In-Person Oral and/or Visual Presentation

BEGINNING AT 9:00 A.M.

KIRKHOF CENTER 1104

Environmental Challenges of Mining Minerals for Solar Panels and Battery Energy Storage Systems

Presenter: Miranda Larva
Mentor: Griff Griffin

Miranda Larva

Reducing greenhouse gas emissions and meeting the Biden Administration's climate goal of reaching 100% carbon-free electricity by 2035 requires the deployment of renewable energy infrastructure and energy storage containers (i.e., batteries). Solar energy is growing across the United States and will be a major source of the nation's renewable energy portfolio. Rare minerals including arsenic, gallium, cobalt, and lithium are used for the manufacturing of solar panels and batteries used to store electricity. Monocrystalline silicon, polycrystalline silicon, cadmium telluride, and copper indium gallium selenide are the main types of solar panels made and sold. Lithium-ion based batteries are the most common utility-scale battery systems used for energy storage on the United States' electric grid. Mining alters the natural landscape of an area; some environmental impacts of mining include water pollution, habitat destruction, and the release of toxic tailings. I will take a comprehensive look at mining processes, and I will explore potential environmentally responsible mining practices.

KIRKHOF CENTER 2259

"The College Experience": An Expose of Challenges Faced by Indigenous University Students in Nicaragua

Presenter: Bradyn Mills
Mentor: Paul Lane

The "college experience" for Indigenous students in Nicaragua does not include highly-resourced orientation events, stacks of free pizza, or a bubble of well-funded social and academic opportunities. Rather, for these students, the "college experience" means one thing: sacrifice. The trip to university might include days of intensive travel by both water and land. To attend, students must assimilate to a language and majority culture which are not their own, learn to use technology that had not been available in their remote communities, and reallocate time that was previously spent helping their families survive. The presented research was compiled from a series of in-country qualitative interviews with students from the Miskito, Mestizo, and Mayangna groups in which participants shared their experiences of encountering their country's dominant culture and the challenges associated with it. Students were also asked to share their educational journey leading up to university, comparing their home communities to their time in higher education. These findings, while specific in context, raise important questions about cultural identity formation throughout K-12 education and how this influences the cross-cultural encounters at the university setting.

KIRKHOF CENTER 2266

Accessibility to Language Immersion Programs and their Cognitive Benefits

Presenter: Lauren Gutierrez
Mentor: Mayra Fortes Gonzalez

Language immersion education programs, especially in Spanish, have become increasingly popular in the United States in recent decades. Nationwide, parents can choose to send their children to a traditional school, or to one that offers the added benefit of bilingual education. Language immersion programs provide multiple cognitive benefits, such as enhanced problem-solving, divergent thinking, pattern

recognition, and brain disorder resistance. Due to benefits, the popularity of language immersion programs has grown; however, not every K-12 student can access them. Factors such as the socioeconomic status of the student and their family, the resources that their school or community can provide, and similar structural barriers to immersion opportunities for Latino/a/x students contribute to a lack of language immersion program accessibility and participation. My presentation will explore how these barriers can limit historically marginalized groups whose first language is not English. I will also demonstrate how a speech-language pathologist can aid in promoting bilingual education involvement, while emphasizing the cognitive benefits of language immersion programs. An increased awareness of the challenges that bilingual Latino/a/x youth face, as well as more support from educators and speech therapists, will extend the benefits from language immersion programs to all students.

KIRKHOF CENTER 2270

Geographic Information Systems as an Effective Grantmaking Tool

Presenter: Christina Vann
Mentor: Kin Ma

This exploratory study examines how Geographic Information Systems (GIS) and mapping can be used to improve grantmaking decisions. An ArcGIS Instant App is developed as a preliminary model for how to present geographic information to grantmakers. The literature review delves into technology acceptance research to lay the foundation for a discussion on the use of information technology (IT) in the nonprofit sector. Referring to the literature, it is determined that nonprofit organizations are not using technology to the fullest extent to achieve their social missions. The review then outlines a variety of prosocial outcomes of IT implementation including the development of critical spatial thinking, social capital, and increased community awareness. These prosocial outcomes suggest that nonprofits must work to advance their technological capacity. Experiential philanthropy is also discussed as a potential setting for IT training to be implemented. Finally, the research surrounding short, single-session training reveals positive learning outcomes indicating that short training may be a more affordable and accessible opportunity for nonprofits and philanthropic entities to engage in IT training and adoption. The mapping application created through ArcGIS is offered as a future tool to be utilized in short, informational tech training sessions for grantmakers.

