COLLEGE of COASTAL GEORGIA

COASTAL SCIENCE SYMPOSIUM 2024
Stembler Theatre and Campus Center Lobby
Friday, December 6
8:30 am – 12:00 pm

Welcome to Coastal Science Symposium 2024, hosted by the College of Coastal Georgia Department of Natural Sciences. The annual event brings together students, faculty, collaborators, and community members to explore coastal and marine research, management, conservation, and more! This year's keynote address will be delivered by Dr. David Patterson, a Paleontology, Mammal Ecology, and Stable Isotopes Professor at the University of North Georgia. The symposium features the work of Coastal Georgia students, who will present posters on their research and experiential learning in biology and environmental science. Community partners will also provide educational exhibits and opportunities to get involved in science and conservation on the Georgia coast and beyond.

Thank you for participating and for supporting our students!

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Symposium Program

Campus Center Lobby
8:30 Session A: Student Poster Presentations
Partner Exhibits

Stembler Theatre
9:30 Welcome
Dr. Johnny Evans, Interim President
Dr. Kimberly Takagi, Assistant Professor of Env. Sci. & Oceanography
Joshua Clark, Senior Lecturer of Biology

9:45 Keynote Address: Of mice and mammoths: What were the ecosystems like on the Georgia coast during the late Pleistocene?
Dr. David Patterson, University of North Georgia, Health & Natural Sciences
Followed by Q&A Panel with Joshua Clark and Kelly Clark

Campus Center Lobby
10:45 Session B: Student Poster Presentations
Partner Exhibits
Refreshments

Digital proceedings will be made available via www.ccga.edu/coastalscience

Feedback

We value your feedback! Scan this QR code or visit https://www.surveymonkey.com/r/M97XHYL to take a 4-minute survey and share your feedback and suggestions.

Poster Presentations

Session A: 8:30-9:15 am

1. *Internship at Coastal Marine Education & Research Academy (CMERA)*
   Kelli T. Adams, Cara Estes, Traesha R. Robertson, & C. Tate Holbrook

2. *Habitat fragmentation and urban wildlife ii: mammal biodiversity at College of Coastal Georgia*
   Kelli Adams, Makinsy Frost, Tracey Henninger, Michele Mixon, & C. Tate Holbrook

3. *Seasonality of nitrate availability and chlorophyll dynamics in the Southern Ocean*
   Kat Breitenbach & Kimberly K. Takagi

4. *Shorebird beach disturbance reduction internship with Manomet, Inc.*
   Andrea Cardona, Abby Sterling, Traesha R. Robertson, & C. Tate Holbrook

5. *Habitat fragmentation and urban wildlife iii: mammal biodiversity at North Glynn Recreation Complex*
   Andrea Cardona, Hunter Miller, Rachel Busbee, Victoria Gordon, & C. Tate Holbrook

6. *Intertidal zonation patterns of marine invertebrates among the Johnson Rocks at Driftwood Beach, Jekyll Island, GA*
   Sage Christman & Kimberly K. Takagi

7. *Marine invertebrate population restoration after periods of overharvesting*
   Sage Christman, Ashlynn Runyon, Bree Summerall, & James B. Deemy

8. *Sea turtle beach nutrient subsidies*
   Harleigh N. Dearth, Brian A. Stewart-Riggin, Destiny G McCollum, Yamilet V Cardenas-Gutierrez, & James B. Deemy

9. *Factors affecting the presentation of allergy symptoms in domestic canines in Southeast Georgia, USA*
   Riley Elkins & Ansley Simpson

10. Estimated hydrological impact of the proposed mining of trail ridge
    Damian Elmore & Robin McLachlan

11. *Investigating the impact of the withdrawal of water from the upper Floridian aquifer by the Hyundai Metaplant*
    Damian Elmore, Audra Werley, Reid Kroken, & James B. Deemy

12. *Habitat fragmentation and urban wildlife i: the Brunswick Altamaha canal habitat corridor*
    Ben Gearhart, Caroline Harley, Hope Land, & C. Tate Holbrook

13. *Forest point quarter study of two different forests on Sapelo Island*
    Michael Helton, Sam Wright, & James B. Deemy

14. *Impacts of the Vilano Beach terminal groin on island erosion and the surficial aquifer*
    Nina Herter & Robin McLachlan

15. *Long term baseflow trends in spring creek and the lower flint river in southwestern Georgia*
    Sabrina R. Hodges & James B. Deemy

16. *Exploring the relationship between algae and pH in a freshwater greenspace pond*
    Zoe Johnston-Hadaway & Kimberly K. Takagi

17. *Social media campaign for Five Oaks Farm*
    Ayden Kennedy & Robin McLachlan

18. *Quantitative assessment of U.S. grown plant-based food products to determine which is the most sustainable in addressing starvation and malnutrition challenges*
    Maraya King & James B. Deemy

19. *Relationship between fish biodiversity and habitat complexity at Blue Heron Bridge, FL*
    Kaylee E. Logan, Ansleigh Peshel, & Kimberly K. Takagi

20. *Quantifying plant cover in dieback affected marshes during my NSF REU at Georgia Southern*
    Ollie Mercer, Christine Hladik, & Jacque Kelly

21. *5 Oaks Farm service learning*
    Vinicius Pedro de Souza & Robin McLachlan

22. *Internship as an Environmental Field Technician with Goodwyn Mills Cawood*
    Annastasia Rodas-Boomer

23. *Understand coastal changes: beach profile monitoring on cabretta island, ga to evaluate inlet breach impacts*
    Paige Spence & Robin McLachlan

24. *Southeast Adventure Outfitters service-learning project*
    Paige Starbuck & Robin McLachlan

25. *Clark Quarry microfossil bio-illustrations*
    Paige Starbuck, Joshua Clark, Robin McLachlan, & Kelly Clark

26. *The annual carbon sequestration of trees on the College of Coastal Georgia's main campus*
    Amber D. Tankersley, Isabella M. Theus, James B. Deemy, & Brandon Letson

27. *Safe Water Together Glynn County*
    Audra Werley, Alice McCloud, & Luke Roberson

Session B: 10:45-11:30 am

1. *Evaluation of the effects of regenerative farming techniques on the soil quality of the Great Plains*
   Victorya Adams, Lanie Sharpe, & James B. Deemy

2. *Population estimate of Bunodosoma cavernatum located on Driftwood Beach, Jekyll Island, GA*
   Victorya Adams, Lanie Sharpe, & James B. Deemy

3. *Soil organic matter in wetland and upland sites*
   Cierra Agisotelis, Emma Baker, Abby Damaschke, Madeline Hinchliffe, & Erica O'Neal

4. *Water quality, vegetation, and macroinvertebrate biodiversity relationships at the southernmost pond at Sea Palms West*
   Téa Autry, Sage Christman, Caroline Harley, Laurel Harrison, & Kimberly K. Takagi

5. *Assessing urban pond health and biodiversity in Sea Palms West, St. Simons Island, GA*
   Brandon Baker, Uriel Villalobos, Emily Weber, & Kimberly K. Takagi

6. *Marsh environment exploration with Scouting America*
   Sage Christman & Robin McLachlan

7. R*elationships and effects of physicochemical properties on freshwater wetlands*
   Kristen E. Darley & James B. Deemy

8. *Effects of gut microbiota diversity on mental and neurological health*
   Kristen E. Darley & Deanna Helphrey

9. *Energy subsidy to the deep sea by whale fall*
   Olivia M. Fambrough, Madeline A. Lott, Madison Washington, & James B. Deemy

10. *Glynn environmental coalition public notice service-learning project*
    Marisa Field, Rachael Thompson, & Robin McLachlan

11. *Survey based monitoring system for water quality analysis and early detection of invasive crayfish populations in residential/golf-course ponds*
    J.T. Flanders & Kimberly K. Takagi

12. *The relationship between ammonia, phosphate, and nitrate concentrations in a greenspace pond ecosystem*
    Campbell E. Fretz & Kimberly K. Takagi

13. *Comparison of organic matter of upland and wetland soil at lake teel*
    Eliza Gonzalez, Ella Sochia, Gracie Lundy, Lanie Garner, Marisa Field, & James B. Deemy

14. *Assessing the impact of salinity on macroinvertebrate biodiversity in greenspace ponds at Sea Palms West, St. Simons Island, GA*
    Victoria Gordon & Kimberly K. Takagi

15. *Burrow density and marsh sediment bioturbation by the Atlantic Marsh Crab (Uca pugnax)*
    Jaxson Grotz & James B. Deemy

16. *Reconstructing past environments with fossilized teeth at Clark Quarry, GA*
    Guy Haller, Robin McLachlan, Kelly Clark, & Joshua Clark

17. *Assessing the relationship between precipitation and phosphate/ nitrate concentrations in a golf course turned greenspace pond at Sea Palms West, St. Simons Island, GA*
    Taylor Kennedy & Kimberly K. Takagi

18. *Recreated Florida manatee sign for '4-H Tidelands Nature Center' to increase manatee awareness and education*
    Maraya King & Robin McLachlan

19. *Filming of hydroponic and other farming processes of Five Oaks Farm*
    Jakob Koehn & Robin McLachlan

20. *Ab initio investigation of the effect of carbon dioxide on water complexes of atmospheric acids*
    Claire Hannah, Joshua Kreider, & Leon Gardner

21. *The impact of conductivity on the abundance and diversity of macroinvertebrates at Sea Palms West, St. Simons Island, GA*
    Reid Kroken, Michelle Mixon, Audra Werley, & Kimberly K. Takagi

22. *Assessing the relationship between golf course pond water quality and amphibian and reptile presence*
    Shelby Ramsey & Kimberly K. Takagi

23. *Fossilized jaws of Clark Quarry, Georgia*
    Emma Robison, Robin McLachlan, Joshua Clark, & Kelly Clark

24. *Capturing a comet*
    Alexander Salgado & Patrice Edwards

25. *Mussel population density estimate on Driftwood Beach*
    Ashleigh Smith, Hannah Phillips, Raegan Higgins, & James B. Deemy

26. *Topographical analysis and the correlation of geologic composition at various locations within the Appalachian Mountains*
    Timothy S. Stephens

Keynote Presentation Abstract

Of mice and mammoths: What were the ecosystems like on the Georgia coast during the late Pleistocene?

