

Yavapai County Gold Mine Museum Recommendations

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Statement of Problem

The problem I have selected is the business decision support option where the Arizona Department of Tourism is seeking to build a museum that honors the rich history of gold mining in Yavapai County, Arizona. I have chosen this topic because I am interested in the tourism industry and was just in Yavapai County in December 2020 for vacation. As a future data analyst, I will have a more than likely be working for a company where I will assist in the decision-making process based upon the data I will analyze. For this project, I will provide a map of site recommendations that depicts all eligible land. I will use ArcGIS to find three potential sites based upon historical and logistical requests. Since the requests includes site recommendations within one mile of a historic or active gold mine and within three miles of a large retail store, I will use range rings to quickly locate potential sites. By sorting land ownership by color, I will be able to see the difference between federal land, private land, and American Indian reservation land. The last requirement I will look if it is not extremely obvious in the beginning is making sure the site recommendation is within 500 feet of a roadway. The map will only include Yavapai County since no other Arizona counties matter in the analytical and decision-making process. This will be possible by exporting only Yavapai County via an SQL query. I will be including various types of vector data such as lines (roads), polygons (county, land use), and points (cities and buildings) (Price, 2019). Data manipulation and analysis will be conducted using ArcMap and ArcCatalog because not all the data provided will be relevant to the project. By using color and symbology, I will apply basic cartographic design best practices and principles. The sites I find to be eligible based on the criteria given will be

ranked in an order and provided back for Arizona Department of Tourism to make a final informed decision on the best location for the new gold mining museum.

