GEOB 270 - Final Project Report

An Analysis of the Skeena Queen Charlotte ALR Land

Mana Hashimoto- 32472136 (Lab Section L1D)
Rachel Maj- 42204131 (Lab Section L1B)
Claire Shepansky- 39731138 (Lab Section L1D)
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Executive Summary

The Agricultural Land Reserves (ALR) of British Columbia is high quality agricultural land preservation data that represents the regions where the land is best suited for agriculture. However, with urban sprawl, these valuable lands for food security are increasingly in competition with non-agricultural land uses such as new buildings and golf courses. Furthermore, due its fragmentary administrative structure whereby the ALR is managed by localized policies, the ALR region is subject to different management procedures which results in discrepancies between the area reported in the ALR Report, and the actual land available for agricultural production (Geography Open Textbook Collective, 2014, Case Study 1).

In this report, focusing on the Skeena Queen Charlotte sub-panel region (see map 0 and map1), we utilized GIS analysis methods to investigate the *actual* land available for agriculture uses of the proposed ALR area with consideration to biogeographical (land cover type, water features, soil types, elevations), and social (roads, parks, golf courses, non-farm uses) uses, as well as demographic patterns of the region.

Our results are as follows:

- Biogeographical:
    - There are 12 different land cover types: Agriculture, barren surfaces, estuaries, fresh water, old forest, recently logged, salt water, selectively logged, sub alpine avalanche chutes, urban, wetlands, and young forest.
    - Sum area of buffered water features: 1760.24 ha, taking up 4.08% of ALR land
    - Soil types: 2,3,4,5,7
    - 7.30% of ALR land is Class 7 soils which are unsuitable for agriculture
    - 0.12% of ALR land is land above 30 m slope (unsuitable for agriculture)
- Social:
    - 6 types of roads in ALR region (3 types of gravel roads, overgrown road, paved road, rough road)
    - Sum Area of Roads with 10m buffer: 372.30 ha, accounting for 0.86% of total ALR land.
    - No federal or municipal parks, only two provincial parks that account for 6.76% of the total ALR land.
    - No golf courses in project subpanel region.

Our final results thus reveal, the the profound discrepancies between current ALR land and actual viable agricultural land in the Skeena Queen Charlotte Regional District. The Skeena Queen Charlotte ALR area is published at 43,189.79 hectares but our findings reveal a more accurate sum of viable farmland that is 35,341.68 hectares.

Introduction

Important political decisions surrounding the ALR in British Columbia are currently misinformed as there are many issues with the data related to the ALR. There are many instances where the improper ALR area is stated and in many cases where land that is counted as ALR and in actuality is not being used for agricultural purposes. The goal of this project is to clear up inaccuracy related to data in the ALR with the goal of gathering more correct data about the agricultural land and its current uses. This in-depth analysis can be used to help policy makers become more aware and knowledgeable about the ALR. The area this report focuses on is the Skeena Queen Charlotte regional district located on the coast of British Columbia. The industry in this region is largely focused on forestry and fishing, as well as recent developments in natural gas. The Skeena Queen Charlotte district is also a popular tourist destination, well known for its abundant natural beauty. The area is currently developing, posing a threat to the small amount of agricultural land in the area.. In addition, it appears that much of the land has poor soil or is heavily forested factors that make it seemingly unsuitable for agricultural purposes. In this report, we reveal using GIS analysis techniques and data from reliable sources that current reported estimates for the ALR in the Skeena Queen Charlotte region are inaccurate. This report documents the steps taken to complete our analysis with a map to showcase each of the threats discovered and their effect on the ALR. We then eliminate these areas inappropriate for farming and create a map to reveal how much ALR actually remains in the area.

Body of Report

Overview

1. Our project area was the ALR land in the Skeena Queen Charlotte census district. Through our analysis we found that the total agricultural land was 43,189.79 hectares. This number was calculated by examining the attribute table of the Skeena Queen Charlotte ALR land layer for the sum area of land of our shapefile and by looking to census Canada for the jurisdictional land area of the Skeena Queen Charlotte Regional district. To calculate the percentage, the total ALR land area was divided by the jurisdictional land area. It was found that only 2.18% of the Skeena Queen Charlotte regional district is ALR land.

   Calculations:
   Skeena Queen Charlotte ALR land - 43,189.79 hectares
   Skeena Queen Charlotte Census District -1,978,146 hectares

   $$\frac{\textit{Sum Area of ALR land}}{\textit{Census district}} \times 100 = \frac{43{,}189.79\ ha}{1{,}978{,}146\ ha} \times 100 = 0.0218 \times 100 = 2.18\%$$

2. See appendix for Map 1 that shows the ALR land in the Skeena Queen Charlotte Regional District.

Biogeographical

1. It was discovered that the Skeena Queen Charlotte ALR land is comprised of 12 different land cover types. It was found that an overwhelming majority of the land cover type in this region is forests, with 39.5% of the ALR land being old growth forests and 38.7% being young forests for a total of 78.2%. Furthermore, this land cover analysis also showed that the region has seen significant logging with 14.8% of the region having been recently logged. In terms of other notable land cover types for this project only 0.7% of the region was recorded as being agricultural land and only 0.7% was recorded as being urban. This analysis was done by summarizing the attribute table for the land classification layer, then dividing each land type sum area by the total ALR land area, and multiplying that number by 100% in order to get the percentage of the ALR land.

$$\frac{\textit{Sum Area of land cover type}}{\textit{Project area}} \times 100 = \text{ percentage of ALR}$$

Land Cover Types	**Sum Area (ha)**	**Percentage of ALR**
Agriculture	302.05	0.7%
Barren Surfaces	222.23	0.5%
Estuaries	171.50	0.3%
Fresh Water	373.72	0.9%
Old Forest	17, 074.52	39.5%
Recently Logged	6, 409.79	14.8%
Salt Water	141.99	0.3%
Selectively Logged	2.92	0.007%
Sub Alpine Avalanche Chutes	0.17	0.0004%
Urban	286.12	0.7%
Wetlands	1, 473.67	3.4%
Young Forest	16, 731.12	38.7%

2. See appendix for Map 2 that shows the land cover types.

3. An important step in analysing our ALR land was to examine how much of the land surface in our subpanel shapefile was actually water, including river and lakes. In order to complete this analysis we used TRIM data published by the Government of BC. The data we needed came in five TRIM tiles so we first merged the tiles together. Both the rivers and lakes data was represented with lines, but in order to calculate the area of lakes we had to convert the feature to polygons. Next, in order to calculate the area we had to buffer rivers and lakes by ten meters because the area differently adjacent is important riparian habitat. Finally the rivers, lakes and corresponding buffers had to be clipped to the project area. It was found that the water features (with a 10 meter buffer) in our area totalled 1760.24 hectares, and took up 4.08% of the ALR land.