BEGINNING AT 9:30 A.M.

KIRKHOF CENTER 1142

Puppies and Ponies and Cerebral Palsy

Presenters: Miranda Baker, Hailey Godbout, Hannah Scameheorn, Mya Van Nortwick
Mentor: Dawn De Vries

This presentation will discuss the benefits of animal-assisted therapy for children with cerebral palsy.

BEGINNING AT 10:00 A.M.

KIRKHOF CENTER 1104

A Restoration Plan for the Bend Area Open Space Park in Jenison, Ottawa County, Michigan

Presenter: Nolan Weatherby
Mentor: Griff Griffin

Properties bought for city or county parks often have ecological problems left behind by the previous owners, creating disturbed sites that allow for invasive species to spread. Restoration and management of these sites is the best way to help these spaces become healthier. Using remote sensing data from Ottawa County and research into native plant species, a restoration plan was developed for a 421-acre park in Ottawa County, Michigan called the Bend Area. Previous gravel mining companies disturbed the site which allowed for the spread of plants such as non-native Phragmites, Autumn Olive, and Garlic Mustard. These

invasive plants prevent growth of native wetland vegetation, which is beneficial for the threatened Blanchard's Cricket Frog, a species found here that the county would like to protect. The proposed plan involves herbicide application of glyphosate near the main parking lot and along a stretch in the northeastern section within the first growing season once restoration starts. A prescribed burn will follow the next winter, and steps will be taken to monitor and manage the growth. Native wetland vegetation will be seeded and planted in the following years until they are established and invasives will still be monitored.

KIRKHOF CENTER 1142

Disordered Eating and the Arts

Presenters: Kenneth Chileshe, Emma Hahn, Catherine Lyman, Gabriella Monte, Brandy Peralta-Sosa
Mentor: Dawn De Vries

This presentation will explain the benefits of the therapeutic use of arts and other related arts therapies for those struggling with disordered eating. It will look into different aspects of the therapeutic use of the arts such as painting, writing, music, etc.

KIRKHOF CENTER 2266

One Way Repeated Measures ANOVA SASpy (Honors Senior Project)

Presenter: Alejandro Hoban
Mentor: Sango Otieno

I have been a statistical consultant at the SCC (Statistical Consulting Center) for the past three years, and we often see clients whose experiments involved multiple measurements on the same person under different conditions. I created this program to make our process more efficient for us at the center and for our clients. My program follows the book *Discovering Statistics Using SPSS: (And Sex and Drugs and Rock 'n' Roll)* (4th ed.), which contains an explanation of One Way Repeated Measures ANOVA and is very handy to us and our clients.

BEGINNING AT 10:30 A.M.

KIRKHOF CENTER 1104

The Relationship Between Soil Factors and Plant Growth in Northern Alaska.

Presenter: Taylor Doorn
Mentors: Griff Griffin, Robert Hollister

This study examines the relationship between soils and the growth of graminoid plants occurring on the Arctic Coastal Plain. The study site was South of Atqasuk, Alaska. Measurements were made within a 1 km^2 grid established in the mid 1990's to monitor ecosystem change. The grid encompasses a wide array of community types that can be categorized as dry heath, wet meadow or moist acidic. Soil samples were taken from 126 plots to measure organic matter content and pH. Other soil abiotic data was recorded, including soil temperature, moisture, electrical conductivity, and thaw depth. Within each plot, the height of up to three individuals of every graminoid species were recorded each week from June to August of 2022. One-way Analysis of Variance was used to identify significant differences in soil factors between community types, while regression analyses were performed to find which soil factors showed the strongest association with plant growth. It is expected that pH, organic matter, and soil moisture had the strongest relationship with plant growth. Understanding the relationship between soils and plant growth may help explain different plant responses to climate warming observed across the landscape.

