discussion sections to allow for homework answers/modified exercises
- **Clarification on homework doesn't make it to all students**
 - Proposed solution:
 - Take notes during office hours and relay any clarifications over Slack
 - Please reach out if you feel you are not able to meet with me or Allie
- **Like focus on environmental justice**
 - Yay! This is an update from last year :)

Opening a conversation on responsible environmental data science in the age of large language models

Ruth Y. Oliver, Melissa Chapman, Nathan Emery, Lauren Gillespie,
Natasha Gownaris, Sophia Leiker, Anna C. Nisi, David Ayers, Ian
Breckheimer, Hannah Blondin, Ava M. Hoffman, Camille Pagniello,
Megan Raisle, Naupaka Zimmerman

What is ChatGPT?

- **Large Language Model**
 - Deep neural networks
 - Trained in a “self-supervised” or “autoregressive”
 - Accept text input and “impute” missing text
- **Why now?**
 - Technology is not new
 - Previous iterations produced content that made them unacceptable to interact with
 - New versions use human labor to make them more palatable
- **What is it really doing?**
 - Just trying to predict the next most likely text
 - So.... what could go wrong?



Prompt: who discovered the global warming potential of CO₂?

Response:

The concept of the global warming potential (GWP) of carbon dioxide (CO₂) was first introduced by scientists in the 1970s, particularly by J. S. Sawyer and Wallace Broecker. They recognized that different greenhouse gases have different warming potentials based on their ability to absorb and trap heat in the atmosphere.

However, the specific calculation of CO₂'s GWP as a factor of its ability to trap heat relative to other greenhouse gases, such as methane and nitrous oxide, was developed in the 1990s by the Intergovernmental Panel on Climate Change (IPCC) as part of their efforts to understand and quantify the impacts of human-caused climate change.

Errors of omission



- Correctly theorized CO₂ as a greenhouse gas
- “Circumstances affecting the heat of the Sun’s rays” (1857)

Eunice Newton Foote

What happens when we outsource our ideas?

Prompt: brainstorm a research project to investigate how racist policies influence biodiversity data

Response:

Title: Investigating the Impact of Racist Policies on Biodiversity Data: A Historical Analysis and Contemporary Assessment [...]

3. Methods:

b. Quantitative Analysis:

- Evaluate the impact of historical racist policies on biodiversity loss, ecosystem degradation, and species endangerment using relevant historical data.
- Assess the current state of biodiversity data in regions affected by past racist policies, including data gaps and inaccuracies. [...]

7. Ethical Considerations:

- Ensure respectful engagement with Indigenous communities and prioritize their knowledge and perspectives.
- Address potential biases within the research team and work to minimize them.
- Collaborate with organizations and experts in environmental justice and Indigenous rights to ensure ethical research practices.

Prompt: write R code to intersect point and polygon data

Response:

```
# Load the required packages
```

```
library(sf)
```

```
# Create a sample polygon dataset
```

```
polygon_data <- st_read(system.file("shape/nc.shp", package="sf"))
```

```
# Create a sample point dataset
```

```
point_data <- data.frame(x = c(-80.1, -79.5, -78.5), y = c(35.2, 35.8, 35.3))
```

```
coordinates(point_data) <- c("x", "y")
```

```
st_crs(point_data) <- st_crs(polygon_data)
```

```
# Intersect the point and polygon datasets
```

```
intersection <- st_intersection(point_data, polygon_data)
```

```
# View the intersection result
```

```
print(intersection)
```