   Calculations:
   Buffered water features: 1760.24 hectares
   Skeena Queen Charlotte ALR land: 43 189.79 hectares

$$\frac{\textit{Sum Area of water features}}{\textit{Project area}} \times 100 = \frac{1760.24\ ha}{43{,}189.79\ ha} \times 100 = 0.0408\% \times 100 = 4.08\%$$

4. The ALR writes "Not all agricultural lands are created equal and not all agricultural land are capable or suitable for producing all agricultural products… [and] the main limiting factors in British Columbia are climate and topography". In light of this it is important to examine the soil classification types in our ALR area to see where the most productive lands are. The land capability classification system identifies seven land capacity classes with one being the most productive with minimal limitations and seven being considered non arable with no potential to grow agriculture. In our ALR subpanel region is comprised of five classes of soils (2,3,4,5,7), and we note that there is no type 1 soil in our region. Our ALR land consisted of 48.7% class 4 which is classified as land that has "limitations that require special management practices or severely restrict the range of crops or both". While our ALR area had no class 1 types, 7% is considered class 2. It is important to note that not all of our ALR land was classified. The percentage of ALR land that is classified in our region is 88%.

Soil Types	**Sum Area (ha)**	**Percentage of ALR**
2	3031.36	7.0%
3	3599.19	8.3%
4	21024.60	48.7%
5	7836.99	18.1%
7	3153.10	7.3%

5. See appendix for Map 3 that shows the soil classifications and water features.

6. The next biogeographical aspect we analysed was the slope of ALR land in our subpanel region. The slope of land is relevant because agriculture can not grow on slopes steeper than 30 degrees. In order to calculate how much land was 30 degrees or steeper we first obtained DEM panels and mosaiced them together. They were then converted from elevation to slope and were reclassified into two classes, 0-30 degrees and 30 - 75 degrees. The slope raster was then converted to a polygon. We were now able to examine the area below and above thirty degrees. It was found that 43,139.89 hectares were below 30 degrees and 49.90 hectares were between 30 degrees and 75 degrees. The slope of our ALR land is almost completely between 0 - 30 degrees.

Slope (degrees)	**Total area (ha)**	**Percentage of ALR**
0 - 30	43,139.89	99.88%
30 - 75	49.90	0.12%

7. See appendix for Map 4 that shows the land too steep for agricultural production.

8. The 2011 census of Agriculture for the Skeena Queen Charlotte Regional district reported that the census district had 20 farms, in which 53 hectares were used to grow crops including hay crops, field crops, fruits, nuts, vegetables, sod and nursery products and 212 hectares was used as natural land for pasture, and 28 hectares were used for seed pasture. It is evident that a majority of the agricultural land is used for animal pasture, likely due to the fact that the climate in Skeena Queen Charlotte is very mild and not ideal for growing crops. The most populous animals in the census tract are hens and chickens with 661 animals recorded to be found in 10 farms. It is also recorded that 95 cows and calfs are found in 6 farms and 11 horses and ponies are found on three farms. Other animals include turkeys, pigs, sheep and lamb, goats, and rabbits. The 2011 census reports that the total farm capital was $10,310,729, and the total wages and salary paid was $25,883.

Social

1. After comparing the available TRIM dataset and the CanMap Streetfiles, we made the decision to proceeded our investigation by working with the TRIM dataset as it yielded better detail for our subpanel region than the CanMap Streetfiles. In order to project and analyze from files that were divided in terms of map sheet and had different projection coordinates, we first reprojected the data, then merged the layers to create a Roads layer.

Based on this new layer, 6 types of roads were found within the ALR region of the Skeena Queen Charlotte Sub-panel section, mainly unpaved roads, including ‘gravel’, ‘overgrown’, ‘rough’, and otherwise paved.

Road Type	**Length of Road (km)**
Gravel Road 1 Lane	55.46
Gravel Road 1 Lane One Way	1.99
Gravel Road 2 Lane	133.40
Overgrown Road	2.73
Paved Road 2 Lane	26.87
Rough Road	145.86

2. While the type of roads found in this region are relatively low-key infrastructures and there are very few of them in this region, roads still take up valuable land for agricultural purposes. Considering that the area surrounding the roads are also unsuitable for agricultural production the roads were buffered 10 metres to compromise that land, resulting in a sum area of roads to be 3.72 km^2 or 372.33 hectares. As the project area of the Skeena Queen Charlotte is 43,189.79 hectares, calculations revealed that roads still compromise of 0.86% of the ALR land.

   Calculations for Percentage of Roads in Subpanel:
   $$\frac{Sum\ Area\ of\ Roads\ with\ 10\ m\ Buffer}{Project\ Area} \times 100 = \frac{(372.33\ ha)}{(43189.79 ha)} \times 100 = 0.00862 \times 100 = 0.86\%$$

3. See appendix for Map 5 illustrating the area that roads take up in the ALR region, with the 10m buffer.

4. It was found that within the Skeena Queen Charlotte region, there are two provincial parks in the ALR region: Naikoon Provincial Park and Lower Skeena River Park. Naikoon Provincial Park is 2758.80 ha**,** and Lower Skeena River Park is 175.00 ha. In total, the two parks take up 2,933.79438 ha of the total ALR land in the subpanel region, accounting for 6.76% of the ALR land.

Calculations for Percentage Total of Parks in Subpanel:

$$\frac{\textit{Sum Area of Provincial Parks}}{\textit{Project Area}} \times 100 = \frac{(2933.79438\ ha)}{(43189.79ha)} \times 100 = 0.0679 \times 100 = 6.76\%$$

5. According to the CanMap Parks dataset which includes data on golf courses in addition to parks data, there are no golf courses in the Skeena Queen Charlotte subpanel region.

6. See appendix for Map 6 for the map illustrating the two provincial park regions within the ALR land.

7. 18,784 people were living in the Skeena-Queen Charlotte regional district in 2011 according to 2011 census tract data.

8. Research of the census data in the Skeena Queen Charlotte regional district revealed many facts about the population worth noting. The population decreased by 4.5% from 2006 to 2011. 80.5% of the people living in the regional district are over 15 years of age and the median age of the population is 39.9. 15,190 people in the area are 15 years and older and are married, representing the majority of the population. The total number of census families living in private households is 5,290 and 50% of the families consist of only two people. 2,940 of the families are married couples, 47.8% of these married couples have children that live at home and of these couples with children at home, the majority of them only have two children. The average number of children at home per census family is 1.1 and the average amount of people living in a household per census family is 2.9.