KIRKHOF CENTER 1142

Mind and Body Relationship: An Integrative Approach to Understanding the Effects of Recreational Therapy in Elementary Schools

Presenters: Aubrey Buckingham, Anna Raffaelli, Kailey Walter
Mentor: Dawn De Vries

This presentation will be about Recreational Therapy interventions based in elementary schools as a means to address behavioral and emotional impairments in children. It will cover activities that lead to mindfulness, coping skills, stress management, and reduced aggression. It will discuss how physical activity can lead to improved behavior and how recreational therapists can help address emotional and behavioral issues in elementary schools.

KIRKHOF CENTER 2201

Exploring Biodiversity and Biogeography of Microbial Mat Communities in Low-oxygen, High-sulfur Springs

Presenter: Davis Fray
Mentors: Bopaiah Biddanda, Dale Casamatta, Sarah Hamsher, Callahan McGovern

High-sulfur, low-oxygen environments formed by underwater sinkholes and springs create extreme habitats with unique microbial communities, living in thin layers known as microbial mats. To explore the diversity and better describe the taxonomic composition of these communities, mat samples, water parameters, and nutrients were collected from sites in Alpena and Monroe, Michigan and Palm Coast, Florida in the spring, summer, and fall. Cyanobacteria and diatoms, the dominant microbes in these mats, were cultured from mat subsamples to create a culture-based DNA reference library. Remaining mat samples were used for high-throughput sequencing using a multi-marker metabarcoding approach focused on exploring bacterial and diatom diversity. Preliminary data analyses revealed higher diversity in these mats than expected. Redundancy analysis was used to identify taxa associated with the conditions found at these sites. This study revealed distinct microbial mat communities in sites with similar groundwater conditions across a continental geographic range. Our results provide novel information on microbial mat communities in extreme environments and advance the field of microbial biogeography by providing insights into the distribution of cyanobacterial and diatom diversity.

KIRKHOF CENTER 2259

Religious Syncretism in Early Modern Latin America: Survival, Power, & Resistance

Presenter: Ian McGuckin
Mentor: Grace Coolidge

This paper explores the theory of religious syncretism and its application within early modern Latin America. It proposes a new model for understanding religious syncretism in order to eliminate the previous bias in the scholarship and misconceptions inherent in the term and seeks to discover why cultures chose specific religious elements over their counterparts in syncretic scenarios. Reviewing primary and secondary sources analyzing the religious characteristics and atmosphere of this period revealed that there was a pattern to syncretism and religious selection in Spanish Latin America. Europeans, Indigenous Peoples, and Africans in the New World selected religious elements based on three factors: survival, power, and resistance. This paper shows that religious elements in this region became “traits” which individuals employed to survive and prosper.

BEGINNING AT 11:00 A.M.

KIRKHOF CENTER 1104

The Impact of Road Salts on Freshwater Systems and the Alternatives to Road Salt

Presenter: Hailee Lamorandier
Mentor: Griff Griffin

Sodium chloride-based road salt has been used as early as 1938 to de-ice the roads in the United States. De-icing is crucial for the safety of drivers, but can have negative impacts on the water quality of

freshwater systems. While sodium chloride is a naturally occurring compound, rock salt being added to roads has increased sodium chloride numbers to harmful levels in wetlands and waterbodies. Alternatives to road salt are beet juice, sand, and salt brine (liquid salt). They all reduce the amount of sodium chloride entering bodies of water. Beet juice is broken down by microorganisms and can decrease oxygen in the water. Salt brine has the same negative effects as rock salt but adheres to the road more than typical solid crystals do. Sand does not melt ice chemically, but friction from the sand prevents buildup of ice on the road. However, sedimentation occurs and can cause the gills of fish to become clogged, smothering them. Each alternative to sodium chloride-based road salt can have negative effects on the surrounding ecosystem.