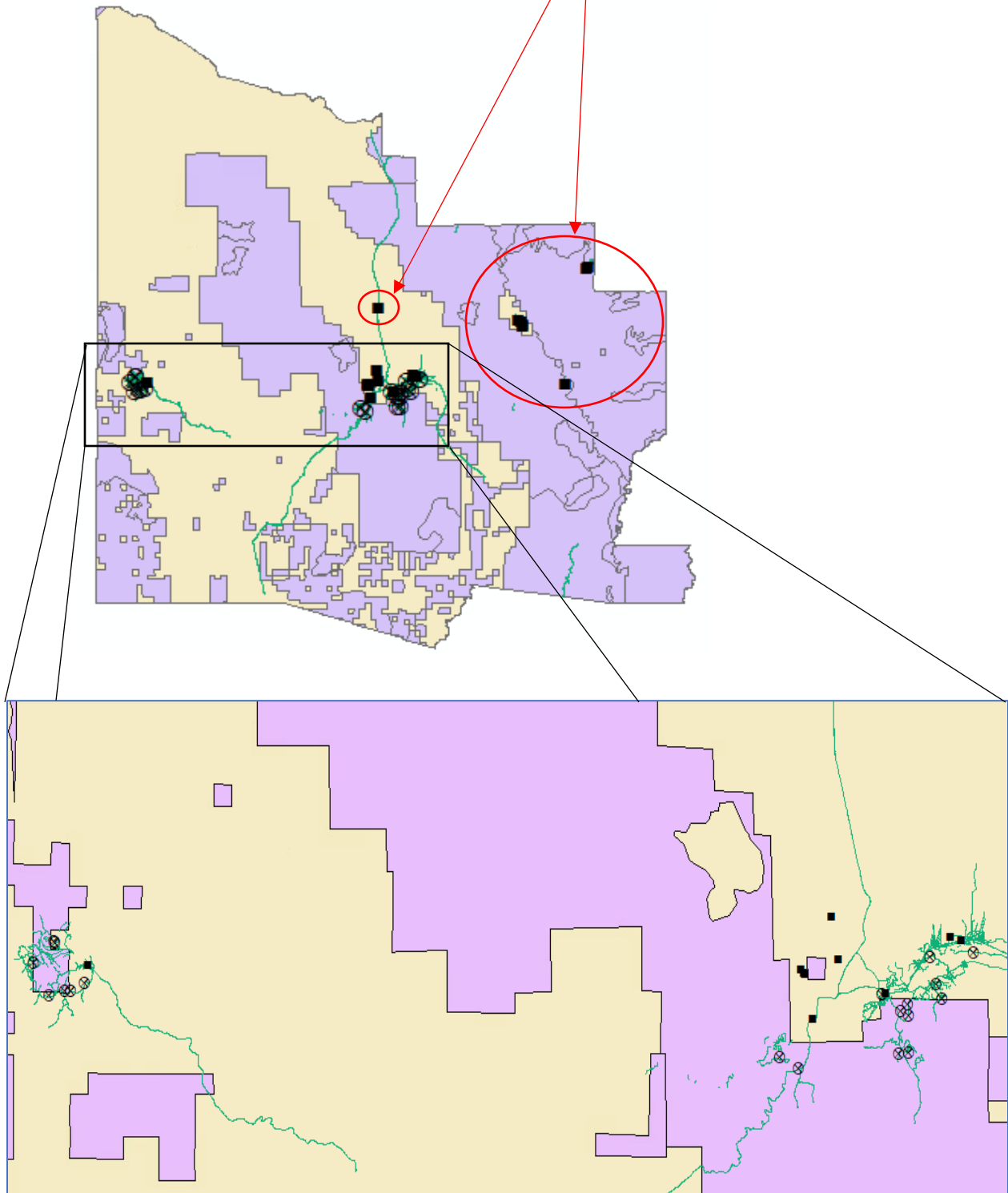
Data

There are various spatial databases containing vector data used together and form the final three suggestions for a new gold mining museum. The first database I loaded into ArcMap was for Arizona Counties. This project is specific to only Yavapai County, Arizona, so I figured it would be best to start by figuring out the exact location of the county in Arizona. I selected on Yavapai County and used it as a cookie cutter for the clip tool to cut down on the amount of data I had at my disposal. The three recommended museum locations must be within one mile of a historic or active mine that at one point mined gold. To locate a mine acceptable to use for this project, I loaded the Mines database into ArcMap. Another requirement is for the museum recommendation site be located within three miles of a large retail store such as Walmart, Basha's, or Safeway, not be on a Native American Reservation, be located on federally owned land, and must be within 500 feet of a paved roadway. To figure out the recommended locations I also had to load in the Arizona business database, roads database, reservations database, and federal lands database. There were multiple ways I was able to organize the data and really figure out what was needed and what was just taking up extra space. To clear the data picture up and make it easier to view, I had selected Yavapai County and made it into a shapefile. I used the shapefile to clip the data from the above-mentioned databases to make sure everything was only inside Yavapai County. I went through and selected the various large retail stores in Yavapai County. The stores I chose due to being larger in size were Basha's, Safeway, Walmart, Fry's, and Trader Joes, which gave me a total of 18 retail locations. I was also able to use the Select By Location feature to select all mines within four miles of the large retail stores. I decided to go

with four miles since the museum recommendation can be within three miles of the retail store and one of a mine, but that does not mean the mine is necessarily within the three-mile range of the retail store. After narrowing down mine location's, I narrowed them down even further by selecting only mines that had an attribute which showed it had been used for gold mining at some point in time. I also decided to narrow down the roads database by selecting all roads within one mile of the previously selected mines. I decided to use a mile because the site can be within 500 feet of a paved roadway and still be within the mile range requirement of a mine. I will finish refining the sites by ensuring each site recommendation is within 500 feet of a paved roadway once it meets all other requirements. The use of queries helped to quickly sort through the data to select the specific data I was looking for. A good example was for selecting all the mines that had been used for gold mining at some point in time. Instead of manually going through and selecting all mines that had the gold commodity, I was able to use a query instead. The data provided is very reliable based upon the provided sources in the database descriptions. The mines data set was derived from the Bureau of Mines Minerals Availability System, the roads data set came from the Arizona Transportation Information System, and the business data was provided by ESRI through commercial data analytics company Dun and Bradstreet.