9. There were many non-farm uses of land that were analyzed for this report that were not located in the ALR region that we analyzed using TRIM data layers and CanMap parks layers. These non-farming land uses included: sports fields and tracks, amusement parks, botanical gardens, campgrounds, cemeteries, drive-in theatres, exhibition grounds, historic sites, swimming pools, migratory bird sanctuaries, national wildlife areas, picnic sites, zoos, towers, bridges, extraction sites (mines) and buildings. Although we did not find any non-farming uses that were included within our ALR land, we did some extensive research and noticed that a lot of the area in the Skeena Queen Charlotte subpanel region is First Nations Reserve land. The information about these reserves is not included in the regional district's figures and because some of their land is included in the ALR, it would be helpful to research further the populations of these areas and how their ALR land is being used. According to Trade and Invest British Columbia, the main economic activities within the Skeena Queen Charlotte Regional District are forestry,

fishing, tourism, transportation and natural gas development. Natural gas development is the most recent economic development in the area. Through our analysis and research on the subpanel region, we believe that the biggest threat to the ALR is future development in the tourism sector as there is a huge push to encourage tourism in such a naturally beautiful region of British Columbia.

10. See appendix for Map 7 showing the First Nations Reserve areas that are included in the Skeena Queen Charlotte ALR area.

Summary

1. In the final processed shapefile for the Skeena Queen Charlotte subpanel region, 35,341.68 hectares remained. This represents 1.8% of the entire census district.

   Calculation for Percentage of Remaining ALR after extractions:
   $$\frac{\textit{New Sum Area of ALR land}}{\textit{Census district}} \times 100 = \frac{35{,}341.68\ ha}{1{,}978{,}146\ ha} \times 100 = 0.01786 \times 100 = 1.8\%$$

2. See appendix for Map 8 that shows the eliminated areas from our subpanel region.

3. Our final shapefile was created by eliminating areas that can not be used to grow crops or as pasture for animals, or are protected areas, or are features that go through our ALR land (ie roads, river). First we eliminated the roads after the 10 meter buffer was added, and the water features with the added 10m buffer. Then we eliminated the areas with slope of 30 degrees or higher and areas with class 7 soils because these areas cannot support the growth of crops or pasture for animals. Finally we eliminated the Naikoon Provincial Park and Lower Skeena River Park because they are protected provincial parks. The area eliminated was equal to 7,848.11 hectares.

Feature Eliminated from Original ALR Shape File	**Total Area (ha)**
Roads with 10m buffer	372.3
Naikoon Provincial Park and Lower Skeena River Park	2,933.79
Land with class 7 soil	3,153.10
Areas with a slope of 30 degrees or higher	49.9
Water features with 10m buffer	1,760.24

4. Based on our research, we feel that the current estimates of hectares are not accurate for the ALR. Using our sub panel study area, we see that there are many features and attributes that are not viable farmland but are included in the current ALR estimates. In the case of our project area, we proposed that 7,848.11 hectares be eliminated from the current estimate of the ALR for our project area. Furthermore we argue the ALR is problematic in our region because a majority of our ALR area is actually forests, while only 0.7% of our ALR area is classified as agricultural land. While this poses a problem, we choose not to eliminate forests from our ALR region because the land use classifications generalize so they may have been viable agricultural land in those areas. Further, eliminating forests pose a problem of consistency because we are only examining a small section of the ALR, however other areas would likely have areas of forest in their ALR too so it would be inconsistent to have forests eliminated in one sub panel region and not others. That being said, it may be something for the ALC to consider in the future.

Error and Uncertainty

Due to its nature as a mimicry of a three dimensional reality onto a two dimensional surface, any analysis using GIS is inevitably subject to some sort of inherent systematic error. Likewise, in this particular investigation of the Skeena Queen Charlotte area, systematic errors were embedded in various stages of the process.

The quality of data that was sourced is considered to be a source of error and uncertainty in our investigation especially due to our limitations in data collection methods. Ideally, for any investigation, the data should be sourced by the researcher to customly select data in the appropriate projection and precision. However, due to the profound costs that would be associated with such endeavour, apart from some private data that was distributed by the university such as the TRIM set, much of our other data sources were openly sourced data. Although our group was careful to be very selective with our data ensure we only chose data produced by a reliable creator such as government data sources, there are the consistent limitations of public data collection methods and the quality of the data.

For instance, when we tried to gather data about soils data from the publicly accessible government dataset, there were gaps in the data for our particular study area, thus hindering our capacity to make accurate conclusions. This shortcoming was significant for our particular research region of the Skeena Queen Charlotte ALR land because in fact 12% of data out of our project area was unavailable for us to analyse. We hypothesize these gaps to be associated with issues of data suppression as there are aboriginal reserves in the region, but we cannot be sure because it is not clearly noted in the datasource. Because the entire region is missing, while our group can draw conclusions on the region that we are able to access to, we are missing a significant portion of the story that could potentially be game changing, thus restricting an accurate comprehension of the conditions of the area of study.

Finally, while we were careful of maintaining accuracy with our procedures and calculations, as students with only working knowledge of the GIS software and concepts, it is necessary to highlight the limitations and errors in our skillset.

Further Recommendations

From our investigation, we highlighted the many shortcomings of the ALR land reports. Further detail would be helpful in informing analysts about the specifics of regions of the ALR. In the Skeena Queen Charlotte area, a large majority of the land has been classified as old or new forest. A lot of this land is in the ALR areas, but we are unable to definitively say that the forested areas are unsuitable for agricultural use. The only information that we can conclude from this data is that the majority of the areas contained within the polygons are forested. This does not necessarily mean that all of the area in polygons classified as forest and should be deemed unsuitable for agricultural production, as there could be other land included in these polygons that does not represent the majority, but is suitable farming land. Further data collection in these areas or information about the polygons would be helpful in determining whether they should be discounted or counted as agricultural land as based on the data we have so far, we cannot conclude one way or another whether they are suitable or not. We would recommend that the government collect or release more detailed data on the forested polygons.

The gaps that were missing in the soils data certainly need to be remedied in order that a more extensive analysis can be done on the land. The large amount of missing soils data has hampered our ability to assess the agricultural viability of a large percentage of the ALR area in the Skeena Queen Charlotte region. This is especially important for this region in particular as none of the soil data recorded is optimal (class 1) for agricultural uses and a large portion of it is very poor (class 7). In order to determine whether or not these land areas with soil data gaps would be suitable for farming, there would need to be better soils data collected by the government regarding the gaps so that a more complete analysis could be conducted on the area.

Finally, more information regarding the land that is a part of the First Nations Reserves in the area would be useful for further analysis as it appears that most of the gaps in our data sets corresponded with First Nations Reserve land. There was also no census information for these areas and this would certainly be helpful to gain a better understanding of the population living in the area.