Dr. David Patterson, University of North Georgia, Health & Natural Sciences

Contemporary ecosystems across the globe are on the threshold of state shifts characterized by widespread extinctions and environmental degradation. Existing research points to utilizing paleoecosystem functionality as a means to understanding the modern impacts of climate change and human population expansion. Central to these inferences are the late Pleistocene (~129 – 11.5 Ka [thousand years ago]) extinctions in North America that resulted in the disappearance of over seventy percent of megamammal species. This talk will focus on our team's ongoing interdisciplinary work in Brunswick, GA that contributes to these ongoing conversations.

Poster Presentation Abstracts

Session A:

Internship at Coastal Marine Education & Research Academy (CMERA)

Kelli T. Adams[1], Cara Estes[2], Traesha R. Robertson[1], & C. Tate Holbrook[1]
[1]Department of Natural Sciences, College of Coastal Georgia; [2]Coastal Marine Education and Research Academy

In the summer of 2024, I completed a four-week internship at the Coastal Marine Education and Research Academy (CMERA) in Clearwater, Florida, where I participated in hands-on field research working with sharks and rays. CMERA's research focuses on the following things: population demographics, sex ratios, and geographic distribution of species along the Gulf Coast. Collaborating with organizations like the Florida Fish and Wildlife Conservation Commission, while also conducting sea turtle monitoring for them as well as NOAA & the Florida Division of Parks and Recreation. Daily activities included classroom lectures on marine biology topics that allow us to gain knowledge about what we need to know in the field. This is then followed by fieldwork on boats using long lines and tangle nets to capture sharks and rays. Due to the amount of time I participated in CMERA, I was considered as a "Chief Scientist", where it grants the opportunity to contribute to ongoing scientific studies, with recognition and acknowledgment in future research publications. While on the boats, I was involved in data collection such as tagging, genetic sampling, and data documentation. The highlight of my internship was catching and releasing a Lemon Shark, a Bluntnose Stingray, and a juvenile Green Sea Turtle. This internship provided unforgettable hands-on research experience. I look forward to hopefully applying this knowledge someday soon working with marine life research.

Habitat Fragmentation and Urban Wildlife II: Mammal Biodiversity at College of Coastal Georgia

Kelli Adams, Makinsy Frost, Tracey Henninger, Michele Mixon, & C. Tate Holbrook
Department of Natural Sciences, College of Coastal Georgia

Habitat loss, including habitat fragmentation, is a major threat to biodiversity worldwide. In BIOL 4020K Conservation Biology, we explored how habitat fragmentation and connectivity

affect urban wildlife in Glynn County, GA. More specifically, we asked how mammal activity and diversity vary between an isolated forest habitat (College of Coastal Georgia campus; CCGA) and a similarly-sized habitat (North Glynn Recreation Complex; NGRC) that is connected to the Brunswick-Altamaha Canal. We hypothesized that the canal functions as a wildlife corridor, facilitating dispersal between habitats and leading to greater species diversity, evenness, and richness at NGRC compared to CCGA. As a class, we utilized motion sensor cameras to monitor mammal activity at the two sites. Our group focused on the mammals of CCGA, where we found slightly lower species diversity overall. Differences between the study sites are likely due to greater habitat fragmentation and human presence at CCGA. To better understand the role of the Brunswick-Altamaha Canal as a habitat corridor, we propose more research into patterns of human activity and animal movement, estimates of mammal population sizes, and surveys of other species.

Seasonality of Nitrate Availability and Chlorophyll Dynamics in the Southern Ocean

Kat Breitenbach & Kimberly K. Takagi
Department of Natural Sciences, College of Coastal Georgia

The Southern Ocean encircles Antarctica and has a huge influence on ocean circulation and climate on a global scale as it's a region of intense interaction between the atmosphere, ocean, and cryosphere. Nutrient cycling is one of the crucial processes that regulate the productivity of marine ecosystems and influences global biogeochemical cycles, with expected seasonal fluctuations. For example, winter replenishment of nitrate helps phytoplankton growth in the summer, indicated by increased chlorophyll levels. Understanding this relationship could help us understand how climate change will impact the Southern Ocean's global influence. To investigate this relationship, 10 SOCCOM floats from five regions (2 floats in each region) of the Southern Ocean were chosen. Preliminary data analysis reveals a positive correlation between summer chlorophyll levels and nitrate availability. This indicates the nutrient replacement directly supports phytoplankton productivity. These findings suggest that nutrient cycling, if impacted by climate change, could cause a significant impact of the Southern Ocean's global biogeochemical cycles. Future studies could expand float coverage in each region as well as expand analytical analysis to better predict the impact of climate change in nutrient dynamics.

Shorebird Beach Disturbance Reduction Internship with Manomet, Inc.

Andrea Cardona[1], Abby Sterling[2], Traesha R. Robertson[1], & C. Tate Holbrook[1]
[1]Department of Natural Sciences, College of Coastal Georgia; [2]Manomet, Inc.

Manomet, Inc. is a non-profit conservation organization that works with a myriad of partners to work towards protecting coastal ecosystems, shorebird migration routes and educating the public. My partnership with Manomet launched me into field work as their Shorebird Beach Disturbance Reduction Campaign intern. I got the incredible opportunity to practice bird identification, various survey field techniques, submitting data to ongoing projects, communicating with the public and developing professional skills. I helped contribute serving and anecdotal data to Virginia Tech's social science disturbance project, as well as served as a shorebird steward on the beach and volunteer engagement. During the course of this internship, I got to attend different training sessions with the organization on how to steward effectively, as well as attended fundraising events hosted by Manomet. This internship has been instrumental in

my career and has informed my future career decisions within the conservation field and has allowed me to make invaluable connections within the conservation sphere. I now am a part of the Coastal Georgia Audubon Society board and am pursuing an internship with another conservation organization, neither of which I would have known of or researched without this internship.

Habitat Fragmentation and Urban Wildlife III: Mammal Biodiversity at North Glynn Recreation Complex

Andrea Cardona, Hunter Miller, Rachel Busbee, Victoria Gordon, & C. Tate Holbrook
Department of Natural Sciences, College of Coastal Georgia

Habitat loss is one of the leading causes of a global decline in biodiversity, a phenomenon that is exacerbated by fragmentation. Habitat fragmentation causes many problems for wildlife including reduced habitat area and quality, loss of genetic diversity, decreased resilience to climate change, and increased extinction risk. Our Conservation Biology class used infrared camera traps to monitor mammal activity on the College of Coastal Georgia (CCGA) campus—an isolated habitat fragment—and at the North Glynn Recreation Complex (NGRC), which is connected to other habitats by the forested Brunswick-Altamaha Canal. We predicted that we would observe higher species diversity and evenness at the connected site (NGRC) in contrast to the fragmented site (CCGA). Cameras were placed in pairs at three survey points per site and data were collected for 28 days. Our group focused on NGRC, where we found nine mammal species, including three that were not observed at CCGA: bobcat, rabbit sp., and white-tailed deer. Overall differences between CCGA and NGRC appear to be minimal, though more sampling is needed to conduct a statistical analysis of species diversity, richness, and evenness at the two sites. This preliminary research helps us understand the role of habitat corridors in combatting effects of habitat fragmentation and supporting urban wildlife communities.

Intertidal zonation patterns of marine invertebrates among the Johnson Rocks at Driftwood Beach, Jekyll Island, GA

Sage Christman & Kimberly K. Takagi
Department of Natural Sciences, College of Coastal Georgia

The rocky intertidal environment created by the Johnson rocks at Driftwood Beach, Jekyll Island, GA, provides habitats for species that would not ordinarily live there (i.e. the Eastern oyster *Crassostrea virginica*, warty sea anemone *Bunodosoma cavernatum*, and Green Porcelain Crab *Petrolisthes armatus*). To examine marine invertebrate biodiversity as a result of the Johnson rocks, we calculated Shannon's and Simpson's Reciprocal biodiversity indices based on species counts from a series of transects and quadrats. We found that the upper, middle, and lower intertidal zones support different invertebrate communities. The most biodiversity was observed within quadrats in the lower intertidal whereas the upper intertidal had the lowest biodiversity with mainly one dominant species. A significant difference within species abundance and distribution was determined for *B. cavernatum*, *C. virginica*, and scorched mussel *Brachidontes exustus* populations between intertidal zones. In general, higher abundance of each species was found in the lower intertidal. The fragile barnacle *Chthamalus fragilis* population also demonstrated a significant difference in distribution but was more concentrated in the transitional zone between the middle and lower intertidal. Overall, ten species were observed

within the study area, however many more were observed outside it. It is clear that the Johnson rocks provide a suitable man-made habitat for both native and non-native species. Understanding the community dynamics in constructed rocky-intertidal zones is not well studied. Continued research could elucidate the mechanisms behind species intertidal zonation patterns and the role of the Johnson rocks in impacting native vs. non-native biodiversity.