Prompt: write R code plot biodiversity observations with socioeconomic data

Response:

```
# Load the required packages
```

```
library(ggplot2)
```

```
library(dplyr)
```

```
# Sample biodiversity observations data (replace with your own data)
```

```
biodiversity_data <- data.frame(
```

```
Species = c("Species A", "Species B", "Species C"),
```

```
Latitude = c(40.7128, 34.0522, 51.5074),
```

```
Longitude = c(-74.0060, -118.2437, -0.1278))
```

```
# Sample socioeconomic data (replace with your own data)
```

```
socioeconomic_data <- data.frame(
```

```
Location = c("Location 1", "Location 2", "Location 3"),
```

```
Population = c(10000, 5000, 15000),
```

```
GDP = c(500000, 250000, 750000))
```

```
# Merge biodiversity and socioeconomic data by a common identifier (e.g., Location)
```

```
merged_data <- merge(biodiversity_data, socioeconomic_data, by.x = "Species", by.y = "Location")
```

```
# Create a scatter plot
```

```
ggplot(merged_data, aes(x = GDP, y = Population, label = Species)) +
```

```
geom_point() +
```

```
geom_text(hjust = 0.5, vjust = -1) +
```

```
labs(x = "GDP", y = "Population", title = "Biodiversity vs. Socioeconomic Data")
```

Welcome!



Jessica Couture
Conservation International



Emily Gaston
Rincon Consulting



Julie Padilla
USGS



Alessandra Vidal Meza
National Audubon Society

Jessica Couture

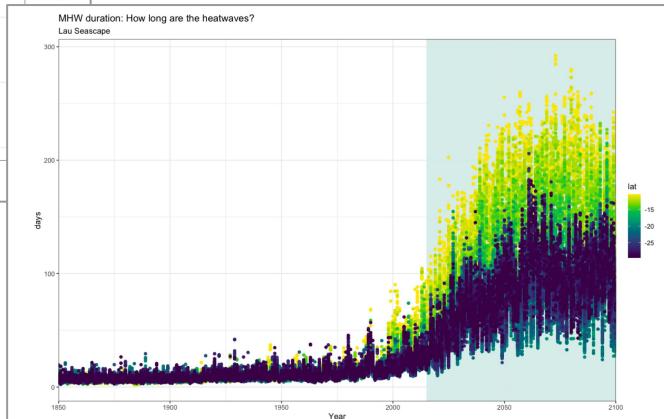
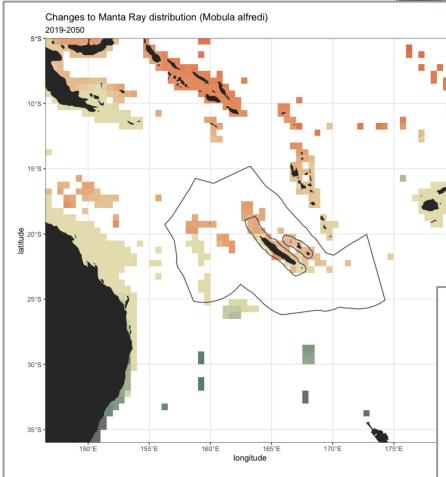
Background

- Marine field ecology
- Bren MESM
- Data projects, NCEAS
- PhD



Current projects

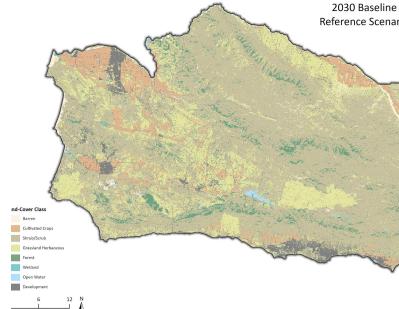
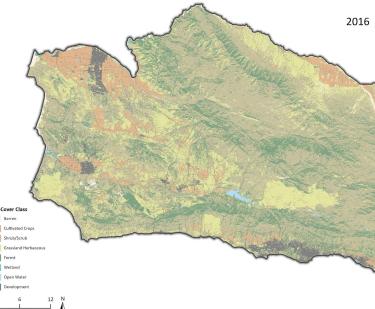
- CoCO (Conservation of a Changing Ocean)
 - Research collaborations
 - Climate change site assessments