Appendix

References

Agricultural Land Commission (n.d.) Agricultural Capability Classification in BC. http://www.alc.gov.bc.ca/assets/alc/assets/library/agricultural-capability/agriculture_capability_classification_in_bc_2013.pdf (accessed December 6, 2015).

Geography Open Textbook Collective. 2014. Case Study 1: The Agriculture Land Reserve (ALR). In *British Columbia in a Global Context (An Open Textbook)*, eds. A. G. Green, S. McPhee, A. Ettya, B. Ricker, and C. Temenos, 100–104. BCcampus OpenEd http://opentextbc.ca/geography/chapter/6-6-case-studies/ (accessed December 6, 2015)

Government of british Columbia Ministry of Agriculture (January, 2013) *Agriculture in Brief, Regional District of Kitimat and Skeena - Queen Charlotte.* Retrieved from: http://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/about-agriculture-and-seafood/statistics-agriculture-and-seafood/census/aginbrief_kitimat-stikine__skeena-queen_charlotte.pdf (accessed December 6, 2015).

Statistics Canada. 2012. *Skeena-Queen Charlotte, British Columbia (Code 5947) and Canada (Code 01)* (table). *Census Profile*. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released October 24, 2012. http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E (accessed December 6, 2015).

List of Data Sources

1) "ALR Shapefiles", http://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis. Agricultural Land Commission (ALC). (31/10/2015)

2) "BC Census Divisions", https://www12.statcan.gc.ca/…/boun…/bound-limit-2011-eng.cfm. Statistics Canada. (Nov. 2011) Version 1

3) "Baseline Thematic Mapping", http://catalogue.data.gov.bc.ca/…/baseline-thematic-mapping. Ministry of Forests, Land and Natural Resource Operations -GeoBC [DataBC] (09/03/2011)

4) "Terrain Resource Information Management Program--(TRIM)", http://hdl.handle.net/11272/10166. BCGOV ILMB Crown Registry and Geographic Base Branch V3 (06/03/2015)

5) "BC Agricultural Capacity Mapping", http://www.env.gov.bc.ca/esd/distdata/ecosystems/Soil_Data/AgricultureCapability. Environmental Stewardship Division, Ministry of Environment. (23/09/2015)

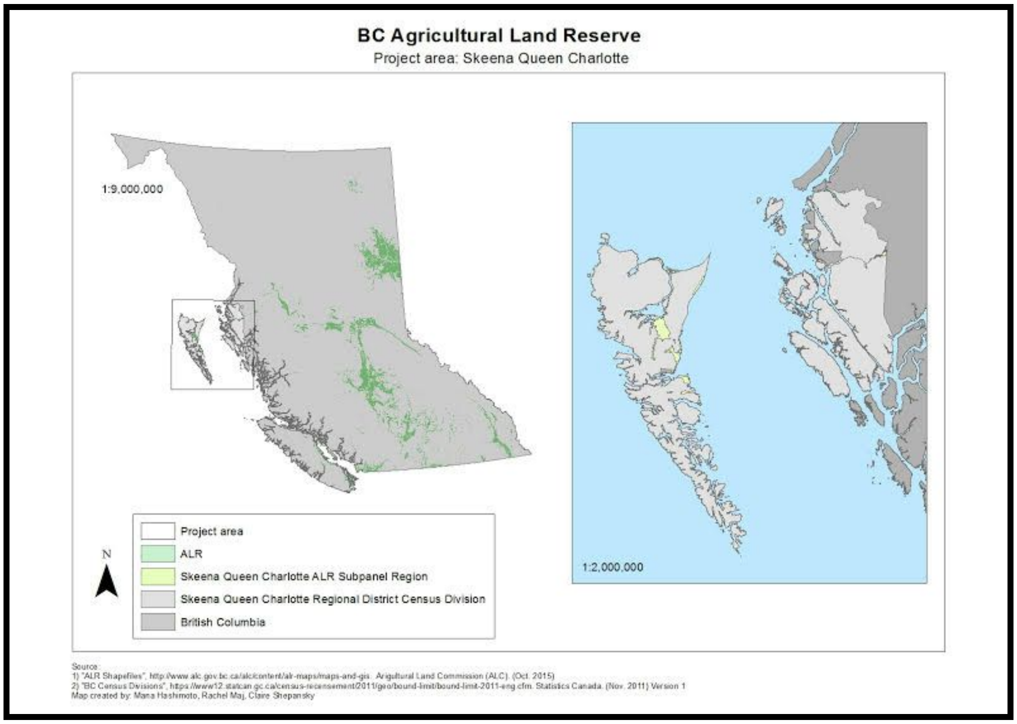
6) "Canadian Digital Elevation Model Mosaic (CDEM)" http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/C40ACFBA-C722-4BE1-862E-146B80BE738E .html. Natural Resources Canada. V3. (06/11/2015).

7) "BC Parks, Ecological Reserves, and Protected Area", http://catalogue.data.gov.bc.ca/dataset/bc-parks-ecological-reserves-and-protected-areas. Ministry of Forests, Lands and Natural Resource Operations - GeoBC, DataBC. (09/03/2015).

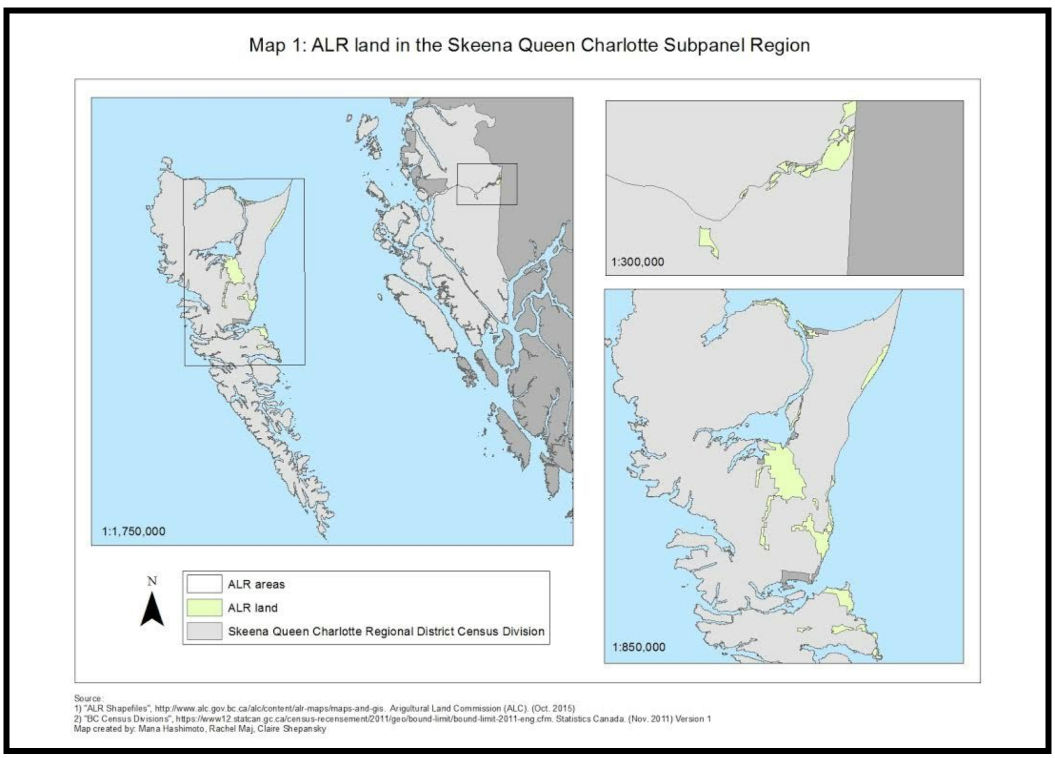
8) "Indian Reserves - Administrative Boundaries" http://catalogue.data.gov.bc.ca/dataset/indian-reserves-administrative-boundaries. Ministry of Forests, Lands and Natural Resource Operations - GeoBC, Data BC. (11/12/2014) [This was the date it was published]