Marine invertebrate population restoration after periods of overharvesting

Sage Christman, Ashlynn Runyon, Bree Summerall, & James B. Deemy
Department of Natural Sciences, College of Coastal Georgia

Eastern Oysters (*Crassostrea virginica*) and blue crabs (*Callinectes sapidus*) are highly demanded species within the seafood industry. In Chesapeake Bay, their populations were decimated after severe overharvesting in the 1990s and they are continuing to decline today. If their harvest rates are reduced, these populations may be able to return to their historical levels. Using STELLA (Systems Thinking, Experimental Learning Laboratory with Animation), population dynamics models were created for each species. Model elements include the total population, birth rate, natural mortality rate, and harvesting mortality rate for each species. Areas of Chesapeake Bay in Maryland and Virginia were used model oyster and blue crab populations, respectively. The initial overharvesting of oysters caused Chesapeake Bay to experience a decline in water quality and available habitat, leading to increased deaths for other species dependent on them. Despite captive breeding and release efforts, marine invertebrate populations in Chesapeake Bay continue to decline today. By reducing commercial and recreational harvest rates, the decline in these populations may become slow enough to allow them to begin to increase. Eventually, with the reduced harvest rates, these populations may return to or even exceed historical levels.

Sea Turtle Beach Nutrient Subsidies

Harleigh N. Dearth, Brian A. Stewart-Riggin, Destiny G McCollum, Yamilet V Cardenas-Gutierrez, & James B. Deemy
Department of Natural Sciences, College of Coastal Georgia

Sea turtle nests are critical to beach ecosystems as sources of carbon, nitrogen, and phosphorus. The nests of Green Sea Turtles, Hawksbill Sea Turtles, Loggerhead Sea Turtles, and Leatherback Sea Turtles vary in their ecological impact due to differences in egg mortality, egg mass, and egg protein content. Our objectives were to: 1) determine nest mortality for each species using scientific literature; 2) analyze nutrient percentages per egg by species; and 3) estimate nutrient deposits on beaches from their nests. We conducted a literature review across online databases to collect data for analysis. On Beach 1a, Loggerhead Sea Turtles deposited 51,762.22 grams of Carbon, 5,627.80 grams of Nitrogen, and 4,814.98 grams of Phosphorus. On Beach 2a, they deposited 69,977.24 grams of Carbon, 7,612.99 grams of Nitrogen, and 6,515.61 grams of Phosphorus. For Green Sea Turtles, deposits on Beach 1b were 212,289.6 grams of Carbon, 174,089.02 grams of Nitrogen, and 664.94 grams of Phosphorus, while on Beach 2b, they deposited 318,745 grams of Carbon, 261,388.9 grams of Nitrogen, and 998.4 grams of Phosphorus. Leatherback and Hawksbills Sea turtles have similar deposition numbers. Our findings reveal that Carbon is the most deposited nutrient, Phosphorus is the least, and species with smaller clutch sizes deposit fewer nutrients. This reflects the high carbon content in eggs,

phosphorus' natural scarcity, and the impact of clutch size on nutrient input. Overall, our study underscores the essential role of sea turtle nests in nutrient cycling and sustaining coastal ecosystem health.

Factors affecting the presentation of allergy symptoms in domestic canines in Southeast Georgia, USA

Riley Elkins & **Ansley Simpson**
Department of Natural Sciences, College of Coastal Georgia

Research shows that 60 to 70 % of dogs have some form of allergies. The primary objective of this research project was to determine if there was a relationship between the breed, location, season, and age of the study dogs and the presence of allergy symptoms. Data were collected from one veterinary clinic in Brunswick, Georgia, and one clinic on St. Simons Island, Georgia. Breed, age, location, and seasons were collected for 660 canine patients between May 2023 and April 2024. Four seasons were distinguished: August–October, November–January, May–July, and February–April. The dogs' allergies were identified as either present or absent. A dog's age was the only significant predictor of allergies found among the 660 canine individuals with older dogs more likely to have allergies. As a dog ages, they are more prone to allergy symptoms. Breed, time of year, and location were not significant. This research is important because it allows us to gain a better understanding of illnesses and diseases, and how to improve quality of life.

Estimated Hydrological Impact of the Proposed Mining of Trail Ridge

Damian Elmore & Robin McLachlan
Department of Natural Sciences, College of Coastal Georgia

The Okefenokee Swamp is a National Wildlife Refuge with unique hydrologic properties that allow for specific flora and fauna populations. Trail Ridge, which was once a barrier island when sea level was higher in the late Pleistocene, is now located to the east of the Okefenokee National Wildlife Refuge in Georgia. This sandy ridge creates a hydrological barrier that confines the downhill flow of water from the Okefenokee towards the St. Mary's River. Twin Pines LLC mining company has proposed to mine this hydrologic barrier for titanium dioxide-rich sand. To do so, they would pump 1.128 million gallons per day (mgd) from the surface groundwater, which would lower the water table elevation by 50 ft. The goal of this project is to quantify the impact of proposed mining on the water level in the Okefenokee Swamp. This project was completed primarily within ArcGIS Pro, using the principles of Darcy's Law and the Theis equation, which are fundamental in hydrogeology: Darcy's Law describes the flow of groundwater through porous media such as a sand aquifer, while the Theis equation models the transient response of groundwater levels in a confined aquifer due to pumping. The hydrologic model built in ArcGIS allows for the determination of water-level impacts in the Okefenokee National Wildlife Refuge assuming a 50-ft drawdown of the water table on Trail Ridge and can be used to predict damage to the stability and lifespan of the Okefenokee National Wildlife Refuge.

Investigating the Impact of the Withdrawal of Water from the Upper Floridian Aquifer by the Hyundai Metaplant

Damian Elmore, Audra Werley, Reid Kroken, & James B. Deemy
Department of Natural Sciences, College of Coastal Georgia

The Hyundai Metaplant is located on the Bryan County Mega Plant site in Ellabell, GA. It is approximately 3,000 acres in size and is permitted to pull 6.6 million gallons of water a day from the Upper Floridian Aquifer for the next twenty-five years. Our objectives were to determine how this withdrawal of water will impact river baseflow and groundwater depth in this area. To do this, we gathered data from river gauges, groundwater monitoring wells, and transmissivity data from the USGS database. Our focal river systems were the Altamaha, Savannah, Ogeechee, Ohoopee, and Canoochee Rivers as well as surrounding areas for groundwater data. Data analysis of river stage, discharge, and groundwater depth was completed in the software package R. Transmissivity data and storage coefficients of the groundwater wells were used in QGIS, Microsoft Excel, and the software package R to calculate drawdown from five to twenty-five years at five-year intervals. The results include a maximum groundwater drawdown range of at least 5.60m-15.04m after twenty-five years of pumping. This indicates that the pumping by the Hyundai Metaplant will likely impact groundwater depth and availability for other anthropogenic uses (i.e. agriculture) as well as ecological purposes (e.g. baseflow in streams).

Habitat Fragmentation and Urban Wildlife I: The Brunswick-Altamaha Canal Habitat Corridor

Ben Gearhart, Caroline Harley, Hope Land, & C. Tate Holbrook
Department of Natural Sciences, College of Coastal Georgia

Habitat loss is a major threat to biodiversity, including habitat fragmentation in which habitats are divided by roads and other infrastructure. These fragments contain smaller populations with limited access to food and mates and restricted dispersal, which can push species towards local extinction. One way to lessen these effects is to establish protected habitat corridors so that wildlife can move between otherwise isolated habitats. In this course-based undergraduate research project for Conservation Biology, we addressed how habitat fragmentation and connectivity affect urban wildlife. More specifically, how do patterns of mammal activity and diversity vary between an isolated urban forest habitat (College of Coastal Georgia campus) and a forest habitat (North Glynn Recreation Complex) that is connected to a habitat corridor, the Brunswick-Altamaha Canal? The Brunswick-Altamaha Canal was constructed in 1836 between the harbor of Brunswick and the Altamaha River. Today its southern portion is largely filled in and/or surrounded by development, but the northern stretch of the canal is forested and could be used as a corridor for species to move between larger habitats. Students placed six passive infrared digital cameras at each site, arranged in pairs at three survey points per site, and analyzed photographs of passing mammals for 28 days. Our group used GIS spatial analysis and plant species composition to characterize the two study sites and their habitats. This information will help our classmates interpret their observations of mammal diversity at each location with respect to habitat features.

Forest point quarter study of two different forests on Sapelo Island

Michael Helton, Sam Wright, & James B. Deemy
Department of Natural Sciences, College of Coastal Georgia

This study examines the tree composition of two different areas of forest on Sapelo Island, Georgia by using the quarter point sampling method. Both forests, Forest A and Forest B, are dominated by pine trees and are routinely subjected to controlled burns to eliminate underbrush. The forests were analyzed and compared using tree density, distribution, and size. Transects were established and tree diameter, basal area, and the distance from each point per quadrant were measured at regular intervals. Significant differences were found in tree diameter and circumference between the two sites, possibly due to different growth patterns or age. Despite these differences, both forests share the same species and environmental conditions. These results suggest that Forest A and Forest B may be similar forest types with a difference in growth due to ecological responses. This study provides insights into the structural diversity of the forests on Sapelo Island and supports the importance of informed management practices in maintaining ecological balance.