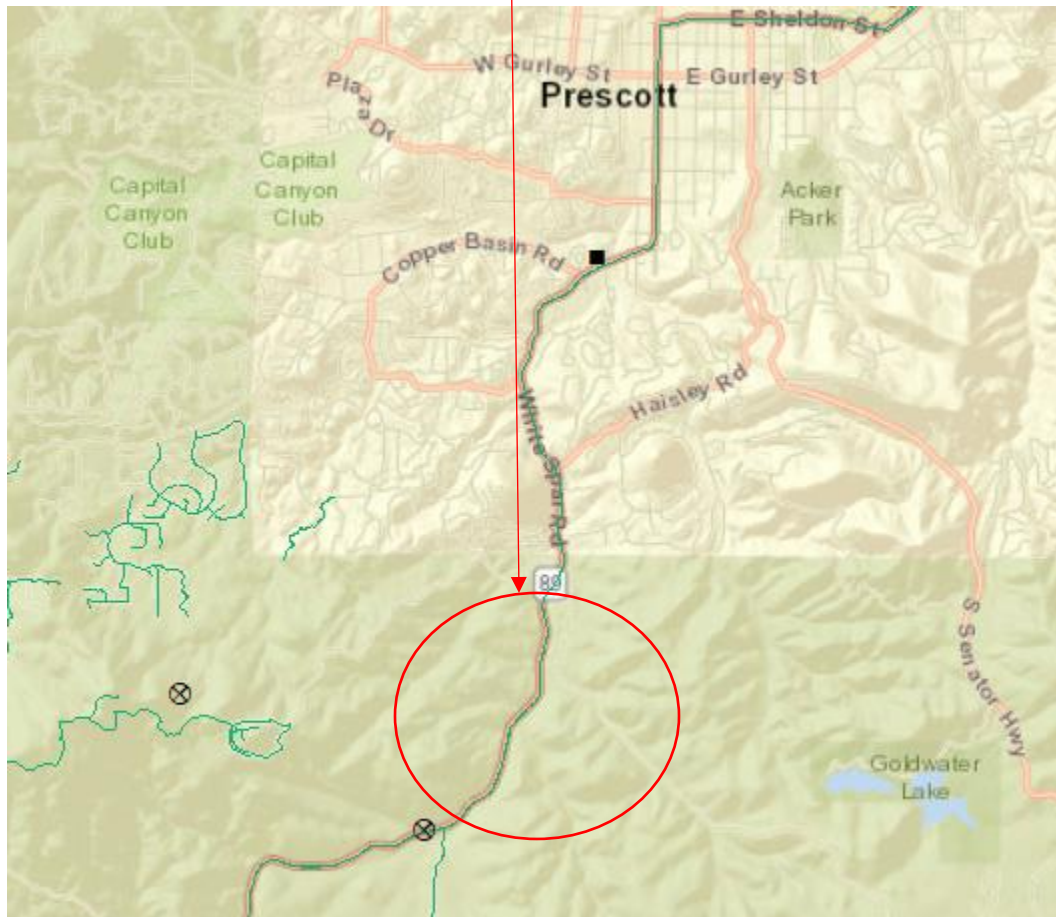
Below is a clip which shows some of the data after being cut and organized to better analyze three recommendations to be made for a gold mining museum. The tan area is Yavapai County and overlaid on top of the Yavapai County layer are purple sections which represent federal land. The black squares are the large retail stores, the circles with an X are gold mines, and the green lines are roads. The second clip will be more zoomed in making the area easier to look at and become more visually appealing.

There are no mines around these large retail stores, so I know I cannot use them for any of my recommendations.



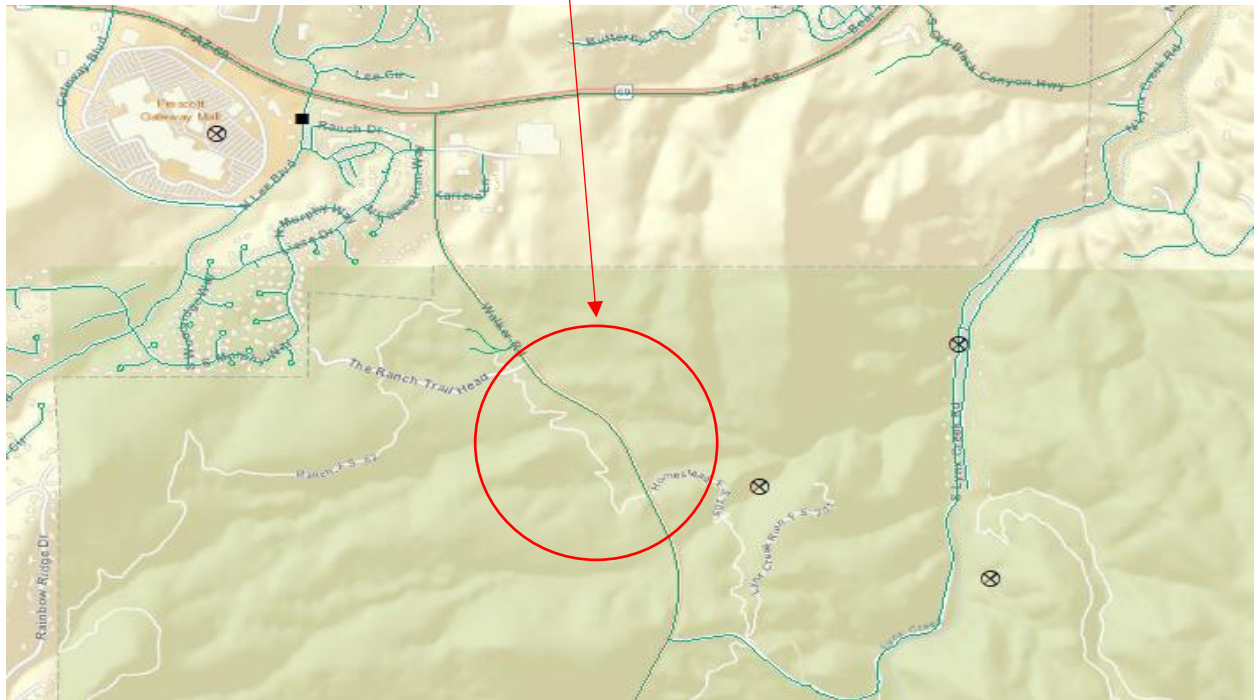
Based upon data organization as mentioned above, I was able to quickly narrow down my search for three site recommendations that appeared to fit all the requested requirements.