Maps

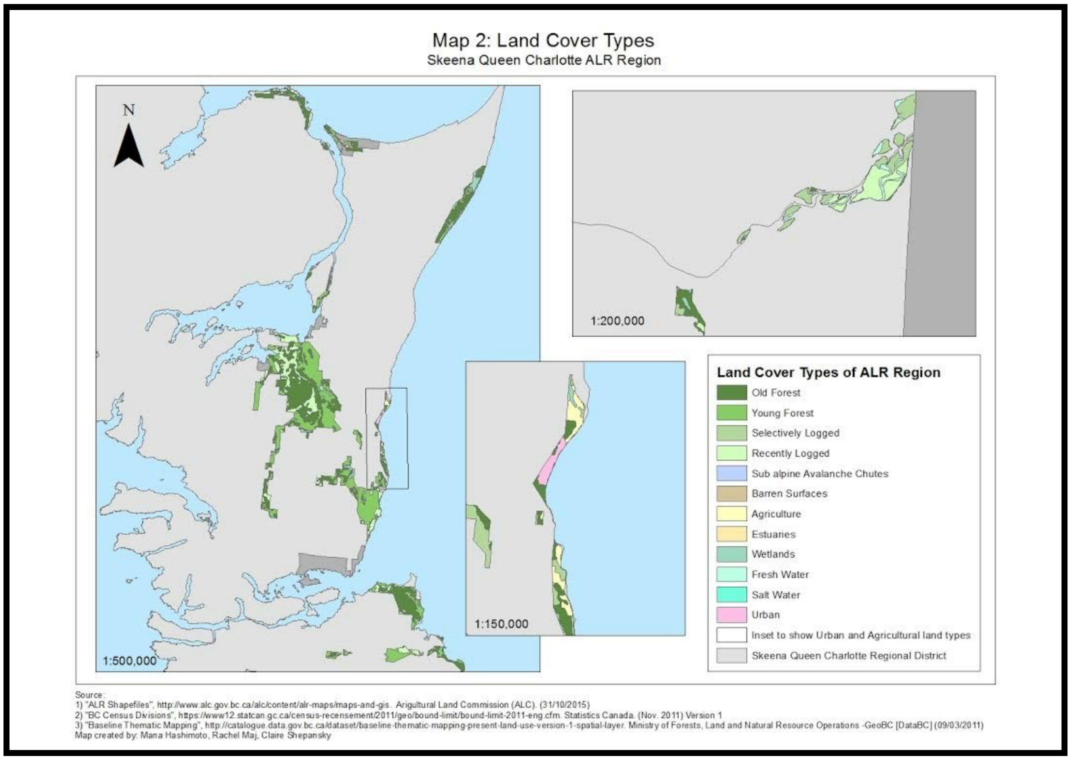
Map 0



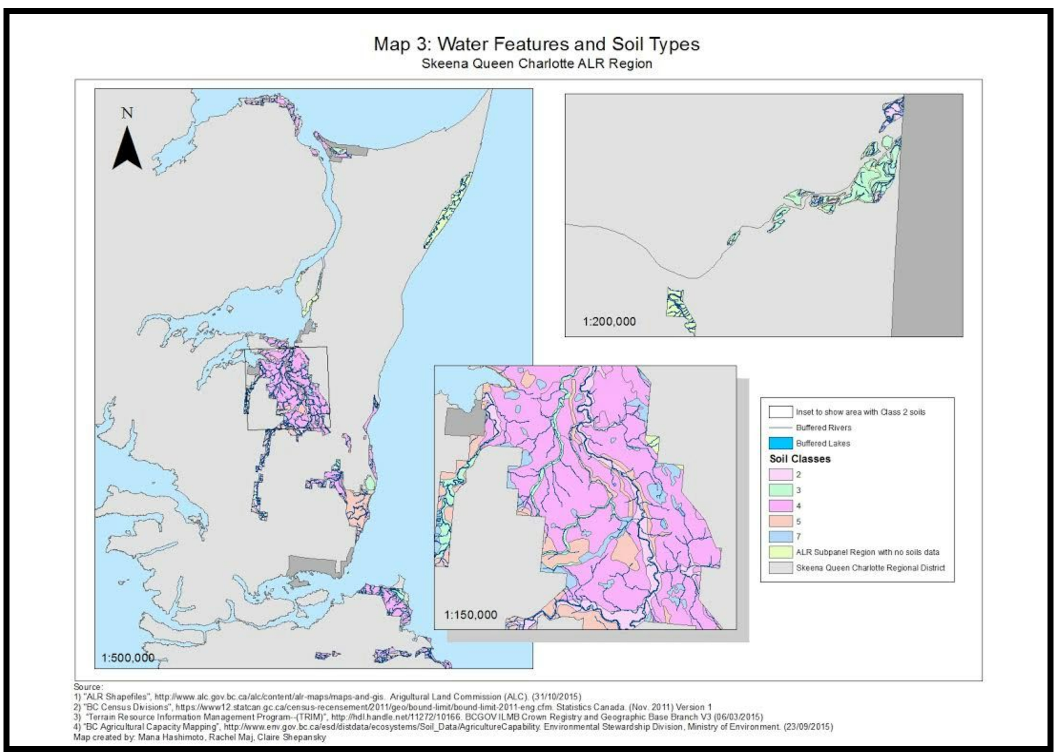
Map 1



Map 2


Map 2: Land Cover Types
Skeena Queen Charlotte ALR Region
N
1:500,000
1:200,000
1:150,000
Land Cover Types of ALR Region
Old Forest
Young Forest
Selectively Logged
Recently Logged
Sub alpine Avalanche Chutes
Barren Surfaces
Agriculture
Estuaries
Wetlands
Fresh Water
Salt Water
Urban
Inset to show Urban and Agricultural land types
Skeena Queen Charlotte Regional District
Source:
1) "ALR Shapefiles", http://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis. Arigultural Land Commission (ALC). (31/10/2015)
2) "BC Census Divisions", https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2011-eng.cfm. Statistics Canada. (Nov. 2011) Version 1
3) "Baseline Thematic Mapping", http://catalogue.data.gov.bc.ca/dataset/baseline-thematic-mapping-present-land-use-version-1-spatial-layer. Ministry of Forests, Land and Natural Resource Operations -GeoBC [DataBC] (09/03/2011)
Map created by: Mana Hashimoto, Rachel Maj, Claire Shepansky