KIRKHOF CENTER 1142

Get Your Hike On

Presenters: Rosemarie Aquino, Aubrey Meindertsma, Jillian White, Emmerika Ziegler
Mentor: Dawn De Vries

This presentation will cover the benefits of outdoor adventure interventions, such as hiking and kayaking, for individuals with a traumatic brain injury.

KIRKHOF CENTER 2201

Michigan Tourism Trends

Presenters: Nathanale Cser, Logan MacGregor, Samuel Townshend
Mentors: Patty Janes, Sango Otieno

Convention and Visitor Bureaus from around Michigan sent surveys to their visitors in 2020 and 2021. We were tasked with the goal of analyzing a data set of over 15,000 observations to identify where certain (if any) demographics place their importance (e.g. Activities, Nightlife, Dining). Additionally, we rank destinations visited based on the performance ratings and assess using a significance test whether some subgroups have preffered destinations. Our ultimate goal is to appropriately market destinations to the demographics they best correlate with in an effort to prevent loss of tourism value. *This project is part of the STA 419 course designed to provide students with an opportunity to gain experience in statistical consulting.*

KIRKHOF CENTER 2259

Organizational Research

Presenter: Malik Robinson
Mentor: Jamie Langlois

Organizations are at risk of creating a space between them and the people served. Almost half (forty-nine percent) of all chief executives reported not having the right board members to establish trust with the communities they serve, and only a third of boards (thirty-two percent) prioritize knowledge of the community served (Wallestad, 2021). With this project, we will analyze the dynamics and culture of a nonprofit board and its navigation through leadership positions to be more inclusive. From research and analysis, I developed a case study investigating the dynamics and culture of a nonprofit board with leadership by interviewing the executive director and the board to analyze how the board functions with a rotating leadership position and how it impacts the culture and power dynamics of the board. The decisions made by the board impact the target population. Not being able to establish trust is significant evidence of a disconnect between the board as leading the organization and the people they are trying to serve. We encourage boards to look at the bigger picture by convincing nonprofit boards to focus on equity and inclusion within their organization and represent each voice within the board.

BEGINNING AT 11:30 A.M.

KIRKHOF CENTER 1104

Potential Energy Provided from Solar Panels on the Rooftops of Grand Valley State University's Main Campus Buildings in Allendale, Michigan

Presenter: Hannah Schafer
Mentor: Griff Griffin

The purpose of this research is to find out how much of Grand Valley State University's power could be generated from solar panels on the rooftops of GVSU's campus buildings. Measurements of the area of rooftops on campus that would allow solar panels to be stationed on were taken from Google Maps. The amount of energy the solar panels could generate was calculated on a monthly basis in 2022 using the PVWatts Calculator. The energy the solar panels could generate was compared to the amount of energy that is needed to provide Grand Valley's campus with power in each month of 2022. Energy provided from these solar panels varies each month due to factors such climate, latitude, tilt, and orientation and angle of the solar panels. The average number of cloudy and sunny days in each month, as well as the orientation of the panels are factored into the solar calculator. The average amount of power the solar panels will provide Grand Valley's campus with will range from 15-25% depending on each month in 2022.

KIRKHOF CENTER 1142

The Power of Play for Siblings

Presenters: Sydney Hain, Emma Sanderson, Sarah Smith
Mentor: Dawn De Vries

Siblings of pediatric cancer patients can experience a range of negative emotions from the moment their sibling is diagnosed, and throughout their course of treatment. Psychological symptoms such as increased anxiety, grief and decreased self-esteem can all be treated by recreational therapists through the use of play as an intervention. This study explores how therapeutic use of play can address the needs of these siblings, and what techniques and strategies lead to most effective outcomes.

BEGINNING AT 12:00 P.M.

KIRKHOF CENTER 1142

The Use of Aquatic Therapy in the Reduction of Falls for Older Adults

Presenters: Madelynn Hickey, Chloe Sabo, Anna Schnyders
Mentor: Dawn De Vries

The purpose of this research is to determine if aquatic therapy has a positive effect on the daily lives of older adults. Aquatic therapy is an intervention used by Recreational Therapists to improve balance, functional skills, and overall quality of life in their patients. Our research seeks to address what benefits aquatic therapy has for older adults.

