

MS-GIST  
 Master Projects Spring 2021  
 Thursday May 10<sup>th</sup> (Livestream via Zoom)

\* There will be 5 minute breaks between each presentation to facilitate transitions in Zoom.

\*\* Zoom links available on a per request basis. Contact: atgrogan@email.arizona.edu

<b>Date/Time</b>	<b>Title</b>	<b>Person *</b>
05/10/2021 1:00 – 1:30 pm	<a href="#"><u>Creating a Secure Data Architecture for the Borderlands Observatory Collaborative Using Arc GIS Hub</u></a>	Warren Bristol
05/10/2021 1:30 – 2:00 pm	<a href="#"><u>Land Suitability Analysis for Wild Pig/Boar Habitat Using Weighted Raster Sum</u></a>	Ian J. Patrick
05/10/2021 2:00 – 2:30 pm	<a href="#"><u>Site Analysis for the Proposed Collection and Reforestation of Karuk Tribal Cultural Assets Using Esri's Geoprocessing Library and Manual Statistical Analysis</u></a>	Nickolaus Hillman
05/10/2021 3:00 – 3:30 pm	<a href="#"><u>The Impact of Proposed F-35 Basing in the Tucson Metropolitan Area</u></a>	Stephen Gelling
05/10/2021 4:00 – 4:30 pm	<a href="#"><u>Using Land Survey Data to Enhance Apache County Parcel Figures</u></a>	Daniel Muth
05/10/2021 5:00 – 5:30 pm	<a href="#"><u>Light pollution in the Tri-Cities, Washington</u></a>	Todd Fisher
05/10/2021 5:30 – 6:00 pm	<a href="#"><u>Roadless Volume Analysis of Yavapai County</u></a>	Christopher McIntyre

## **Creating a Secure Data Architecture for the Borderlands Observatory Collaborative Using Arc GIS Hub**

Warren Bristol

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### **Abstract:**

The Borderlands Observatory Collaborative is a group of advocates, NGOs, and academics that want to promote ethical, horizontal research on border militarization. This collaboration created a digital platform for NGOs, advocacy groups, and academics to communicate their information directly to policymakers and the public. ArcGIS Hub provided an interface to create a user-friendly platform to store, mix, and display spatial and other media and keep data secure for collaborators. It takes untold sums of human effort, technical know-how, people power, and geospatial tools to create datasets used in the region, including datasets regarding humanitarian, social, environmental, as well as ongoing monitoring of border militarization. The purpose of this Master Project is to detail the construction of this Hub site and one case study from the collaborative on mapping the construction and overlooked laws associated with Trump and Bush era border walls. The case study focuses on the collaborative work performed with The Sierra Club utilizing ArcGIS Hub and AGOL tools. This study utilizes Public Participation GIS (PPGIS) feedback from collaborative members to guide the creation of a secure data architecture. This case study explains the techniques used from PPGIS feedback to create a Hub and applies it to construct a border wall AGOL Dashboard. The collaboration in this study is ongoing, but a noted finding from the overall Hub-PPGIS experience was that the highly sensitive nature of the data made the collaborative tend to prefer less centralization and a diffused data sharing platform and power structure for ethical reasons.

### **Key Words:**

Data Architecture, ArcGIS Hub, PPGIS, Border Studies, Data Sharing

## Land Suitability Analysis for Wild Pig/Boar Habitat Using Weighted Raster Sum

Ian J. Patrick

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### **Abstract:**

Land suitability analysis has historically been used to predict faunal habitat locations. Predicting locations allows biologists, hunters, and recreationalists to focus their search area and minimize travel times to areas that are not suitable for habitation. Modern GIS capabilities allow users to overlay weighted rasters containing relevant data for the targeted faunal species. Weighted sum adds the ranked weights of all the input rasters and creates a suitability output. Prior to GIS based analysis, researchers employed statistical analysis which was useful but did not provide a graphical representation for the user. Wild pigs/boar are an invasive species in North America. They are responsible for devastation to many fauna and flora species, altering the geographic landscapes they inhabit by preventing native plant growth which in turns allows invasive flora species to thrive. Modeling in ArcGIS was used in this study to create a workflow allowing the user to enter standardized data for use in a weighted sum model for suitable wild pig habitat. This study focused on San Benito County, California, but could be employed in any geographic region by retrieving the publicly available data necessary for the weighted sum analysis. Field visits and GIS review confirmed the capacity of the workflow and weighted sum model developed in this project for identifying areas of suitable, and less suitable, wild pig habitat in San Benito County.

### **Keywords:**

Land Suitability, Weighted Sum, Raster Analysis, Wild Pig, San Benito County

## **Site Analysis for the Proposed Collection and Reforestation of Karuk Tribal Cultural Assets Using Esri's Geoprocessing Library and Manual Statistical Analysis**

Nickolaus Hillman

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### **Abstract:**

The Slater Fire was one of many devastating fires that left many displaced. With many effected by the events including the Karuk Tribe of Happy Camp California, residents woke that morning to the devastation in progress September 8th, 2020. Combination of un-managed vegetation and high winds aided the utility caused fire that changed this community of both tribal and non-tribal residents. The event burned more than 157,229 acres destroying forests and local housing. Among the vegetation loss, many tribal cultural assets were also lost. Purpose of this project was to identify suitable habitats for both collection of pre-existing cultural assets outside the burn path and identify suitable habitats for these assets to be placed back into where the devastation occurred. Using SRTM raster data and applying a Slope Analysis identified matching degrees in slope from proposed collection sites and mathematically matched them to proposed reforestation locations. Adding the Aspect Analysis to these proposed locations created an accurate suitability match between proposed collection locations and reforestation sites by finding slope average/slope face direction. This analysis applied Python geoprocessing methods and statistical analysis to achieve results. These tools successfully generated a matching site location that was outside the burn path with near matching slope/aspect values of a site that is near within the burn area making the project a success.