Map 3


Map 3: Water Features and Soil Types
Skeena Queen Charlotte ALR Region
N
1:500,000
1:200,000
1:150,000
Inset to show area with Class 2 soils
Buffered Rivers
Buffered Lakes
Soil Classes
2
3
4
5
7
ALR Subpanel Region with no soils data
Skeena Queen Charlotte Regional District
Source:
1) "ALR Shapefiles", http://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis. Arigultural Land Commission (ALC). (31/10/2015)
2) "BC Census Divisions", https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2011-eng.cfm. Statistics Canada. (Nov. 2011) Version 1
3) "Terrain Resource Information Management Program--(TRIM)", http://hdl.handle.net/11272/10166. BCGOV ILMB Crown Registry and Geographic Base Branch V3 (06/03/2015)
4) "BC Agricultural Capacity Mapping", http://www.env.gov.bc.ca/esd/distdata/ecosystems/Soil_Data/AgricultureCapability. Environmental Stewardship Division, Ministry of Environment. (23/09/2015)
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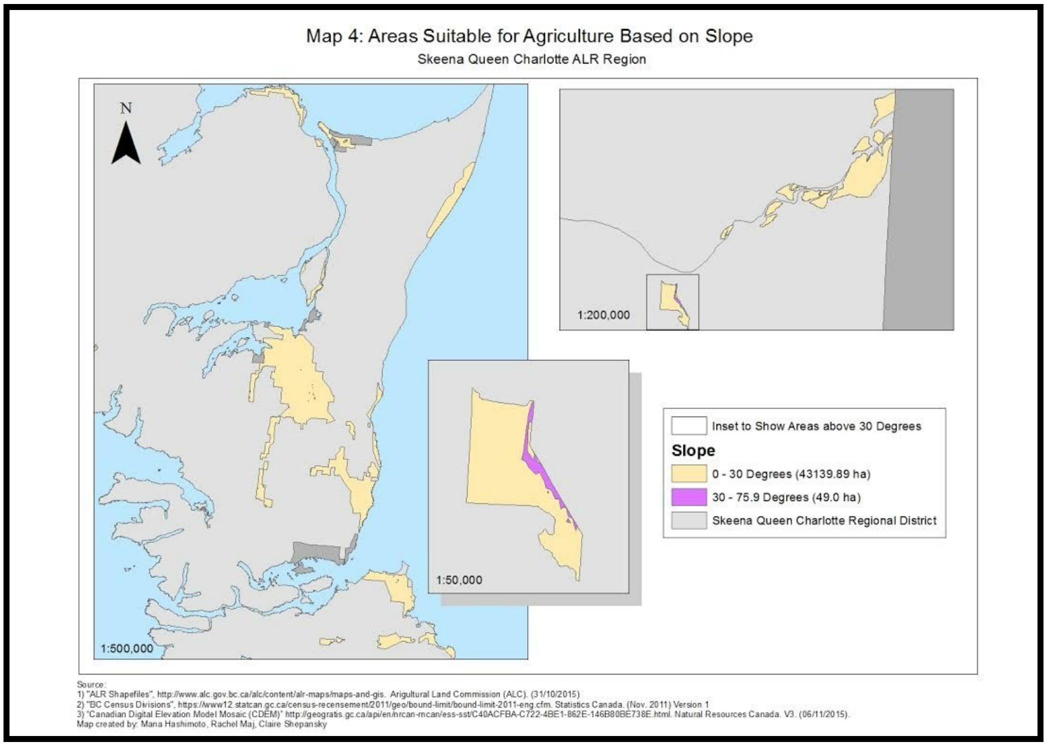
Map 4


