September 25th 2015   Jordan (Yu-Lin) Wang

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Introduction and Goal:

In this lab, the previous GIS skill sets we learned from geography 222 are being reviewed and refreshed in this assignment. These techniques are being used to help us identify and understand the model. We will be using the habitat data from the Foothills Model Forest in Alberta to examine the data projection issues and improve on our query skills. This lab provides us with data and movements for the grizzly bear that is living in the areas around the Jasper National Park. The objective of this assignment is to use the provided data and information to indicate three risk factors that may have led to the grizzly bear death by poachers.

Data:

There are eight data files provided for this lab for the Foothills Model Forest and are as followed; wells, roads, streams, trails, fires, jasper, g020_99, and g020_99arc. The wells file shows the point location of where the wells are located on the map. The roads file and trails file presents the web of open roads and trails that are publicly accessible. Streams file presents the river channel system that is spread out around the Jasper park region. The fires file shows the area that had been previously burned down by fire. G020_99 file shows the point locations of the bear during 1999 and the g020_99arc file presents the movement of the bear during the period from June to November. The wells file and g020_99 file are presented using the points vector data files. There are four line vector data files presented and they are streams, roads, trails, and g020_99arc files. The two polygon vector files given are the fires file and the Jasper national park file.

Method:

First, we can start by understanding the data files that were presented for the labs. Using the attribute table, it allows us to examine the information provided by each vector data files. After understanding the information we are working with, start gathering the proven research about the grizzly bear behavior.

Risk Factor1- The proven information we found provided us with knowledge that the bear prefer the shrubs located in the younger growth forest.(Zager,P.1983) By looking at the attribute table we can notice that the most recent fire occurred in 1997 and is the perfect condition for shrubs growth. We can use select by attributes tool to locate the 1997 fire, putting "fire" as the layer and entering the query of ["YEAR_"=1997]. After, use select by location tool to find out the bear's position that are within 100m of this 1997 fire; select g020_99 as target layer, 1997 fire as source layer, select 100m within a distance, and export data into new layer "bear within 100m 1997fire". Finally, we narrow down these locations down to the spots that are within 500m of roads by the help of select by location tool; select the new layer created as target layer, roads as the source layer, use 500m within a distance and export data to new layer. (Benn,B.2002) Theses locations have a high chance of poaching happening.

Risk Factor 2- The information we gathered shows us that the bear favour the stream as a food resource during fall season due to the salmon spawn.(Olsen,T.1996) First we use select by location to locate the positions of bear within 200m of river; select g020_99 as target layer, use streams as source layer, choose

200m within a distance, and export data into new layer "bear within 200m river". After, from this new layer, we can figure out the positions during fall season by using select by attributes tool; The layer used is "bear within 200m river" and enter the following query: MONTH_">8 AND "MONTH_"<12. Once complete, export the data into new layer once again "bear within 200m river (fall)". Last, we narrow down these locations down to the spots that are within 500m of roads by the help of select by location tool; select the new layer created as target layer, roads as the source layer, use 500m within a distance and export data to new layer.

    Risk Factor 3- The two previous risk factors allow us to understand the most favourable locations at the shrubs and the streams for food resource. We can determine the routes that intersects the roads that are being used to travel between streams and shrubs. These routes can be found by using select by locations tool; by selecting g020_99arc as target layer, roads as the source layer, and choose intersecting. Export the selected data into a new layer "routes". We can narrow down these routes by the using select by locations tool to locate the routes that are touching streams; select the "routes" as the target layer, "within 200m river (fall) and within 500m road"(from factor 2) as the source layer and choose touching boundary. Export the new selected data into another new layer as "stream route". After, perform the select by locations once again to locate the "stream route" that are also touching the shrubs; select "stream route" as the target layer, select "within 500m road within 100m 1997 fire" as source layer and choose touching boundary. Finally, export these data as "route crossing road between shrubs and streams". By performing these steps, we can locate the section of the roads that has the highest chance of bear sighting. This can be done by using select by locations with "route crossing road between shrubs and streams" as the target layer, use "roads" as source layer, and choose by intersecting.