One recommendation general location:



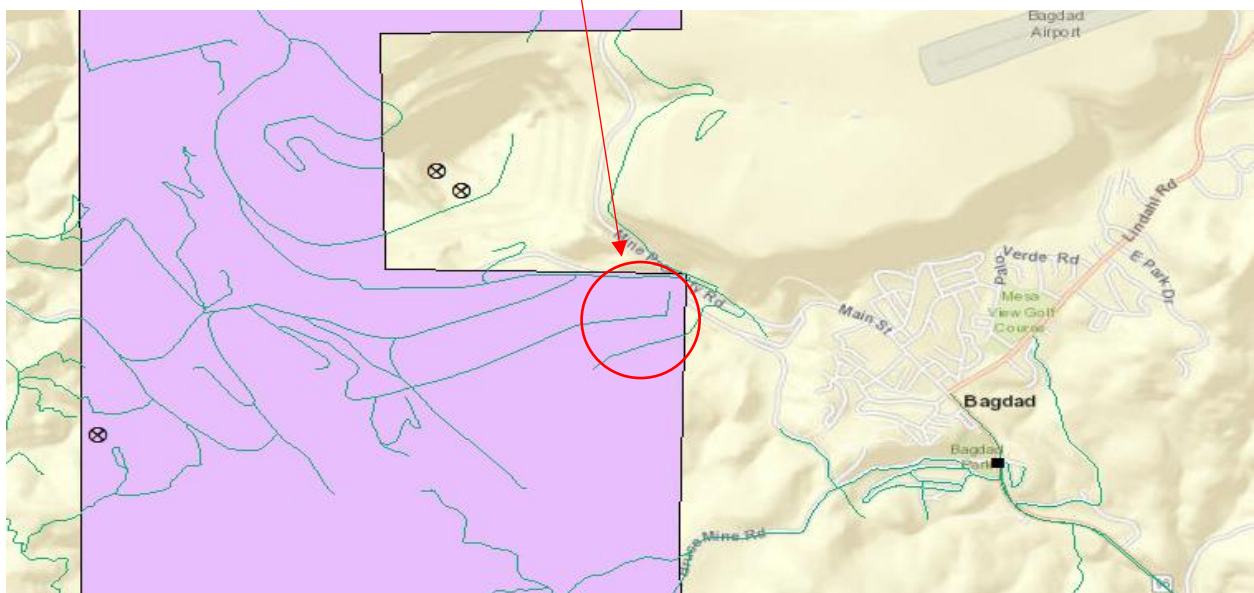
*The darker green color on the map is federal land.

Another recommendation general location:



*The darker green color on the map is federal land.

Possible recommendation general location:



*The purple color on the map is federal land.

Methodologies

Overall, the data processing and scrubbing methods I used were simple to go through and figure out. I first started by reviewing the requirements needed for each site recommendation. The three recommended museum locations must be within one mile of a historic or active mine that at one point mined gold. To locate a mine acceptable to use for this project, I loaded the Mines database into ArcMap. Another requirement is for the museum recommendation site be located within three miles of a large retail store such as Walmart, Basha's, or Safeway, not be on a Native American Reservation, be located on federally owned land, and must be within 500 feet of a paved roadway. To figure out the recommended locations I also had to load in the Arizona business database, roads database, reservations database, and federal lands database.

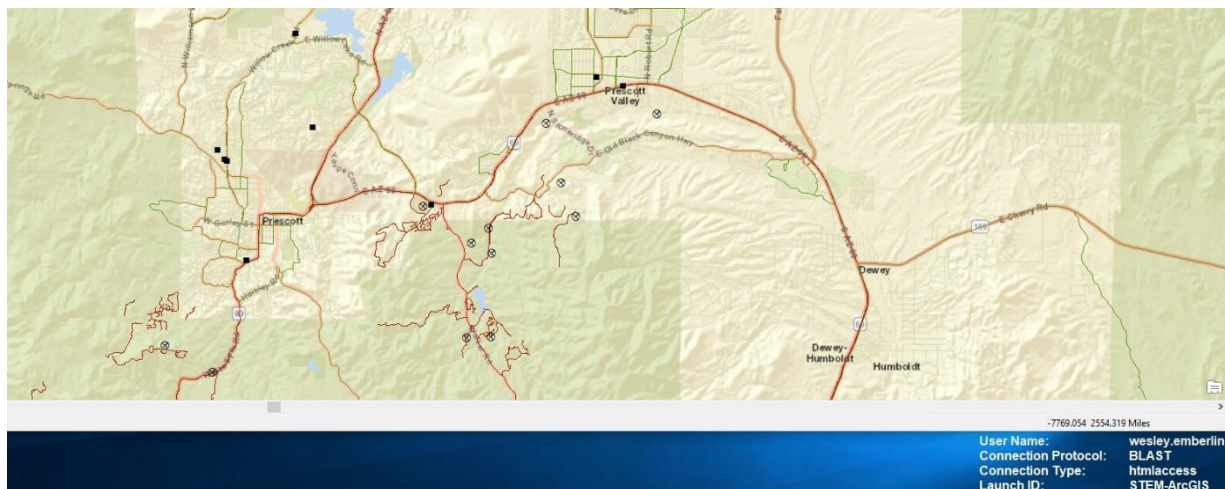
There were multiple ways I was able to organize the data and really figure out what was needed and what was just taking up extra space. To clear the data picture up and make it easier to view, I had selected the Yavapai County shapefile and used it to clip the data from the above-mentioned databases to make sure everything was only inside Yavapai County. I went through and selected the various large retail stores in Yavapai County as mentioned earlier in this paper. The retail stores I chose due to being larger in size were Basha's, Safeway, Walmart, Fry's, and Trader Joes, which gave me a total of 18 retail locations across Yavapai County. I used the Select By Location feature to select all mines within four miles of the large retail stores. After narrowing down mine location's, I narrowed them down even further by selecting only mines that had an attribute which showed it had been used for gold mining at some point in time. I narrowed down the roads database by selecting all roads within one mile of the previously selected mines. The use of queries helped to quickly sort through the data to select the specific data I was looking for. A good example was for selecting all the mines that had been used for