Map 4: Areas Suitable for Agriculture Based on Slope
Skeena Queen Charlotte ALR Region
N
1:500,000
1:200,000
1:50,000
Inset to Show Areas above 30 Degrees
Slope
0 - 30 Degrees (43139.89 ha)
30 - 75.9 Degrees (49.0 ha)
Skeena Queen Charlotte Regional District
Source:
1) "ALR Shapefiles", http://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis. Arigultural Land Commission (ALC). (31/10/2015)
2) "BC Census Divisions", https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2011-eng.cfm. Statistics Canada. (Nov. 2011) Version 1
3) "Canadian Digital Elevation Model Mosaic (CDEM)" http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/C40ACFBA-C722-4BE1-862E-146B80BE738E.html. Natural Resources Canada. V3. (06/11/2015).
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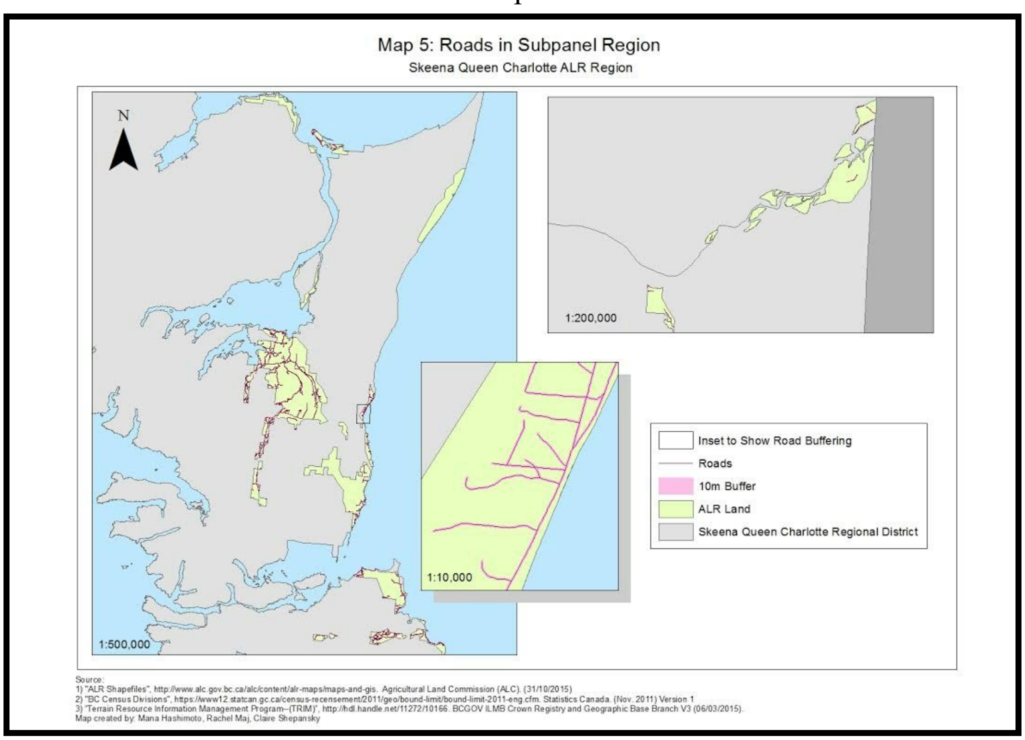
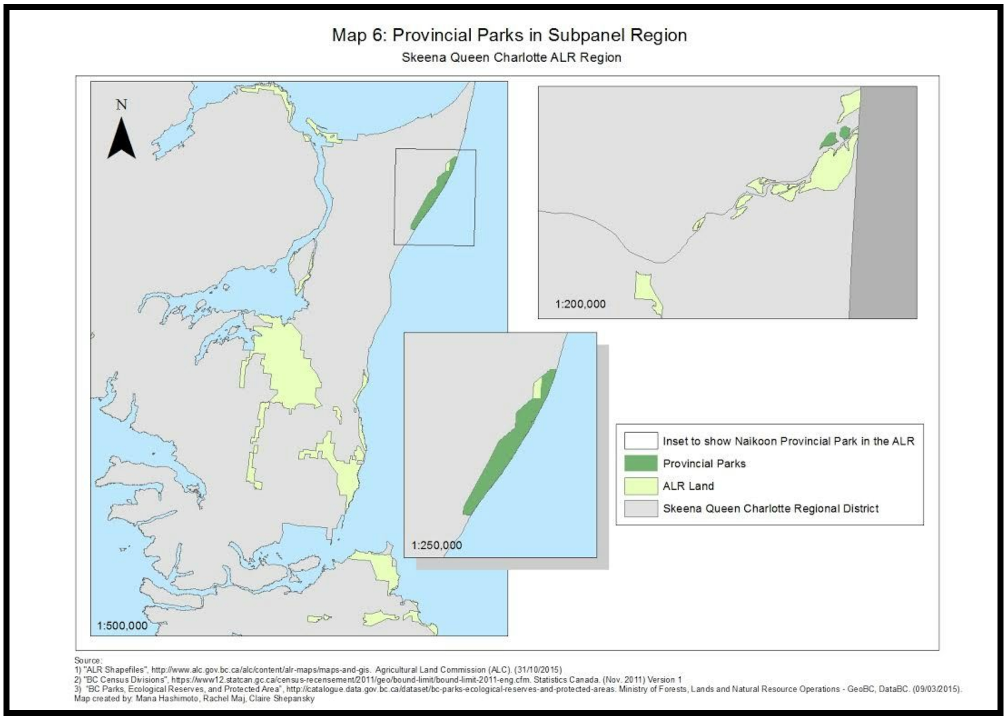
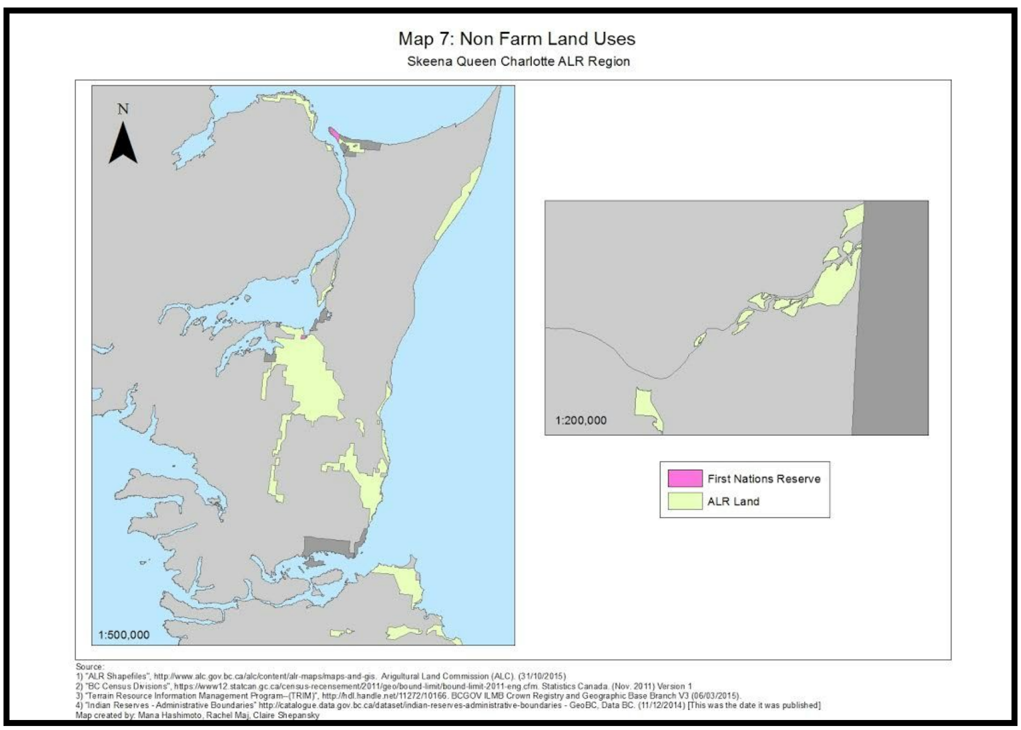
Map 5


Map 5: Roads in Subpanel Region
Skeena Queen Charlotte ALR Region
N
1:500,000
1:200,000
1:10,000
Inset to Show Road Buffering
Roads
10m Buffer
ALR Land
Skeena Queen Charlotte Regional District
Source:
1) "ALR Shapefiles", http://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis. Agricultural Land Commission (ALC). (31/10/2015)
2) "BC Census Divisions", https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2011-eng.cfm. Statistics Canada. (Nov. 2011) Version 1
3) "Terrain Resource Information Management Program--(TRIM)", http://hdl.handle.net/11272/10166. BCGOV ILMB Crown Registry and Geographic Base Branch V3 (06/03/2015).
Map created by: Mana Hashimoto, Rachel Maj, Claire Shepansky