Impacts of the Vilano Beach Terminal Groin on Island Erosion and the Surficial Aquifer

Nina Herter & Robin McLachlan
Department of Natural Sciences, College of Coastal Georgia

This study investigates the impacts of the Vilano Beach Terminal Groin, near St. Augustine, Florida, on island erosion and the Surficial Aquifer, which serves as a water source for residents. The groin was implemented to mitigate erosion, but its effects on the island and aquifer are not fully understood. Using Google Earth Pro, I mapped shoreline changes and vegetation shifts before and after the groin's installation. Additionally, Excel was used to create graphs illustrating these changes, with a focus on the south end of Vilano Beach and the adjacent Matanzas Inlet. The results indicate that the southern end of the island is eroding at a faster rate than before the groin was installed, with notable dieback of vegetation. The Matanzas Inlet has expanded, further contributing to shoreline erosion. While the study suggests that the Surficial Aquifer is not currently at risk of inundation due to the groin alone, rising sea levels could exacerbate this threat in the future. These findings highlight the importance of monitoring coastal infrastructure impacts and the need for adaptive management in response to ongoing environmental changes.

Long Term Baseflow Trends in Spring Creek and the Lower Flint River in Southwestern Georgia

Sabrina R. Hodges & James B. Deemy
Department of Natural Sciences, College of Coastal Georgia

Due the building of the Jim Woodruff Lock and Dam and the creation of Lake Seminole the stream flow from the three main rivers of this region, The Flint River, Chattahoochee Rivers and Spring creek, became an integral resource in Southwestern Georgia and Northwestern Florida. The inflow from these rivers into Lake Seminole maintains the water levels of the reservoir and the outflow of resources into the headwaters of the Apalachicola River. The aim of this study was to determine whether the baseflow of Spring Creek and The Lower Flint River are impacted by seasonality and what long term trends can be seen in the baseflow for both rivers and their input into Lake Seminole. The objectives of this research were to 1) quantify the downstream gradient baseflows for Spring Creek River and the Lower Flint River using hydrographs; 2) evaluate the seasonal variation in baseflow between the summer (June) and winter (January) months by employing the Kolmogorov-Smirnov two sample tests. 3) Identify any long-term

trends in baseflow for Spring Creek and the Lower Flint River and their input into Lake Seminole. Long-term data from 2012-2022 was be collected from 7 U.S.G.S gaging stations. The results showed a significant difference in baseflows in a downstream gradient, with p-values < 0.05. The Lower Flint river sites had a consistent increase in baseflow downstream, and Spring creek had the lowest baseflow in the midstream site. We also found that a relationship existed between the winter and summer flows in both streams.

Exploring the Relationship Between Algae and pH in A Freshwater Greenspace Pond

Zoe Johnston-Hadaway & Kimberly K. Takagi
Department of Natural Sciences, College of Coastal Georgia

Wetlands are a vital part of the ecosystem and can be found in various places, including golf courses. In particular, the Sea Palms West community (St. Simons Island, GA), contains multiple ponds (numbered 2-8) on their golf course turned greenspace. The water quality of these ponds are important for the ecosystems within and around it. Preliminary observations of Pond 5 led to the question of whether there is a relationship between pH and algae coverage. Previous research shows that pH can be altered in the presence or absence of carbon dioxide (CO_2). For example, when algae is present, more CO_2 is being extracted from the water, while when less algae is present, less CO_2 is being extracted. The organisms living within these ponds have an ideal pH that they can survive in along with the offspring of transitional organisms. Understanding how algae affect pH can help efforts to protect the organisms that live within pond ecosystems. Over the course of four weeks, four surveys were conducted to compare the average percent algal coverage of the pond with the measured pH value. Our results displayed that as algae increased, so did pH.

Social Media Campaign for Five Oaks Farm

Ayden Kennedy & Robin McLachlan
Department of Natural Sciences, College of Coastal Georgia

Five Oaks farm is in Jesup, GA and promotes a fresh way of living. They farm their own vegetables, produce their own honey, and raise chickens for eggs which supplies local restaurants. Additionally, they attend farmers markets selling their produce. Five Oaks Farm takes great care of their farm, animals, and plants. As part of a service-learning project for ENVS 3200: Environmental Communication, my goal was to get more of the community involved in their business over social media. I made 6 posts: Introduction to their farm, the products they produce, the community engagement they have with field trips and volunteers, how they invest in hydroponics which grows some of their plants in nutrient based water, how they take care of the soil and plant pecan trees, and how their honey is harvested. I have gone on a photography adventure to see their farm firsthand and to capture the beauty and peacefulness of the land. I want the community to feel excited and to express an interest in being informed on the hands-on experience to be had. Through this process, I have learned about the hard work and effort that goes into maintaining a farm and how much time they invest. I have learned how to work with a business and complete their social networking needs through the media. Businesses like Five Oaks Farm are important because they bring a balance. It gives the opportunity to reach families seeking a more organic and natural path. I used color schemes and engaging photos to reach the citizens of our community.

Quantitative Assessment of U.S. Grown Plant-Based Food Products to Determine Which is the Most Sustainable in Addressing Starvation and Malnutrition Challenges

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The average person needs approximately 1,200 calories and 0.05 kg of protein a day to stay out of starvation mode and avoid malnutrition. To quantitatively address and present viable solutions to these sustainability challenges, our objective was to determine the most sustainable foods based on the following set of criteria: calories produced per hectare per year, kilograms of protein produced per hectare per year, carbon footprint, global average water footprint, as well as energy, fertilizer, and pesticide use. Chili peppers, dry onion, sugarcane, lentils, and chickpeas were the top five foods to address starvation because they produce the most calories per acre in a given growing season (72,559,800-593,305,300 kcal/ha/yr). Additionally, chili peppers, dry onion, lentils, and chickpeas were the top four foods to address malnutrition because they had the highest protein content (2,374-32,996 kg/ha/yr). Watermelons, sugarcane, bell peppers, sugar beets, and chili peppers have the smallest carbon footprint with a range of 0.05-0.07 kg CO2e/kg. Safflower, raspberries, and rye have the smallest global average water footprint with a range of 203-214 L/kg. Grapes, apples, and chili peppers use the least energy with a range of 74-176 kWh/ha/yr. Sunflower seeds, green beans, chickpeas, and lentils use the least fertilizer with a range of 90-142 kg/ha/yr. Buckwheat, hempseed, and rye use the least pesticides with a range of 0.3858-0.5172 kg AS/ha/yr. According to my sustainability criteria, the top three most sustainable foods to address starvation and malnutrition are chili peppers, lentils, and chickpeas.

Relationship Between Fish Biodiversity and Habitat Complexity at Blue Heron Bridge, FL

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Artificial reefs in Southeast Florida mimic natural reef ecosystems. These reefs, composed of sunken ships, concrete modules, and sculptures, become vital habitats supporting marine life (i.e. corals and fish) where natural habitats are lacking. They play a critical role in enhancing biodiversity, fisheries productivity, and attracting tourists and researchers. This study investigates three distinct habitats: coral reefs, seagrass beds, and a cement bridge piling. We assessed their respective habitat characteristics and tested relationships with macrofaunal biodiversity. The objectives include comparing species diversity among these habitats, defining habitat complexity, and exploring the relationship between habitat complexity and biodiversity.

We employed two methods: visual assessments and videography to survey habitat structures and fish populations. We established a habitat complexity score based on different observed habitat characteristics such as; water depth, hidey-holes, structure height, and percentage of corals and sponges. Statistical analyses, including the Shannon Index and Chi Square Goodness of Fit Test, compared biodiversity across habitats.

Our results indicate stark differences in biodiversity among habitats. Coral reefs exhibited the highest biodiversity, followed by the bridge area, and seagrass. Habitat complexity on the other hand was the highest under the bridge followed by the coral reef. However, we found no

significant relationship between habitat structure complexity and fish biodiversity, challenging the initial hypotheses. These results underscore the need for further investigation to clarify the drivers of biodiversity in this ecosystem. This study further lays a foundation for future ecological studies and conservation efforts at Blue Heron Bridge, Riviera Beach, FL.

Quantifying Plant Cover in Dieback Affected Marshes During My NSF REU at Georgia Southern

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The Research Experiences in Southeastern Coastal Plains Ecosystems program at Georgia Southern University is a National Science Foundation research experience for undergraduates (NSF REU) that aims to provide mentoring and research based in the sciences of coastal plains. My project focused on studying marsh plant dieback and tracking plant cover at three dieback-affected marshes in Camden, Glynn, and Chatham counties. Marshes are an important part of coastal areas that provide a border from the coast to land along with many valuable ecosystem services. These habitats go through events of sudden dieback, where large portions of the marsh grass begin to deteriorate due to many possible reasons. Using ImageJ's software and thresholding techniques, the area of plant cover was found at points from over ten years to evaluate marsh health. As part of my internship, I helped to collect data at one of these marshes to contribute to the ongoing study. Through marsh plant cover monitoring, the general health of the areas can be studied to gain better knowledge about these sites and their habits. This program allowed me the opportunity to network with professionals in my prospective career, develop research experience, gain professional experience, and develop myself both professionally and academically.

5 Oaks Farm Service Learning

Vinicius Pedro de Souza & Robin McLachlan
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This service-learning project with 5 Oaks Farm, a regenerative and sustainable farm, provided a unique opportunity to engage in environmental communication and sustainable farming practices. 5 Oaks Farm produces organic vegetables, honey, free-range pasture-raised chickens, microgreens, and hydroponic lettuce, all with a commitment to eco-friendly agriculture. Through the creation of social media videos documenting the farm's daily routines, this project showed these sustainable practices to a broader audience. The videos highlighted aspects of the farm's regenerative practices, from microgreen and hydroponic lettuce cultivation to responsible poultry care and soil management, which demonstrate the importance of environmentally responsible food production in the agriculture field. This experience also contributed to my career goals in environmental communication, offering valuable experience with engaging in environmentally conscious campaign. Understanding how to connect with people interested in sustainable products, while learning more about sustainable farming, reinforced the importance of clear, impactful messaging in promoting sustainable choices. This collaboration supported the mission of 5 Oaks Farm by providing practical experience with regenerative agriculture.