gold mining at some point in time. Instead of manually going through and selecting all mines that had the gold commodity, I was able to use a query instead. One of the last datasets I viewed was the Reservations dataset which showed locations of Native American Reservations. There were only three reservations in Yavapai County, and none were close to the areas I had narrowed down from my data processing mentioned above. There were multiple important datasets I used for this project. Roads, Businesses, Mines, Land Ownership, Federal Land and Reservations. I also used the World Street Map as a base-map for viewing the data frame. I was able to use the business dataset to locate large retail stores and the mines dataset to locate mines that were specifically used for gold mining.

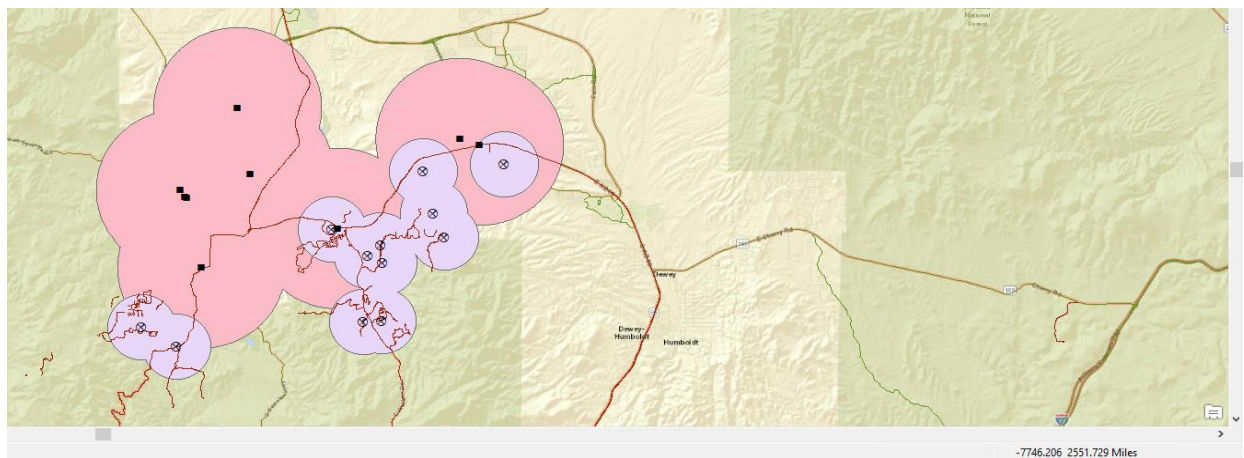
The Geoprocessing tools came in handy. I heavily relied on the Clip and Intersect tools along with the Multiple Ring Buffer Analysis tool. The first Geoprocessing tool I used was the Clip tool to help narrow down data. From the Counties dataset, I selected on Yavapai County and used it as a cookie cutter for the clip tool to cut down on the amount of data I had at my disposal. I used the Yavapai County clip on all other datasets since everything outside of Yavapai County was useless to me for this specific project. Once I had located large retail stores and gold mines within four miles of each other, I used the Multiple Ring Buffer Analysis tool to create a range ring around each one. For the large retail stores, I made the ring be three miles out and for the gold mines I made the ring be one mile out. Once I had the range rings at my disposal, I added in the federal land dataset. I then used the Intersect tool to create a dataset layer which showed where both sets of range rings intersected with each other and federal land. By doing so, I could quickly find a site recommendation area that meets all the requirements needed by just looking at the data frame. For adding my site recommendations to the map, I created a .CSV file with the latitude and longitude for the sites. I was unable to use the area in Bagdad, Arizona which I had

originally believed would have been a good place for a site recommendation. At first when going through the data, it appeared meet the requirements until I looked more in depth at land ownership and discovered there was no way for a site recommendation in the area to meet all of the needed requirements. There was not a paved road within 500 feet that I could find within the buffer that was not on the property owned by the mine which was secured behind a guarded access point. The recommended sites are observed in some of the screenshots below. See labeled screenshots below for my examples.