### **Keywords:**

Siskiyou County, Karuk Tribe, Wildfire, Slater Fire, Utility Fire, Reforestation.

## The Impact of Proposed F-35 Basing in the Tucson Metropolitan Area

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### **Abstract:**

Noise pollution is a contentious issue in communities near airports and air bases. Concerns that flight activity can have a detrimental effect on property values, quality of life and health animate discussions on airport expansion and aircraft basing. These arguments often revolve around economic development, national security, and the impact of the noise on the public. Vocal opponents tend to be those who are most affected, and the question of basing becomes a binary contest; yes, we do or no, we do not want this aircraft here! Alternately, policy makers address noise pollution in less absolute terms and with more focus placed on managing public attitudes rather than analyzing real risks or hazards. In basic terms, the systems which develop mitigation strategy for addressing noise around major airports base their methodologies on predicting people's level of annoyance. Rather than rely on subjective data, would it not be better to predict actual noise exposure through utilization of real-world data in order to assess its impact on the community? Through this we can estimate exposure from flight paths, traffic patterns, approach and departure corridors and better assess its impact on schools, businesses, and homes.

### **Keywords:**

Sound-Shed, Noise Pollution, Sound Exposure Level, F-35, Tucson

## Using Land Survey Data to Enhance Apache County Parcel Figures

Daniel R. Muth

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### **Abstract:**

Land Surveying has had a historical role in the registering and cataloging land parcel information in the United States since the country's inception. Geographic Information Systems have become the data hub for Counties to manage their cadastre and infrastructure. With the advancements in computer technology, coupled with the advancement in land information systems; geographic information science; and the advances within the surveying profession; there is an opportunity for land surveying data to be used to augment and enhance the location and reliability of land parcel data. Using Global Positioning technology and the National Spatial Reference System; parcels that are surveyed using a published mapping reference system can be directly inserted into a parcel network by coordinates or Computer Aided Drafting drawings. Then used to control the location(s) of neighboring parcels. The result is a spatially relevant and reliable parcel network that is more closely aligned with features identified in aerial photography. The use of survey data can be easily coordinated with the co-operation of County governance and the professional surveying community. Using available tools, technology, and metadata, the enhancement of parcel networks can be realized.

### **Keywords:**

Land Survey, Coordinates, Apache County, Parcel Figures

## Light pollution in the Tri-Cities, Washington

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### **Abstract:**

The technology of artificial nighttime lighting has existed for centuries. A breakthrough occurred in the late 19th century at which time electricity became the power source for artificial lighting. Increased illumination created extended workdays, allowed nighttime recreation, and provided greater safety enhancement. The downside of this technology also generated increasingly disruptive light pollution. Results included health hazards and sleeplessness in humans and altered behavior in the plant and animal kingdom. This project aims to determine the levels of ambient nighttime lighting in the Tri-Cities metropolitan area of South East Washington State. Quantification of the levels are evaluated by the Bortle Scale, providing a standard for the results. The illumination was manually measured via a Unihedron light meter at randomly generated data collection points. This provided an overall portrayal of the lighting levels in the study area. Variation within data collection parameters was minimized. These included collection times, cloud cover, avoidance of full moon cycles, and light meter placement. Statistical analysis captured trending of the metropolitan area lighting data. Results show that different types of lamps influence the levels and intensity of the nighttime illumination. Data collection points that demonstrated higher illumination values were in both industrial and residential areas. Rural areas were minimally present but showed lower illumination values. Improvements in lighting fixtures include illumination shielding, preferred styles, and directional options. Further study may necessitate later collection times, greater number of data points, and increased collection areas.

### **Keywords:**

Light Pollution, Electricity, LED, Incandescent, Tri-Cities

## Roadless Volume Analysis of Yavapai County

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### Abstract:

Standard area calculations do not suffice when determining the amount of space lost when a road is built; the area reduced is related to the size of the road itself. An improved metric, *roadless volume*, can be used to enhance the understanding of this change in space. The effectiveness of *roadless volume* is related to its geometric behavior. A road penetrating to the core of a roadless space leads to the greatest loss of volume. Due to ever-increasing human population and the resulting urbanization, it is imperative to understand how fragmentation of space degrades ecosystems and habitats. While roadless volume does not fully describe this negative relationship, it provides the framework to begin to model it. This analysis examines the *distance to road* and *roadless volume* of Yavapai County from 2010 to 2020 using various road datasets. The calculated roadless volume of Yavapai County in 2019 was 15008 cubic kilometers. Examining roadless volume over time will provide a qualitative and quantitative analysis of how the roadless space is continually fragmented in Yavapai County. Implementation of this metric will provide analysts and transportation managers the tools to determine the loss of space when new roads are built.

### Keywords:

Roadless Volume, Distance to Road, Surface Volume, Transportation, US Census, Yavapai County