KIRKHOF CENTER 2266

Analysis of Clinical Efficacy: A Personality and Trauma Knowledge and Attitudes Review

Presenters: Ella Beringer, Cameron Lindsay
Mentor: Joshua Bishop

The following research investigates the relationship between personality and trauma knowledge and attitudes among Social Work students at a moderate-sized midwestern university in the United States. Previous literature has not investigated this connection but provided context for how personality interacts with general knowledge, coping skills, learning, and trauma. All of these depicted significant correlations between trauma knowledge or attitudes and the Big Five Personality traits: extraversion, agreeableness, openness or imagination/intellect, conscientiousness, and neuroticism (McCrae and Costa, 1987). For the current study, personality was operationalized with the Mini International Personality Item Pool (IPIP) Scale

(Donnellan et al., 2006). Trauma knowledge and attitude were measured using the Knowledge, Attitudes, and Practice of Trauma-Informed Practice (King et al., 2019). JAMOVI was used to determine the Pearson Correlation Coefficient and descriptive statistics (JAMOVI, 2022). Doing this, the researchers found few low positive significant correlations between various personality traits and trauma knowledge and attitudes, specifically agreeableness and openness or imagination/intellect. Conscientiousness displayed a low negative significant correlation with trauma knowledge. *Keywords*: Personality, Trauma Knowledge, Trauma Attitudes, Social Work

BEGINNING AT 12:30 P.M.

KIRKHOF CENTER 1142

Multidimensional Models of Personality: How Healthcare Providers can use Assessments to Provide Holistic Care in a Clinical Setting

Presenter: Krista Davis
Mentor: Dawn De Vries

In the last few decades there has been a paradigm shift in the way personality disorders are assessed and diagnosed. Classic categorical models for personality, 3 clusters organized by common behaviors, are being replaced in favor of multidimensional models that divide personality into various traits domains and and assess functionality within each domain. With the publication of the Alternate DSM-5 Model for Personality in 2013 and adoption of ICD-11 in 2022, multidimensional models are starting to see implementation in clinical settings across the world. Although the new models offer a more holistic description of personality and functionality, clinicians are still in the early stages of determining how these models can be used and expanded to populations beyond personality disorders. In my research I looked at how certain assessments based on multidimensional models were being used in clinical settings and discussed how this may be used by recreational therapists (also known as activity therapists in mental health settings).

KIRKHOF CENTER 2201

Markov Chains and Mixing Times

Presenter: Adam Korte
Mentor: Jiyeon Suh

In an ongoing study by McNair and Suh, we are presented with an irreducible, aperiodic Markov chain as a model for the evolution of an algal system. This Markov chain converges to its stationary distribution. We are interested in the rate of convergence and the time required for the chain to get close to the stationary distribution. This time to achieve some predetermined closeness to the stationary distribution is called mixing time. Deriving bounds for the mixing time of a reversible Markov chain is straightforward, thanks to the simplicity of the spectral decomposition of reversible chains. The Markov chain presented by McNair and Suh is non-reversible. This presentation will explore the challenges of finding bounds for the mixing time of a non-reversible Markov chain, and the role of the eigenvalues of a transition matrix on the bounds for its mixing time.

KIRKHOF CENTER 2266

Positive Assortative Mating of Grand Valley's Tree Swallows and Their Corresponding Reproductive Success

Presenters: Michael Clark, Brianna Desappio, Grace Heaton
Mentors: Michael Lombardo, Sango Otieno

Positive assortative mating occurs when mates assort themselves based on similar characteristics (e.g., males with long wings mate with females with long wings). Negative assortative mating occurs when mates assort themselves based on dissimilar characteristics (e.g. males with long wings mate with females with short wings). We analayze Tree Swallow data collected around Grand Valley to determine if

there is evidence for positive assortative mating for several physical characteristics (e.g., mass, wing length, tail length) in Tree Swallows, and if positive assortative mating associated with measures of reproductive performance (e.g., timing of egg laying, the number of eggs laid, the number of offspring that successfully leave the nest). *This project is part of the STA 419 course designed to provide students with an opportunity to gain experience in statistical consulting.*

BEGINNING AT 1:00 P.M.