Internship as an Environmental Field Technician with Goodwyn Mills Cawood

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During my 18-month internship and employment at Goodwyn Mills Cawood (GMC), I had the privilege of working under my supervisor Dr. Robert Brown, who has been with the company for over seven years. His mentorship provided me with a deep understanding of stormwater inlet and pipe inspections, as well as green infrastructure planning across the city and neighboring regions. GMC's passion for preserving, restoring, and enriching the environment through responsible resource management was reflected in our daily work. I actively participated in the mapping and inspection of thousands of stormwater pipes and inlets, playing an important role in various regional projects. My experience at GMC not only sharpened my technical skills but also reinforced my commitment to sustainable infrastructure planning, playing a key role in stormwater management initiatives that aim to meet the growing ecological needs of today's population.

Understand Coastal Changes: Beach Profile Monitoring on Cabretta Island, GA to Evaluate Inlet Breach Impacts

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Northern Cabretta Beach, part of the Sapelo Island complex in Georgia, has experienced erosion (~12,600 m^2/year) for at least seventy years, followed by a shift to accretion (~3,000 m^2/year) following Hurricane Irma in 2017, when an inlet breach through the adjacent Blackbeard Island redirected water flow. The primary cause of previous erosion was the migrating inlet due to north-to-south longshore transport. To analyze these changes, satellite imagery (1985-2024) from Google Earth Pro and Copernicus Browser were analyzed to estimate rates of erosion and accretion, supplemented by land surveys to assess beach scarp presence and stability. An error analysis was conducted to compare measurements made from satellite imagery to those from the field, which were found to not be significantly different. Following the 2017 inlet breach, northern Cabretta Beach has entered an accretionary phase within its expected inlet breaching cycle. To monitor impacts of the breach, field measurements were conducted of beach elevation in March, October, and November of 2024, revealing steeper winter profiles due to higher wave energy, but no persistent erosional structures such as scarps. Additionally, the dunes increased in height and the vegetation became denser and more expansive, indicating a stable accretionary beach. These elevation surveys allow for the assessment of accretion rates and the tracking of seasonal variations in the beach profile and should be continued into the future.

Southeast Adventure Outfitters Service-Learning Project

Paige Starbuck & Robin McLachlan
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Southeast Adventure Outfitters provides kayak and boating tours of the local salt marshes and estuaries of Brunswick and St. Simon's Island. These tours allow guests to have a chance at experiencing a variety of wildlife species while admiring the abundant coastal environments of the barrier islands. With many guests not being locals to the area, or simply not being well-

versed in wildlife knowledge, their involvement with nature can be limited to basic recognition. My work with Southeast Adventure Outfitters is to create a pictorial nature reference guide that can be used on tours to help visitors engage with the environment on a deeper level. By providing the names of the local animal species, visitors can leave knowing what birds and other wildlife they encountered and have a greater sense of fulfillment from their experience. The guide is waterproof and re-usable, so it does not create excessive waste and can be written on as visitors mark off the animals they come across on their tour. Through this project I have gained experience working with someone who has a specific vision in mind for me to develop as an artist, which is critical in my intended career as a scientific illustrator.

Clark Quarry Microfossil Bio-Illustrations

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The Clark Quarry, located in Glynn County, GA, has yielded countless fossil specimens that are key indicators of the paleoenvironments for the surrounding area. Previous research on the site has focused primarily on larger mammal fossils, but microfossil evidence suggests a broader range of vertebrate species, including fish, reptiles, rodents, and some invertebrate species like crabs, snails, and bivalves indicative of varying aquatic paleoenvironments. In this study, sediments deposited in the Late Pleistocene were taken from the Clark Quarry and dry sifted to remove finer materials, and fossil fragments were subsequently organized by identifying features. Fossil fragments were microscopically assessed and hand illustrated to create a detailed reference for possible species identification and to create a collection for future research reference. Like previous studies, fossil evidence of a variety of aquatic and amphibious species suggests periodically changing environments from freshwater, estuarine, to marine paleoenvironments. The fossil evidence of amphibious, rodent, and reptile provides the greatest proof of the existence of a possible freshwater paleoenvironment, making the presence of these species especially significant.

The Annual Carbon Sequestration of Trees on the College of Coastal Georgia's Main Campus

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Carbon sequestration is the process of capturing and storing carbon dioxide from the atmosphere to reduce the amount of carbon in the atmosphere. Trees sequester carbon through the process of photosynthesis. Our objectives are to quantify carbon sequestered by trees on the College of Coastal Georgia's (CCGA) main campus each year and create a carbon cycle STELLA model that demonstrates this process. We delineated a 100-acre portion of the campus using ArcGIS. We then used the tree survey provided by grounds maintenance to quantify and identify the species of trees on campus. We then randomly selected 17 trees and measured their diameters. The sample consisted of 4 oak trees, 3 palm trees, and 10 pine trees. Lastly, field measurements were used to inform a STELLA model that demonstrates the allometric equation of annual carbon sequestration from the trees on CCGA's main campus.

Safe Water Together Glynn County

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Brunswick, Georgia, is home to four Superfund sites identified by the U.S. Environmental Protection Agency (EPA). The impact of these toxic sites disproportionately affects the health and well-being of the residents of downtown Brunswick, which is composed of majority-minority and economically disadvantaged groups. Since the Coronavirus pandemic started in 2020, many more downtown residents began subsistence fishing in Terry Creek, a water body known to have high levels of pollution. Although there are fishing advisories and monitoring completed by the EPA and Hercules, warnings are often ignored. The Safe Water Together Glynn County initiative addresses this issue through a partnership between the Institute for Water and Health, local leaders, and volunteers. The initiative trains community members, forming the Safe Water Ambassador Group (SWAG), in Adopt-A-Stream protocols. Volunteers gain hands-on experience in chemical monitoring (e.g., pH, temperature) and bacterial analysis, using tools such as the Most Probable Number (MPN) to assess coliform levels. A newly established community lab in downtown Brunswick supports these efforts, providing accessible resources and equipment for water quality monitoring and data analysis. This participatory approach fosters collective efficacy, equipping residents with actionable knowledge for self-advocacy and promoting long-term community resilience.

Session B:

Evaluation of the effects of regenerative farming techniques on the soil quality of the Great Plains

Victorya Adams, Lanie Sharpe, & James B. Deemy
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Soil loss and degradation across the Great Plains have been a major threat to agricultural health and production since the introduction of large-scale practices during the 1800s. Conventional farming (CF) practices remove soil organic matter (SOM) from topsoil, which in turn reduces soil organic carbon (SOC), as 58% of SOM is SOC. The loss of SOM contributes to the loss of the ability of soil to retain water, as well as the loss of ability to deter pests. Regenerative farming (RF) methods, and methods of combining both conventional and regenerative farming (C/RF) methods, have been introduced to address the decline of SOM and SOC presence. Our objectives are to: 1) use scientific literature values to determine the difference in carbon storage between regenerative and non-regenerative agriculture; and 2) estimate the potential for soils in the Great Plains to sequester carbon under a variety of regenerative farming scenarios (10%, 25%, 50%, 75%, 90%, and 99% conversion to regenerative farming). A 10% introduction of RF within all total agricultural land of the Great Plains (63,510,724ha), has the potential to sequester 184,019,425 tons of Carbon. A 99% conversion shows the potential of sequestering 1,821,792,380 tC. Thus regenerative farming has incredible potential for carbon sequestration as well as improving soil health throughout the Great Plains.

Population estimate of *Bunodosoma cavernatum* located on Driftwood Beach, Jekyll Island, GA

Victorya Adams, Lanie Sharpe, & James B. Deemy
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Hard substrates are a novel, anthropogenically driven ecosystem components to shoreline ecosystems on the Georgia coast. One of the species that inhabits this novel habitat on Jekyll Island, Georgia is *Bunodosoma cavernatum* (Warty Sea Anemone). Our objectives for this study were to: 1) estimate the population of *B. cavernatum* located on Driftwood Beach; and 2) determine if sampling intervals affected accuracy of population estimates (2.5 m, 5 m, 7.5 m, or 10-meter intervals). The focal site for our research was Driftwood Beach, Jekyll Island where we sampled an area of 3372m², only accessible during low tide. We established 5 transects, 40 m in length, spaced approximately 4 m apart beginning 2 m above and parallel to the waterline. Using a 1 m2 quadrat, *B. cavernatum* was counted at 2.5 m, 5 m, 7.5 m, and 10-meter intervals individually for each transect, beginning at a random point between 0 and 1 m to reduce sampling bias. The population estimate using the median for 2.5 m intervals, was 6,744 individuals. After comparing population estimates of *B. cavernatum* using data at 2.5 m, 5.0 m, 7.5 m, and 10-meter intervals, it is determined that one can sample at 10-meter intervals and capture a reasonable estimate of the population. While the 2.5-meter intervals and 10-meter intervals gave identical results, there were extreme values of up to 23 individuals measured within a square meter.

Soil Organic Matter in Wetland and Upland sites

Cierra Agisotelis, Emma Baker, Abby Damaschke, Madeline Hinchliffe, & **Erica O'Neal**
Department of Natural Sciences, College of Coastal Georgia

Soil organic matter is a critical factor in soil ecosystem health as well as an important storage of carbon in the carbon cycle. Our objective was to determine the organic matter in wetland and upland soils on campus. We collected 10 soil cores (5 wetland, 5 upland) using a push core and divided them at 10-centimeter intervals. Samples were dried in a drying oven at approximately 60 degrees Celsius for 48 hours. The dry mass was then measured prior to combustion in a muffle furnace for 5 hours at approximately 450 degrees Celsius. Samples were weighed again to determine the amount of organic matter combusted. We split our samples into 2 grams per sample and put them into ceramic crucible. The volatilized organic content that we found within the wetland material was an average of about 31.46 grams, and the upland material was an average of about 26.94 grams. Prior to being dried, the average weight of the wetland soil was approximately 42.42 grams, and upland soil averaged weight of around 32.21 grams. For the dry wetland soil samples, we had an average weight of around 33.37 grams, and the dry upland soil samples had an average weight of around 30 grams. Given these results we can conclude that wetland soil contains more organic material compared to upland soil.