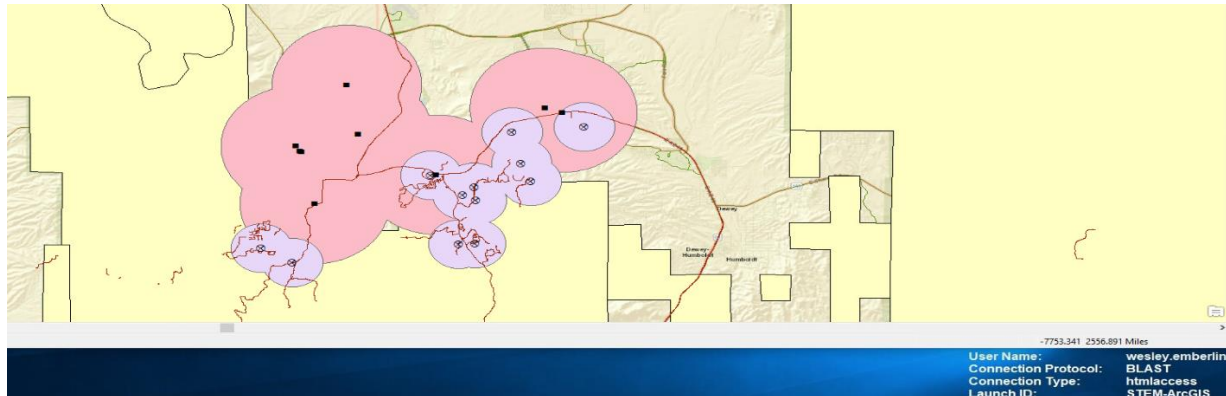
Pre-buffer showing just large retail stores (black squares) and gold mines (circles with an x through it):



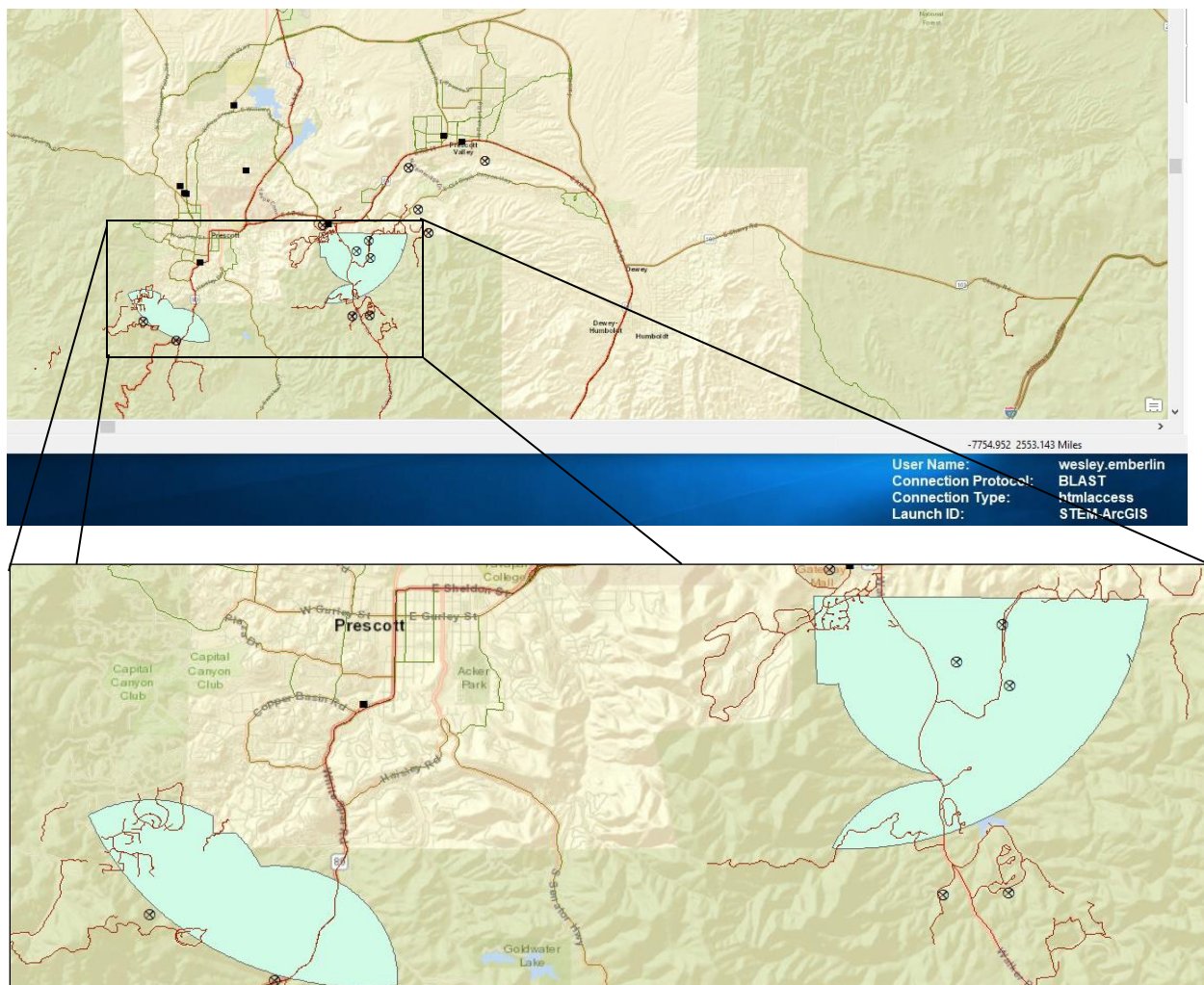
With range rings added (3 miles for stores (red) and 1 mile for gold mines(purple)):