KIRKHOF CENTER 1142

Spinal Cord Injuries and Aerobic Exercise

Presenters: Abby Haney, Grace Ottinger, Rachel Paulsen, Sandra Sanchez-Lagunas
Mentor: Dawn De Vries

Aerobic exercise holds many physical benefits and can produce positive effects in adults with spinal cord injuires.

KIRKHOF CENTER 2270

Damming, Deluge, Degradation and Displacement: The Relationship Between Hydroelectric Infrastructure and the Poor and Indigenous

Presenter: Coltrane Bodbyl-Mast
Mentor: Chad Lingwood

This presentation will focus on the relationship between hydroelectric infrastructure and impoverished and/or indigenous populations from several worldwide examples. The Klamath dams in the West Coast US, the Kinzua in the Allegheny region of Pennislyvania, dams on the Missouri, the Itaipu in Brazil, the Aswan in Egypt, and the Ilisu in Turkey will all be discussed; due to time constrants, the presentation may be limited to one or two of these regions. The main question of this project is the degree of intentionality in the respective states' actions against their indigenous/minority populations. Other questions ask how they (the states) interface with potiental confrontions, and how these dams are confronted by the non-Indigenous.

BEGINNING AT 1:30 P.M.

KIRKHOF CENTER 2259

Profiles of Michigan State Park Campground Visitors based on 2019 and 2020 Surveys

Presenters: Malachi Daniels, Keagan Fisher, Chance Kramer, Jacob Pohl
Mentors: Patty Janes, Sango Otieno

The data were collected by an online survey sent out to all visitors of the campgrounds under Michigan's Department of Natural Resources. Data analysis to find factors that are conducive to positive experiences for campers is performed. The findings will assist the DNR in developing key factors that result in happy campers, for example, used to foster an environment more enticing to younger campers. This would help create a new generation of campers to enjoy everything the Michigan State Park system has to offer. *This project is part of the STA419 course designed to provide students with an opportunity to gain experience in statistical consulting.*

KIRKHOF CENTER 2270

Profiles of Michigan State Harbors/Marina Visitors based on 2020-2022 Surveys

Presenters: Talumba Chitaya, Emma Loveland, Alexis Studabaker
Mentors: Patty Janes, Sango Otieno

The data were collected by an online survey sent out to all visitors of the harbors/marinas under Michigan's Department of Natural Resources. In 2020, the survey was sent to 15,545 parties who registered, and 1,414 parties responded, while in 2021, the survey was sent to 23,919 people who made reservations and 2,275 responded, and in 2022, 1,656 responded from 22,511 that made reservations. Data analysis to find factors that are conducive to positive experiences for harbor/marina visitors is performed. The findings will assist the DNR in developing key factors that result in satisfied visitors, for example, used to foster an environment more enticing to younger boaters, helping create a new generation of boaters to enjoy everything the Michigan Harbor and Marina system has to offer. *This project is part of the STA419 course designed to provide students with an opportunity to gain experience in statistical consulting.*

BEGINNING AT 2:00 P.M.

KIRKHOF CENTER 1104

Factors that Contribute to Highly Impactful Nature Center Field Trip Experiences for K-6th graders

Presenter: Kalie Pathuis
Mentor: Griff Griffin

Nature centers are an invaluable community asset that have a unique function in serving as outdoor classrooms. They allow students to experience nature at a deeper level which can have lifelong benefits. The impact a nature center field trip can have on students compared to a traditional classroom setting has been studied using pre- and post-visit interviews, surveys, self-reported behavior, and comparative test scoring. School field trips have been linked to improved science literacy and attitudes toward biodiversity as well as physical and mental health benefits. Children who visit nature centers are more likely to demonstrate environmentally friendly actions in their home. Furthermore, students who view live animals at a nature center are more likely to correctly describe and identify those animals in the future. The focus of this paper is to explore the benefits of these unique field trip experiences and provide information for educators to use while designing nature-based educational programs that meet Michigan's K-6 state standards.