Water quality, vegetation, and macroinvertebrate biodiversity relationships at the southernmost pond at Sea Palms West

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Aquatic environments must have proper hydrology, hydric soils, and hydrophytic vegetation to be considered wetlands. A surprising location of freshwater wetlands are golf course ponds like those at Sea Palms West on St. Simon's Island, GA. This study investigates the relationships between the water nutrient concentrations and macroinvertebrates of the area's southernmost pond, focusing on dissolved oxygen, nitrate, phosphorus, and vegetation. The macroinvertebrate biodiversity indices not only provide insight into the macroinvertebrate population dynamics but also indicate the pond's overall health and its ability to support a large biodiversity of species. Weekly water quality testing was completed on Thursdays from September 12th, 2024, to November 21st, 2024, with two dates missed due to hurricanes. Surrounding pond vegetation percentages were observed in person and via Google Earth. During this period, five macroinvertebrate surveys were conducted by sweeping the bottom of the sampling area with a D-net. The calculated Shannon and Simpson's indices showed low to moderate macroinvertebrate biodiversity, indicating the presence of a few dominant species. A significant difference was found between macroinvertebrate biodiversity indices and water phosphate contents. Additionally, there is enough vegetation surrounding the pond to provide adequate organic matter and dissolved oxygen which contributes to efficient phosphate and nitrate cycling. These values are then appropriate for aquatic species like dragonflies to complete a full life cycle. To further this research, additional data could be collected at areas where water enters this pond. This would allow additional insight into how ponds provide wetland ecosystem services such as processing organic matter and water filtration in areas with high residential input.

Assessing Urban Pond Health and Biodiversity in Sea Palms West, St. Simons Island, GA

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Urban ponds are unique and require a system of management to maintain good water quality due to the influences of urban development. Ponds are often integrated into communities to act as retention ponds that collect localized run-off. The ecological status of these ponds is of particular interest as it is important to maintain their ecosystem dynamics for the health and attraction within a given community. In this study, we focus on a green space, that was formally a golf course, which now serves the Sea Palms West Community on St. Simons Island, GA. Here we compare aerated vs. stagnant pond water parameters to assess which factors most influence the conditions of pond health and biodiversity. Our analysis focuses on key water quality parameters: dissolved oxygen, carbon dioxide, total dissolved solids (TDS), and phosphate concentrations. In addition, organismal surveys were conducted to collect data on macroinvertebrates, birds, reptiles, and amphibian species to assess pond biodiversity. These comparisons will help identify the role of aeration in aquatic environments, potentially offering insights into management practices for urban ponds. Our results suggest that ponds with fountains exhibit better conditions such as higher dissolved oxygen concentrations and macroinvertebrate counts. Aerated ponds also indicate lower total dissolved solids, carbon dioxide and phosphate concentrations. These characteristics are potentially mitigating conditions that lead to algal blooms when compared with those without fountains.

Marsh Environment Exploration with Scouting America

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For a course-based service-learning project in my Environmental Communication course, I worked with Scouting America at Camp Tolochee to develop an outdoor environmental education program. Through this hands-on program, we aimed to get scouts into the marsh environment so they could, see, feel, and experience the diverse ecosystem around their camp. I made a marsh plant and invertebrate identification guide and took the scouts on a tour of the campground, pointing out different nearby plants and animals. I helped them learn the names of several plants as well as easy plant identification tools like leaf fragrance. I then introduced them to marsh invertebrates like the squareback marsh crab, periwinkle snail, and several species of fiddler crabs. Scouts learned how to tell the difference between fiddler crab species and male and female individuals based on claw size. They then captured and measured the length, width, and claw length of their crabs before racing them to determine if sex or body size contribute to speed. Afterwards, scouts were successfully able to identify several marsh plants and invertebrate species. I love marine invertebrates, and working with the scouts allowed me to present my knowledge about them to a new audience and implement communication skills that I learned in class. I had to adjust my explanations and teaching methods based on the age group I was working with. This project helped me communicate information about the marsh invertebrate to a younger audience, which is not something I ever thought I would do.

Relationships and Effects of Physicochemical Properties on Freshwater Wetlands

Kristen E. Darley & James B. Deemy
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During this project, information was gathered on nine physicochemical properties of freshwater wetlands and how these data affect the growth and distribution of different plant vegetation. Three different freshwater wetland areas were surveyed and compared between the months of July and November. Each site was tested multiple times per month, in five different, consistent areas. A Polarographic DO Sensor (YSI) was used during all five months to obtain the temperature, specific conductivity, dissolved oxygen, and pH of each area. A LaMotte colorimeter was used during the last few weeks to obtain the ammonia, nitrate, nitrite, phosphate, and turbidity. Each area also had plant samples taken for identification. Data is currently still being collected and analyzed, but there seems to be a difference in some of the plant species due to certain aspects of the physicochemical properties. Each wetland area is unique and important to the health and functionality of the surrounding ecosystems, as well as the health and happiness of the people that depend on it for drinking water, food, livelihoods, and entertainment. It is hoped that this study will increase awareness of the importance of these vital areas and encourage others to help protect and preserve them.

Effects of Gut Microbiota Diversity on Mental and Neurological Health

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Mental and neurological health is a topic that conjures up mixed feelings among the ones affected with a type of illness and those around them. Even though history has many examples of mental and neurological illnesses, sophisticated countries such as the United States, did not issue begin issuing research grants or budgets to study them until 1947 and 1951 respectively. With

these studies have come many different types of medications, many of which have almost unbearable side effects. New studies have begun looking at another factor within the human body that could possibly reduce or even reverse symptoms of mental and neurological illnesses. Inside the human body is a completely separate little world. These microorganisms outnumber the genes of their human hosts by more than 100 times. This relatively new area of research is studying the effects of the gut microbiota on mental and neurological health. Many of these studies show the types and numbers of the different microbiota, which include bacteria, viruses, fungi, archaea, and eukaryotic microbes, can have major impacts on a person's mental and neurological health. Some of these studies also show that things as simple as the food a person consumes, can greatly impact the number and diversity of their gut microbiome.

Energy Subsidy to The Deep Sea by Whale Fall

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Whale fall is the descent of whale carcasses to the ocean floor. When a whale carcass reaches the ocean floor it becomes a nutrient-dense food source for organisms in the deep sea. Our objective was to model the trophic implications of whale fall for deep-sea organisms. We focused on five types of whales, sperm whale (*Physeter macrocephalus*), blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), and north Atlantic right whale (*Megaptera novaeangliae*). We determined the number of Sleeper Sharks (Somniosidae), Hagfish (Myxinidae), and Ratfish (*Hydrolagus colliei*) supported by a whale fall of each type of whale using S.T.E.L.L.A, which is short for systems thinking experimental learning laboratory with animation. We used scientific literature to determine the total population of each species of whale and the annual birth rate and death rates. Additionally, we used scientific literature to determine the average mass of each adult whale for each species along with the percentage of fat, mass muscle, viscera, and bone. Lastly, we determined the feeding rates per day of Sleeper Sharks Hagfish, and Ratfish. After gathering data from the literature, we used S.T.E.L.L.A. to multiply the average mass of a whale by the average rate of death. We compared results across all whale species and estimated how many individuals could be supported by a whale fall of each focal whale species. We concluded that between 448 and 1121 Hagfish, 545 and 1362 Ratfish, and 777 and 1941 Sleeper sharks can be supported yearly by whale falls.

Glynn Environmental Coalition Public Notice Service-Learning Project

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The Glynn Environmental Coalition (GEC) is determined to create a safe and healthy environment for Glynn County. During my Service-Learning experience, I worked with Rachael Thompson at GEC to communicate with the community the importance of Public Notices. We focused mainly on the Shoreline Protection Committee and the Coastal Marshland Protection Committee. With these committees, we were trying to communicate to the general public the importance and meaning of the Public Notices they send out. We did this by creating a fact sheet to present in public settings, like First Friday in Downtown Brunswick. The time I spent working on this project has given me more information on what committees from the Department of

Natural Resources (DNR) do, and has improved my public communication skills. This Service-Learning project encouraged me to have a better understanding of the beaches and marshes the DNR is protecting. It has also encouraged me to communicate more to the public about important environmental issues and policies, to make sure people are aware of what is occurring in their community.

Survey based monitoring system for water quality analysis and early detection of invasive crayfish populations in residential/golf-course ponds

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During water quality sampling at former golf course ponds inside of Sea Palms West, macroinvertebrate surveys were conducted. Given their known role as bio-indicators, the absence of native crayfish species in pond six raised concern for water quality and niche fulfillment pressure given the open role this absence created in the pond's ecosystem. Species surveys were conducted on a routine basis using trapping and dip-netting as the main means of observation. Water chemical analyses were conducted via chemical-reaction and titration-based test procedures along with automated sensor readouts. The parameters tested were Nitrite, Nitrate, Phosphorus, Ammonia, Dissolved Oxygen, total dissolved solids (TDS), and Carbon dioxide. Results indicated consistent concentrations of Ammonia and Nitrite that were unsuitable for viable crayfish populations to exist in the pond. Recommendations for balancing Ammonia and Nitrite levels in the pond included creating vegetative buffers around the pond's perimeter, increasing aquatic plant populations inside the pond, and utilizing an aerator device to help diffuse ammonia out of the pond water. A long-term system designed to monitor native crayfish presence is recommended due to the beneficial aid crayfish presence in freshwater systems provides by indicating acceptable water quality levels. The system will double as an early detection system for invasive crayfish species presence and will provide surveyors the opportunity to implement corrective measures in the event an invasion occurs.