Results:

    The 3 different risk factors of bear poaching are shown using the 3 map figures that is attached to the back of this report. The 3 factors taken into accounts are produced from taking all the data files into consideration.

Discussion:

    1st risk factor(figure.1)- This risk factor is taking consideration of the grizzly bear favorable habitat and to the open roads. Open roads that are located close to the bear's favorable habitat can increase the potential of poaching.(McLellen,B.1988) The favorable habitat for the grizzly bears are shrubs and old burns, which provide them with food supplies.(Zager,P.1983) These areas are available after the disturbance of fire; the condition after fire favours the growing habitat for shrubs and old burns.(Zager,P.1983) Research shows "continued fire suppression will...result in declining food production on these sites" and "mature forests... production...of important food plants is relatively low."(Zager,P.1983) The information listed above indicates bear likes area that had recently been burned by fire because of the shrubs. Locating the most recent fire (1997) allows the observer to indicate the bear's most favorable habitat due to its freshly grown shrubs. From this information, it allows us to locate the bear's favor locations that are located within 500meters of the roads. The highest mortalities occurred in locations within 500m of roads or 200m of trails. (Benn,B.2002) These locations have a high percentage of the potential poaching occurring.

2nd risk factor(figure.2)- The second risk factor is considering the streams (bear's hunting ground) that are within 500m of roads, these could be potential poaching grounds. Salmons are one of the main food source for the grizzly bear.(Olsen,T.1996)These fish are only available to the stream system during fall time due to it's nature spawn time.(Olsen,T.1996) By knowing these information we can narrow down the bear's favour hunting stream locations. Using the select by location option, it allows us to identify the bear location that are within 200m of river; "bear within 200m river". This is a necessity due to identifying the bear locations that are interacting with the streams. After, we can use the select by attribute option to narrow down the "bear within 200m river" locations to only the locations that were recorded during the fall period. This is influenced by the salmon spawn season time.(Olsen,T.1996) These vector points show the most frequent hunting location for the bears during fall period; "bear within 200m river (fall)". We can narrow these locations even further down to the spots that are located within 500m of roads. As mentioned before, the mortalities rates are highest within 500m of roads.(Benn,B.2002) With that being said, the locations of "bear within 200m river(fall) within 500m road" have the highest potential of poaching activities and should be consider as a risk factor.

3rd risk factor(figure.3)- The g020_99arc line file presents the movement routes of the grizzly bear in this region. From Figure 1, it establishes the bear's favour fire locations based from its favour food source/habitat, shrubs.(Zager,P.1983) From Figure 2, it presents us with the locations of the favourable hunting spots within 200m of the river and during the fall period.(Olsen,T.1996) The two figures each present an important food source/habitat for the grizzly bear. By connecting the movement routes of the grizzly bear between the stream locations(salmons) and the 1997 fire location(shrubs), we can identify the routes that are crossing through the roads. From the identification of these routes, we can locate the area of the road that has a high chance of bear sighting. "Roads increase access for hunters and poachers," these roads is a high risk potential of bear poaching.(McLellen,B.1988)

Conclusion:

Based on the provided vector files, we are able to create three figures that indicates the three possible risk factors of poaching (figures attached on the back). Figure 1, presents the number 1 risk factor of the bear locations that are in 1997 fire area and are within 500m of road. The 1997 fire area favour the shrub growth, which is a main source of bear's food/habitat.(Zager,P.1983) As a result, the roads that are within 500m of these locations could be a potential poaching ground.(Benn,B.2002) Figure 2, shows the risk factor 2 of the bear location along the streams during fall. Fall period is the salmon spawn season, which is another main source of food for the bear.(Olsen,T.1996) The roads within 500m of these locations can have a high chance of poaching occurring.(Benn,B.2002) Figure 3, presents the road section with the high chance of bear crossing. This information is derived from the previous two factors. By locating the routes between the 1997 fire locations and fall stream locations we can determine the roads with highest bear sighting and also highest potential poaching.(McLellen,B.1988)

References:

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