KIRKHOF CENTER 2201

Profiling Michigan State Park Campground Visitors From a 2022 Survey

Presenters: Ian Curtis, Adam Korte, Ty Rau
Mentors: Patty Janes, Sango Otieno

This project involves data collected by the Michigan's Department of Natural Resources (DNR) in a 2022 online survey sent to overnight visitors at Michigan state parks and campgrounds. Exploratory and inferential data analysis, including various maps of camper origin and destination, are performed and created to profile parks by campers' positive experiences. The trends discovered will help the Michigan DNR to identify why campers visit parks, where they come from, and the activities they do there. This will lead to improving the environment of state parks to entice campers from all over the state, especially younger campers who are creating a new generation of camping trends. *This project is part of the STA419 course designed to provide students with an opportunity to gain experience in statistical consulting.*

KIRKHOF CENTER 2266

Impact of Hybrid Clinical Simulation Labs on the Student's Confidence Levels and Professional Competencies of Dysphagia

Presenters: Peter Frenette, Bradley Monarch, Aidan Pittenger
Mentors: Srihimaja Nandamudi, Sango Otieno

Dysphagia is a swallowing difficulty that occurs to any individual in the lifespan especially seen in older adults. Data from multiple labs designed to help graduate students develop and improve clinical

competencies in dysphagia management at a Mid-West University in 2021 and 2022 were analyzed to determine whether the labs offer a positive impact on the student's understanding of dysphagia and professional competencies. Using Cronbach's Alpha, we assess if the questions on a scale from 1-5 can be collapsed into a single score for each subscale and thereafter investigate to see if on average the participants had more improvement within the year and if the magnitude of improvement differs between the two years. *This project is part of the STA-419 course designed to provide students with an opportunity to gain experience in statistical consulting.*

BEGINNING AT 2:30 P.M.

KIRKHOF CENTER 1104

Predicted Effects of Climate Change on Endangered Felidae Species

Presenter: Kaley Filiccia
Mentor: Griff Griffin

Climate change has always influenced our planet. However, with climate change accelerating at unprecedented rates it is difficult for species to adapt quickly enough. Wildlife species can adapt, move, or go extinct. This research is looking at the modeled effects of climate change on the Snow Leopard, Siberian Tiger, Bengal Tiger, and Jaguar. Felidae species such as the Snow Leopard or the Siberian Tiger are vulnerable to climate change because of their habitats. Snow Leopards live in high-alpine areas above the treeline and Siberian Tigers live in mangroves susceptible to flooding. For Snow Leopards, their Himalayan habitat is at risk because the treeline is predicted to shift but refugia can be seen in China. The Bengal Tiger habitat is facing threats in Bangladesh due to flooding. The Siberian Tiger population will remain constant if habitat conditions stay the same but could go extinct under high climate scenarios. Compared to climate change Jaguars face issues primarily with poaching and deforestation. Regardless of what their largest threat is, large predators are vital to the Earth's ecosystems. They are part of a fully functioning healthy ecosystem.

KIRKHOF CENTER 2259

Overview of Camping in Michigan in 2021

Presenters: Julia Curtis, Brad Reame, Nolan Vander Wall
Mentors: Patty Janes, Sango Otieno

This project involves data collected by the Michigan Department of Natural Resources (DNR) via an online survey sent to overnight visitors at Michigan state parks and campgrounds in 2021. Data analysis identifies factors that are conducive to positive experiences for campers. The findings will assist the DNR in developing key experiential components that result in satisfied campers. Using variables such as age, region, income, and gender, we were able to paint a picture of camping experiences in Michigan's parks. This project is part of the STA419 course designed to provide students with an opportunity to gain experience in statistical consulting.

BEGINNING AT 3:30 P.M.