The relationship between ammonia, phosphate, and nitrate concentrations in a greenspace pond ecosystem

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Freshwater pond ecosystems are essential in maintaining the genetic diversity of aquatic biotic life and function as aquatic nurseries. This study was conducted on St Simons Island, GA, where there is greenspace that was previously a golf course in the community of Sea Palms West. Previous studies at Sea Palms West have been conducted to analyze pond water quality, macroinvertebrates, and the presence of local birds, amphibians, and reptiles. This study aimed to explore the relationship between ammonia, phosphate, and nitrate concentrations, and determine if they are correlated by using the obtained values from ponds 3, 6, and 8. These three concentrations play a significant role in the health of a pond system, so understanding their relationship and values can allow us to assess the health of the ponds. Our results show that ammonia, nitrate, and phosphate are not related. Pond 8 had a higher concentration of ammonia and nitrate, with an average of around 3 ppm and around 0.15 ppm respectively. Pond 6 had a higher concentration of phosphate compared to the other ponds in this study with an average of

around 0.4 ppm. A high concentration, being over 0.5 ppm for ammonia, 0.03 ppm for phosphate, and 0.6 ppm for nitrate, indicates a pond is unhealthy and essential bioindicator species will not exist in the system. This study explores the importance of mitigating the concentrations of ammonia, phosphate, and nitrate in this ecosystem to ensure the survival of the organisms that rely on the pond to survive.

Comparison of Organic Matter of Upland and Wetland Soil at Lake Teel

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Upland and wetland soils typically differ in organic matter content which can be a key factor in productivity. Our objective was to compare the organic matter content of upland and wetland soils. The study site was at Lake Teel on the College of Coastal Georgia where distinct upland and wetland zones occur. Soil samples were collected using a hand bucket auger along two transects: one upland transect, located approximately 37 meters from the lake's edge, and one wetland transect, located about 2 meters from the lake's edge. Each transect consisted of five samples, spaced 5 meters apart, collected to a depth of at least 10 cm. After sampling, the soils were measured for in situ mass, dried for 48 hours, measured for dry mass. Organic matter content was determined by combusting the samples in a muffle furnace. Post-combustion measurements were taken to determine the remaining weight after carbon volatilization. Results revealed that wetland exhibited a higher organic matter content compared to upland, indicating that it may provide a more nutrient-rich environment conducive to plant growth. These findings underscore the importance of understanding soil composition in coastal ecosystems and suggest that wetland soil may offer greater potential for supporting plant life in these environments.

Assessing the impact of salinity on macroinvertebrate biodiversity in greenspace ponds at Sea Palms West, St. Simons Island, GA

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Freshwater pond ecosystems play a critical role in supporting biodiversity, particularly in coastal regions where environmental factors like salinity can vary significantly. This study examined conductivity levels and macroinvertebrate biodiversity across six ponds located in the Sea Palms West residential community on St. Simons Island, GA. The goal was to, better understand the effects of pond salinity on aquatic biodiversity. Conductivity was tracked over six weeks to monitor changes in salinity across ponds, while macroinvertebrate samples were collected to assess biodiversity (which was calculated using both the Shannon and Simpson diversity indices). Pond 2 had the lowest and most stable conductivity levels (± 0.0035 mS/cm), around 0.38 mS/cm, indicating consistently low salinity. Meanwhile, Pond 4, located closest to the marsh, had the highest fluctuations in conductivity, reaching a peak of 6.17 mS/cm in early October, suggesting possible environmental factors like evaporation, saltwater intrusion, or runoff from nearby areas.

These results indicate that ponds with lower and more stable salinity, such as Ponds 2 and 3, tended to have higher species richness and a more even species distribution, as reflected by higher Shannon and Simpson diversity indices. In contrast, Pond 4, which experienced greater

salinity fluctuations, showed lower biodiversity and was dominated by fewer species, as indicated by lower Shannon scores (0.85–1.05) and Simpson values (0.60–0.65). These findings suggest that stable, low-salinity environments support more diverse macroinvertebrate communities, while ponds with higher salinity or larger fluctuations reduce biodiversity. Understanding these patterns provides insight into how local environmental changes, particularly salinity, can impact pond ecosystems, with broader applications for managing small freshwater habitats in coastal regions. This project highlights the importance of stable conditions for supporting healthy biodiversity in coastal freshwater ecosystems.

Burrow Density and Marsh Sediment Bioturbation by the Atlantic Marsh Crab (*Uca pugnax*)

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Fiddler crabs (*Uca pugnax*) are important invertebrate detritovores inhabiting salt marshes along the Georgia Coast. Fiddler crabs contribute to bioturbation of sediments, driving pore water salinity and organic matter turnover in salt marshes. This survey investigates the burrow density of *U. pugnax* in Glynn County's marshes and compares sediment turnover and displacement during September through November. Our objectives were to 1) estimate the burrow density of U. pugnax in several coastal areas along the Southeastern Georgia Coast; and 2) estimate the sediment turnover from burrows in the area. Burrow density was measured with1 m^2 quadrat placed at 10 m intervals along a 100 meter transect in the marshes of Brunswick. Average burrow count and bioturbation estimate were calculated and scaled up to a subset area of the marsh. Results indicate significant variation in burrow counts, sediment turnover, and sediment displacement in October compared to September and November. In the October results, Sydney Lanier Bridge site yielded a maximum 4.75e+05 burrows, 1.70e+7 cm^3 turnover, and 1.19e+7 cm^3 displacement. Earth Day Nature Trail yielded 3.04e+5 total burrows, 1.08e+07 cm^3 turnover, and 7.59e+06 cm^3 displacement. Finally, Jekyll Island Causeway yielded a minimum of 5.96e+04 total burrows, 2.13e+6 cm^3 turnover, and 1.19e+7cm^3 displacement.

Reconstructing Past Environments with Fossilized Teeth at Clark Quarry, GA

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This study examines microfossils from Clark Quarry in Brunswick, GA, to reconstruct the paleoenvironment of Georgia during the late Pleistocene epoch. Sediment samples were collected, sifted to separate the larger specimens, and analyzed through a microscope to identify any microfossils.

In total, we have 117 identified specimens, including fossils from mammalian, reptilian, amphibian, shark, bony fish, and molluscan groups. Forty-four are teeth, with the leftover being vertebrae, jaws, spines, scales, etc. Most teeth specimens belong to aquatic species, indicating a water-influenced habitat, with the exception of 4 mammalian specimens. The most commonly found teeth are from bony fish, including *Aplodinotus* sp. (Freshwater Drum - 15 count), *Amia calva* (Bowfin – 11 count), and *Lepisosteus* sp. (Gar – 9 count). Less common are the shark specimens, such as *Sphyrna* sp. (Hammerhead – 1 count), cf. *Carcharodon* sp. (Great White – 1

count), *Sphyrna cf. S. tibura* (Bonnethead – 1 count). Our only reptilian teeth identified belong to *Alligator mississippiensis* (American Alligator – 3 count), which all together suggests a coastal environment transitioning between fresh, brackish, and marine water. The large quantity of bony fish teeth, like Freshwater Drum, suggests a freshwater habitat. Gar, Bowfin, and American Alligator, commonly associated with freshwater and brackish habitats, point to stable estuarine conditions. The lower number of shark teeth, including HammerHead and Great White, suggest that marine conditions were less frequent but still possibly present. Together these suggest that environmental conditions had both stable brackish water and occasional marine influences, likely due to slowly fluctuating sea levels.

Assessing the relationship between precipitation and phosphate/ nitrate concentrations in a golf course turned greenspace pond at Sea Palms West, St. Simons Island, GA

Taylor Kennedy & Kimberly K. Takagi
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Natural water sources provide water to many terrestrial organisms and harbor a large diversity of aquatic organisms. Water quality is an important aspect of an environment because it can affect both the aquatic and surrounding ecosystem. When closed, golf courses, which can take a up a large amount of space, can be reverted into a natural functioning greenspace. Because golf courses are known to use great amounts of fertilizers and herbicides, there is a higher chance of the ponds within the course to be adversely affected by chemicals and other pollutants due to precipitation runoff. The objectives of this study were to assess the influence of precipitation on the concentrations of phosphate and nitrate, common components of fertilizers, within a pond of a golf course recently converted into a greenspace in Sea Palms West on St. Simons Island, Georgia. We monitored the change in nutrients by using water quality testing kits on a weekly basis for the span of 12 weeks and compared the data with past data from 2021-2023. The most important finding was how the weekly precipitation did not influence phosphate and nitrate levels in the pond, which could have been from the past chemicals used on the golf course or potential current pollution from surrounding residential yards and drainage from roadways, and no correlations to runoff. The results of this study underscore how important it is to monitor and ensure the greenspace is able to sustain a natural ecosystem, and limit and prevent pollution accordingly.