Buffers with Federal Land data layer (yellow) added:

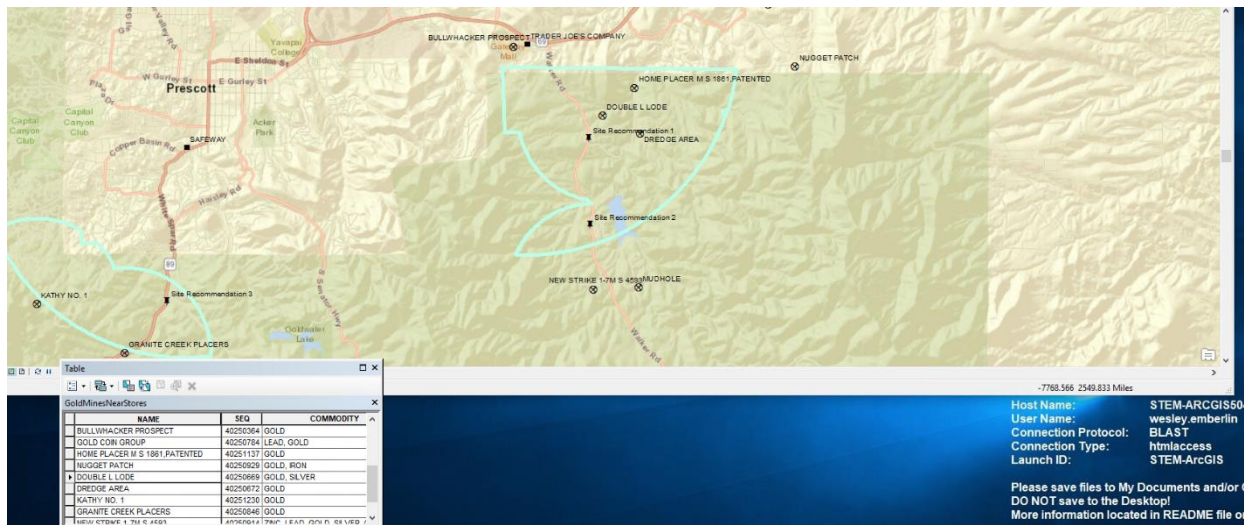


Finally, all three combined using the Intersect tool (bluish-green color):



For symbols, I used a circle with an X in the middle for gold mines (X marks the spot). For the large retail stores, I felt a large box would be appropriate since they are large box stores. For my site recommendations, I used a pushpin symbol to help them stand out from everything else. The symbols can be observed on the screenshot below along with the final maps at the end of the project.

Photo showing all recommended sites are within the buffer intersect:



Conclusion

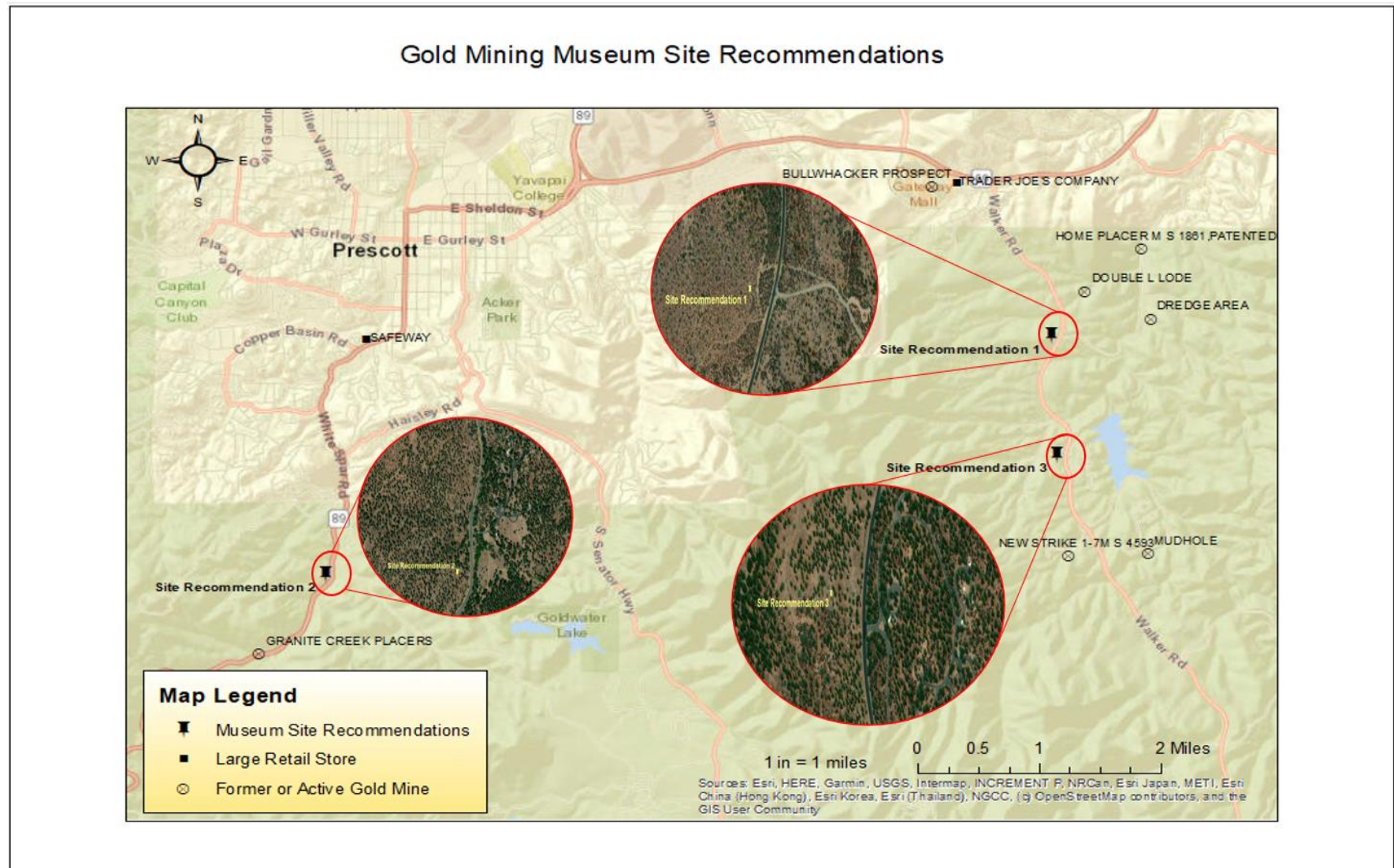
I decided the different site recommendations based upon what I felt like would be best upon the surroundings. Site one was chosen because it has the most gold mining sites within one mile of it and is not only less than three miles from a large retail store (Trader Joe's), but also a shopping mall and a recently built Costco. Site one is also right next to the Lynx Creek Gold Pan Day Use Area which is neat due to customers being able to go pan for gold after visiting the museum. Site two was chosen due to its location being closest to the main city area of Prescott and being directly off a major state highway. Site two is also directly across the street from a camping ground. Site three was chosen last due to it being the furthest from a retail store and the urban area of Prescott. Site three is however conveniently located directly across from a large campground, a recreational lake, and directly down the road from the Highlands Center for Natural History. All site recommendations are located on federally owned land apart of the Prescott National Forest. The museum can be built within the national forest through a Special Use Permit with Prescott National Forest just like the Highlands Center for Natural History.

To enhance the maps, I added a base layer which makes the map much more appealing to the user. The base-map shows cities and roads with labels that make it much easier to view other data on top of the base layer. I added a distance scale to the map to make it easy for viewers to get an idea about how far objects are from each other. Another key feature to making the map easier to view was to add a map legend. The legend shows what the different symbols mean such as a gold mine or a large retail store. You also cannot go wrong with adding in a compass. When looking at a map it is always a good idea to know which direction is at which angle. The last important element for a good map is having a title so the user knows what they are looking at.

Reference

Price, M. H. (2019). Mastering ArcGIS.

Final Site Recommendations Map:



Final Eligible Land Map:

Gold Mining Museum Site Recommendations