KIRKHOF CENTER 1104

Comparing Nitrogen, Phosphorous, and E. coli levels in Michigan Surface Waters Between 1998-2018

Presenter: Elizabeth Hudson
Mentor: Griff Griffin

The purpose of this study was to compare E. coli levels to nitrogen and phosphorus in Michigan's surface waters. Escherichia coli is a bacteria found in human and animal waste. It is widely used as an indicator species in surface waters to signal the presence of other pollutants. The presence of elevated nitrogen and phosphorus in surface waters is a known cause of algal blooms which can lead to low dissolved

oxygen levels and fish die offs. The primary source of E. coli in the State of Michigan is agriculture. I expected to find high levels of nitrogen and phosphorus where E. coli also exceeded safe levels due to runoff, where both liquid manure and fertilizers are commonly used. To determine if these variables are linked, I compared land use with water quality measurements that were collected across the state over 20 years. The results suggested that in agricultural areas, there is a strong association between E. coli, nitrogen, and phosphorus. Furthermore, the levels have changed over the 20 years of the testing. These findings reinforce the importance of managing agricultural runoff for the health of Michigan's waters.

KIRKHOF CENTER 2201

Molecular Determination of Branch Angle in Native Tree Species

Presenter: Noah Holkeboer
Mentor: Margaret Dietrich

Tree branch architecture is responsible for a tree's ability to transport water and support its limbs; such architecture is determined by genetic and environmental factors. Branch angle is a key factor in branch strength, an important consideration for both ecological study and practical forestry and agricultural applications. Previously, I contributed to the development of a photo-based technique for quantifying branch architecture to use in models of hydraulic efficiency and structural support. Here, I pursued the coding sequences of two genes involved with regulating branch angle, so as to further understand why species branch differently. *TAC1* is a gene involved in the phototropic response that promotes wide branch angles, while the *LAZY1* gene is involved in the gravitropic response that promotes narrow branch angles. These genes have been studied in cultivated and ornamental trees, but not in native trees. We examined them in seven native species via reverse transcription PCR using degenerate primers and DNA sequencing. Differences between species within protein encoding sequences or expression could explain the difference in branching architecture as previously quantified with our non-destructive method. These sequences also open the door for future research and analysis on the architecture of native tree species.

BEGINNING AT 4:00 P.M.

KIRKHOF CENTER 1104

Dune Erosion, Coastline Erosion, and Vegetation Loss in the Nordhouse Dune Wilderness and Ludington State Park (NRM Capstone Presentation)

Presenter: Zane Leslie
Mentor: Griff Griffin

The objective of this study is to quantify and analyze the changes in vegetation, dune systems, coastline movement, and water levels near Mason County, Michigan, over time. This research is focused on the impact of natural and human-induced processes on the coastal ecosystems of Ludington State Park and the adjacent Nordhouse Dunes Wilderness. Using data collected in ESRI's Wayback Imaging, Google Earth Pro, and Earth Explorer, then processed with ArcGIS Pro, the results show that the shoreline and dune areas have experienced significant erosion over the period of 1985-2022 due to more severe weather patterns and dramatic peaks in water levels, while hikers and beachgoers affected the dune vegetation. This study can inform management efforts in Ludington State Park and can help assist managers in understanding the current impact of hikers.

BEGINNING AT 4:30 P.M.

KIRKHOF CENTER 2201

Let's get Back to Moving; Time to Rebuke the Sedentary Lifestyle that our Educational System is Reinforcing

Presenter: Jessie Webb
Mentor: John Kilbourne

In recent years, as many may have noticed, the emphasis placed on test scores is increasing at escalating rates, while the time dedicated to the physical movement in our schools is diminishing. This is problematic because daily physical movement is a necessity, and with such long school days our educational system needs to place greater value on the incorporation of it. Every child, and every adult has a right to being given time specifically dedicated to physical movement. Every individual should be getting a minimum of 60 minutes a day. With that said, there is growing concern over the sedentary lifestyles in which many Americans are living. Unfortunately though, our educational system is reinforcing this concerning lifestyle. Sedentary lifestyles are really a death sentence, and so those in our educational systems need to evaluate and consider flipping the script in order to rewrite our stories. In this presentation I will detail the importance of including physical movement daily throughout all levels in K-12 by exemplifying how these changes improve an individual's mental health, ability to focus in the classroom, academic performance, and attitude towards school, as well as overall benefits for all students.