Emily Gaston

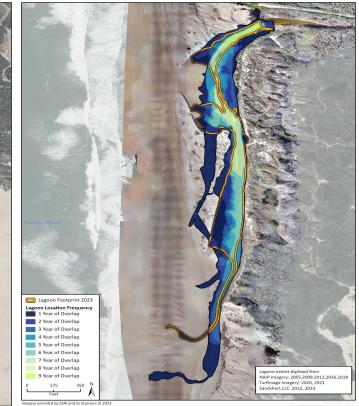
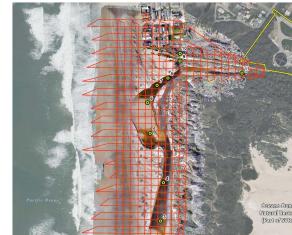
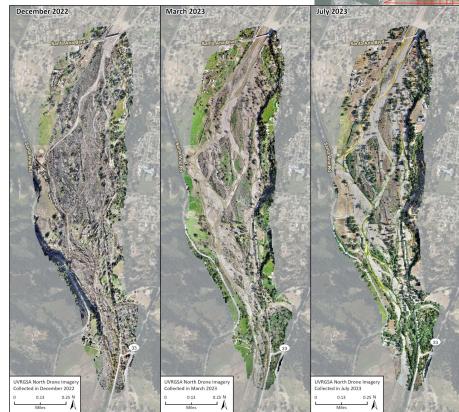
Background

- Remote Sensing Specialist & GIS Analyst at Rincon Consultants
 - Drone/GIS/Lab manager at CSU Channel Islands

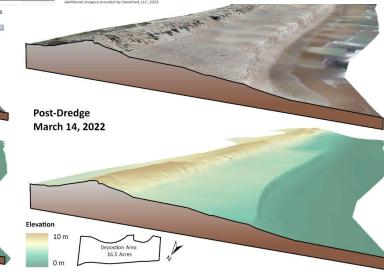


Current projects

- Drone Collection, Processing, and Analysis
 - Volume Calcs Pre/Post Dredge
 - Deep Learning & Machine Learning
 - Modeling 2030 Land-Cover change using spatial tools like ST-SIM and GIS



Pre-Dredge
February 2, 2022



Julie Padilla

Background

- Data Scientist at US Geological Survey
- Project Engineer and Manager for environmental consulting firm
- BS, Stanford/ MS, Michigan Tech

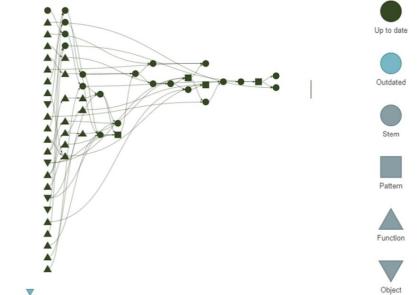
Current projects

- Data Assembly Lead
- National Water Availability Assessment
- National Hydro Geospatial Fabric
- Detail to Energy and Minerals Mission Area



An example targets pipeline for pulling data from the Water Quality Portal (WQP)

- Up to date
- Outdated
- Stem
- Pattern
- Function
- Object



Alessandra Vidal Meza

Background

- GIS Dangermond Fellow, National Audubon Society with Esri
- MEDS '23, Bren School

Current projects

- Hemispheric conservation planning/impact assessment
- Landscape/social data synthesis
- Meta-analysis of climate change impacts on bird species
- Authoritative training material



The top half of the image shows a screenshot of the CHIRP (Conservation Hemispheric Impact and Insights Reporting Platform) web application. It features a map of South America with various regions highlighted in different colors. A sidebar on the left contains navigation links like 'Audubon', 'National Audubon Society', 'CHIRP', 'Editor', 'Settings', and 'Edit features'. A central panel shows a search bar and buttons for 'Select a site', 'Create or edit a site', 'Site attributes', and 'Conservation actions'. Below the map, there's a section titled 'Instructions' with detailed steps for selecting sites. The bottom half of the image shows a screenshot of the 'GIS Training Gallery' page. It has a header with the title 'GIS Training Gallery' and a sub-header 'Explore existing trainings, request a custom training, or contact our team'. There's also a 'Featured Training Resources' section with small thumbnail images.