Recreated Florida Manatee Sign for '4-H Tidelands Nature Center' to Increase Manatee Awareness and Education

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Florida manatees (*Trichechus manatus*) are a threatened marine mammal and migratory species. The primary threats to their survival are boat collisions, warm water habitat loss, and other human-related impacts. They begin their migration during the spring out of Florida into the warmer waters of coastal Georgia, where they stay as late as November. The 4-H Tidelands Nature Center, located on Jekyll Island, offers guided kayak tours in the salt marshes and tidal creeks of Jekyll, where visitors can frequently sight and observe Florida manatees from a safe distance when they migrate here during the warmer months. However, their original Florida manatee sign, which was located on the outside of their building next to a Florida manatee

plaque in front of their dock to Tidelands Pond, has been destroyed by a power washer. Although it did contain some outdated information, it also included important information to educate visitors about Florida manatees' natural and human threats to survival, body characteristics, size and lifespan, diet, habitat and range, reproduction, and what we can do to help protect manatees. Therefore, for my service-learning project, I applied academic learning in collaboration with Tidelands to help serve their needs of a new and updated Florida manatee sign. To do so, I applied visual communication skills learned in class while using Adobe Illustrator to create this sign and also utilized ibisPaint X to draw an original Florida manatee illustration to incorporate into this sign, which allowed me to expand my environmental communication and creative skills.

Filming of Hydroponic and other Farming processes of Five Oaks Farm

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For this project we worked with Five Oaks Farm, a regenerative and sustainable farm located in Jessup County Georgia. Their mission is to produce farm grown products such as vegetables, fruits, and eggs using the healthiest methods possible. We worked with Five Oaks on a service-learning project for our Environmental Communication (ENVS 3200) class. Our goal was to promote their company using social media, and help others understand what they do and why it is important environmentally. We produced both photos and videos of Five Oaks farm and their everyday practices. Videos were taken of seed planting and the process of hydroponics, as well as of the chickens and other parts of the farm. I took videos of the process of planting seeds for micro plants, such as carrots, lettuce, and basil. Our product served Five Oaks Farm by promoting and showing what they do. Our hope is that when people see our photos and videos on social media, they will have a better understanding of what Five Oaks does and want to come visit and buy their products. This project has contributed to my learning and career as an environmental science major by giving me more knowledge on what hydroponics are and why it is an important way to grow/ produce sustainable agriculture, as well as strengthening my skills with environmental communication.

Ab initio Investigation of the Effect of Carbon Dioxide on Water Complexes of Atmospheric Acids

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The complexes of water, inorganic acids of nitrogen (nitric acid, pernitric acid, and nitrous acid), and carbon dioxide were investigated using Gaussian at the DFT/6-311++G(3df,3dp) level of theory. This study investigates how rising levels of carbon dioxide in the atmosphere affect the formation and stability of these atmospheric complexes. Comparisons between the energy of the acid-water complex and the acid-water-carbon dioxide complex were done in Gaussian via a single point energy calculation and give preliminary insight into the effects of carbon dioxide on atmospheric acids.

The Impact of Conductivity on the Abundance and Diversity of Macroinvertebrates at Sea Palms West, St. Simons Island, GA

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Freshwater ponds provide important environmental functions such as providing habitat for many different aquatic species. These species, which include aquatic macroinvertebrates, are bioindicators and can help determine if an ecosystem is healthy or not. This study was based in the Sea Palms West (SPW) residential community, on St. Simons Island, GA, where a golf course turned greenspace with multiple ponds is located. Since 2020 the College of Coastal Georgia has been doing water quality monitoring in partnership with SPW. In this study, we tracked conductivity in addition to other water quality parameters and macroinvertebrate populations in an effort to determine if salinity impacts the abundance and diversity of macroinvertebrates in these ponds. Ponds 2, 3, 4, 5, 6, and 8 were used to compare conductivity and macroinvertebrate data. A YSI ProQuatro Model 10 was used to calculate conductivity and D-Nets were used to find macroinvertebrates. All this data was analyzed in an effort to determine the relationship between each pond, their conductivity, and their invertebrate species diversity. We found that if the conductivity is above one thousand microsiemens per centimeter then there are, on average, fewer total aquatic macroinvertebrates, and a lower diversity of aquatic macroinvertebrate species. This indicates that conductivity and by proxy, salinity, impact the abundance and diversity of macroinvertebrates in these ponds.

Assessing the relationship between golf course pond water quality and amphibian and reptile presence

Shelby Ramsey & Kimberly K. Takagi
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Amphibian and reptile population declines at golf courses can be related to habitat alteration and the use of pesticides and fertilizers affecting the water quality. Turning retired golf courses into green spaces is a great opportunity to create safe spaces to increase the local populations of amphibians and reptiles and other fauna. The water quality of golf course turned greenspace ponds was tested at Sea Palms West, a retired golf course on St. Simons Island, Georgia, USA during the Fall of 2022 and Fall of 2023. During this time, multiple amphibian and reptile surveys were conducted during the day and night. Data collected from the water quality parameters: dissolved oxygen, ammonia, phosphate, nitrate, and pH were compared to the amphibian and reptile surveys to assess whether there was a relationship between pond water quality and amphibian and reptile abundance and time of day. A preliminary data analysis of the Fall 2022 data was inconclusive. The comparison results were also inconclusive. In each case, two of the five parameters did support the conclusion, but three did not. These results suggest that a buffer zone is needed for a healthy and abundant population of amphibians and reptiles and that water quality parameters should be measured more often or concurrently with any extra maintenance being conducted by the various landscaping companies that provide service to Sea Palms West community residents. As well as educating the residents on how to maintain a healthy ecosystem and what a healthy pond environment looks like.

Fossilized Jaws of Clark Quarry, Georgia

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In total, the College of Coastal Georgia fossil research lab has identified 12 jaw specimens of varying species from Clark Quarry, a late-Pleistocene fossil quarry located in Brunswick, GA. Ten of these specimens are of the Sciaenidae family, a large family of bony ray-finned fishes commonly referred to as Drum. Fish of this family can be found living in coral reefs, surf zones and coastal estuaries. Because of the number of specimens identified thus far and the amount that have yet to be identified, it can be determined that Clark Quarry at one point during the late Pleistocene was a saltwater or brackish coastal environment. The other two jaw specimens are reptilian. One is a jaw fragment belonging to the species *Alligator mississippiensis* commonly called the American Alligator. As is commonly known, alligators' typical habitats include freshwater swamps, slow moving rivers, marshes, lakes, etc. The last specimen is an *Anolis carolinensis* jaw. These are small lizards commonly called Green Anoles. They are also typically found in wetlands or swamps as well as forests. Because both the American alligator and the green anole can be found in freshwater wetland areas, it can be said that at another point during the late Pleistocene, Clark Quarry was also a freshwater wetland swamp. The sediment being studied at the College of Coastal Georgia has been mixed and the geologic strata are no longer intact, so it cannot be definitively said in what order these environments existed. The Pleistocene had many rises and falls in global climate and so water levels would fluctuate often changing the environment in and around Clark Quarry.

Capturing A Comet

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The proposed presentation provides a brief overview of comets, offering insights into their structure, origins, and the essential role they play in enhancing our understanding of the solar system. Specifically, this presentation will focus on Comet C/2023 A3 (Tsuchinshan-ATLAS), highlighting its unique characteristics and significance within the broader field of comet research. Additionally, it will detail the process used to capture a photographic image of this comet, along with an analysis of its origins and expected trajectory after leaving Earth's orbit. The discussion will also cover the importance of studying comets as ancient remnants that hold valuable clues about the formation of celestial bodies and the early history of our solar system. Through this presentation, attendees will gain a clear overview of comets and their crucial role in uncovering the secrets of our cosmic origins.

Mussel population density estimate on Driftwood Beach

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Scorched mussels (*Brachidontes exustus*) is a sessile benthic invertebrate that inhabits rocky substrate on Jekyll Island's Driftwood beach. Our objectives were to: 1) estimate the population of scorched mussels; and 2) compare to previous estimates. We established transects of 30 meters length and sampled at 2.5, 5, 7.5, 10 intervals using a 1 m^2 quadrat. Mussel densities were used in conjunction with the area of Driftwood Beach to estimate the population. we estimated the population of mussesl using the median, Q1, and Q3 calculate for each sampling interval. The median population of the 2.5m intervals was 183, 816 mussels. The Q1 population

of the 2.5m interval was 7,659, and the Q3 population was 648,462. The median population. The median population of the 5m interval was 125,948. The Q1 is 3,404, and the Q3 is 645,909 for the 5 m interval. For the 7.5m interval the median is 156,584. The Q1 is 3,404 and Q3 is 750,582 for the 7.5 interval. The median for the 10m interval is 342,102. The Q1 is 102,120 and the Q3 is 835,682 for the 10m interval. Our results indicate that smaller sampling intervals are necessary to more accurately and precisely estimate the scorched mussel population.

Topographical Analysis and the Correlation of Geologic Composition at Various Locations Within the Appalachian Mountains

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The Appalachian Mountains were once as tall as the Himalayas, and after more than 300 million years of erosion, there is an abundance of mineral-rich deposits within the eroded remains. After the events of Hurricane Helene, the quartz mine in Spruce Pine, NC, was rendered inoperable for over two weeks. This is the largest producer of silicon quartz used in global microchip development. My objective was to find similar quartz deposits within the Appalachian Mountain Chain, given its geologic history. An additional objective was to analyze the viability in using topography as an initial indicator for similar mineral deposits. In order to compare the geologic composition, I acquired data from mines and prospects of different areas and compared them to the topography of Spruce Pine. I utilized the USGS topographic scans of the United States and uploaded them into a 3D software program. I was able to map the Appalachian Mountains and overlay different topographic regions for comparison. The most important findings were the observations of topographic and mineral composition similarities. These results were specifically between Green Mountain National Forest in Vermont and the region of Spruce Pine in North Carolina. These conclusions suggest that topography can be a useful initial indication of geologic composition, even across continent-spanning structures.

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