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GEOG-585
Final Term Project Writeup
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<div align="center">**Final Term Project Writeup**</div>

I.   Purpose of Project

The primary purpose of my project was to develop an interactive web map that showcases botanical seed collection points across Southern Nevada. This web map is meant to serve as a tool for a range of professionals including field botanists, botany technicians, restoration specialists, and researchers. Each flower icon on the map signifies a historical seed collection point, which provides additional information about the point upon selection including plant family, scientific name, and collection date. The map also incorporates an administrative boundary layer which shares information about the agencies that manage specific areas within the region. The main purpose of this layer was to provide spatial context and land status awareness for its users, specifically field crews who are utilizing the map to determine potential seed collection sites but are limited to specific areas due to permit requirements and agency affiliation. In addition, a marker clustering feature was integrated into the map to allow for dynamic visualization of spatial patterns and density clustering within the collection points. Overall, the map aims to present both historical collection points and their associated information while highlighting density clustering patterns, aiding professionals in their seed collection efforts.

II.   Decision Process for Serving Different Layers

The decision to source basemap tiles from OpenStreetMap was made with the objective of providing a wide range of basemap options for the map's users. Incorporating multiple basemaps was intended to give the users the ability to select the basemap that most aligns with their specific needs. By incorporating multiple basemaps, the web map enhances the user experience by catering to diverse user preferences and various use-case scenarios.

On the other hand, the thematic layers, which includes the botanical seed collection points and land administrative boundaries, were served as GeoJSON layers that were drawn by the browser. This method was chosen due to its faster loading speed, simplicity, and customization capabilities. In contrast to the alternative methods, using JavaScript for symbolizing vector layers and incorporating interactive elements provided a level of flexibility in customization. This resulted in a more seamless, personalized, and responsive user experience.

III.   Reinforcement and Applied Extensions of Course Lessons

My project builds upon and reinforces the principles covered in the course by applying key concepts and techniques learned from the lessons to create a professional web map. Using the Leaflet API, I designed a browser-based web map with interactivity using HTML and JavaScript. I expanded on this by employing GeoJSON to draw the vector layers directly on the client side, resulting in a more dynamic and

responsive web map. Going above the main lessons, I incorporated interactive elements such as marker clustering and a scale bar to enhance the map's functionality. I also modified the map's original extent in order to reduce white space for a more efficient and aesthetically pleasing map. Although unsuccessful, I attempted to incorporate an "edit" feature with the purpose of editing specific point attributes. The main obstacle I encountered when applying this feature was the inability to save the edits after changes were made. For example, the values would revert back to their original state after the modifications were made and the page refreshed. Despite this unsuccessful attempt, I hope to continue working on finding a solution that will allow for the successful implementation of this edit feature. Overall, my project combines course knowledge with advanced techniques to create a functional, user-friendly web map.
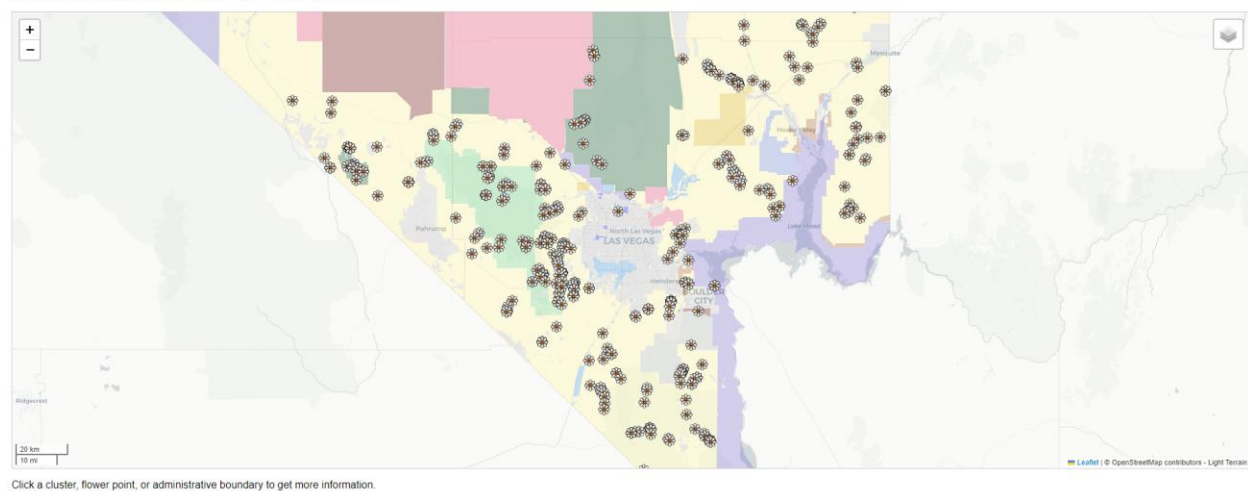

Figure 1: Final web map

IV.   Most Valuable Lessons Learned for Professional or Academic Career

One key takeaway from this course that will significantly benefit my professional and academic career is learning how to set up and use GeoServer to create dynamic web services. As a free and open-source program that adheres to standardized formats such as WMS, GeoServer allows for the sharing of data from a variety of sources and provides accessibility, customization, and interoperability. This enhances the program's effectiveness by enabling its integration with various tools and applications, making it a valuable skill to have. Another valuable lesson I gathered from this course involved learning how to construct tiled maps using QGIS and hosting them on Amazon S3 storage. The hands-on experience using Amazon AWS for storing geospatial data offered practical insights into cloud services and provided a real-world understanding of their functionality and associated costs. Finally, learning the Leaflet API proved immensely valuable as it provided a lightweight and beginner-friendly introduction to web mapping. Leaflet's simple and user-friendly design and online resources allowed for quick learning of web mapping concepts. Leaflet is widely used and adopted by many agencies and organizations, and learning Leaflet has increased my proficiency and confidence when creating interactive and visually appealing maps, both professionally and academically.

Link to Final Web Map:

https://geog585-psu2023.s3.us-west-
1.amazonaws.com/Geog+585+Final+Term+Project/finalproject.html