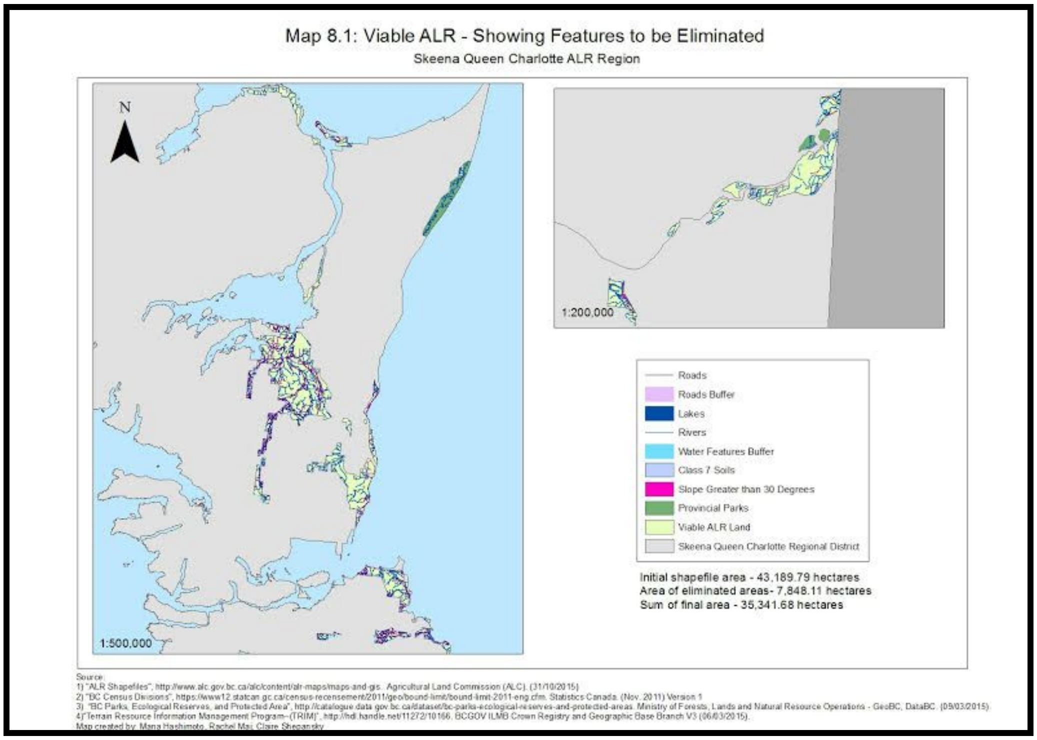
Map 6


Map 6: Provincial Parks in Subpanel Region
Skeena Queen Charlotte ALR Region
N
1:500,000
1:200,000
1:250,000
Inset to show Naikoon Provincial Park in the ALR
Provincial Parks
ALR Land
Skeena Queen Charlotte Regional District
Source:
1) "ALR Shapefiles", http://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis. Agricultural Land Commission (ALC). (31/10/2015)
2) "BC Census Divisions", https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2011-eng.cfm. Statistics Canada. (Nov. 2011) Version 1
3) "BC Parks, Ecological Reserves, and Protected Area", http://catalogue.data.gov.bc.ca/dataset/bc-parks-ecological-reserves-and-protected-areas. Ministry of Forests, Lands and Natural Resource Operations - GeoBC, DataBC. (09/03/2015).
Map created by: Mana Hashimoto, Rachel Maj, Claire Shepansky

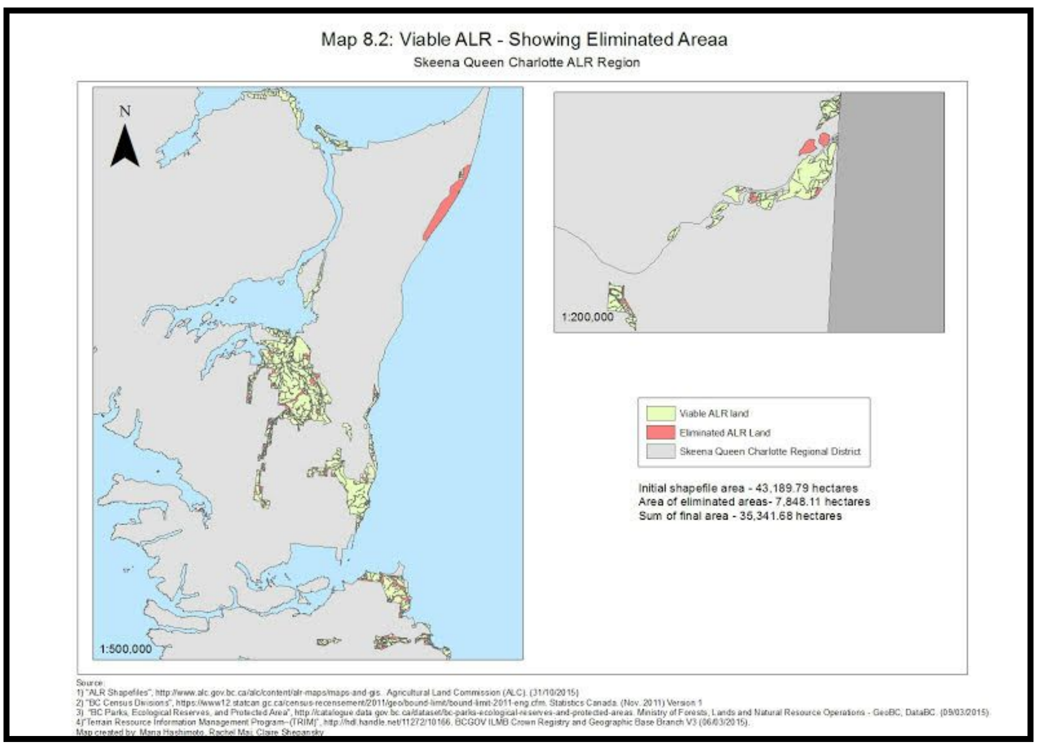
Map 7


Map 7: Non Farm Land Uses
Skeena Queen Charlotte ALR Region
N
1:500,000
1:200,000
First Nations Reserve
ALR Land
Source:
1) "ALR Shapefiles", http://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis. Arigultural Land Commission (ALC). (31/10/2015)
2) "BC Census Divisions", https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2011-eng.cfm. Statistics Canada. (Nov. 2011) Version 1
3) "Terrain Resource Information Management Program--(TRIM)", http://hdl.handle.net/11272/10166. BCGOV ILMB Crown Registry and Geographic Base Branch V3 (06/03/2015).
4) "Indian Reserves - Administrative Boundaries" http://catalogue.data.gov.bc.ca/dataset/indian-reserves-administrative-boundaries - GeoBC, Data BC. (11/12/2014) [This was the date it was published]
Map created by: Mana Hashimoto, Rachel Maj, Claire Shepansky

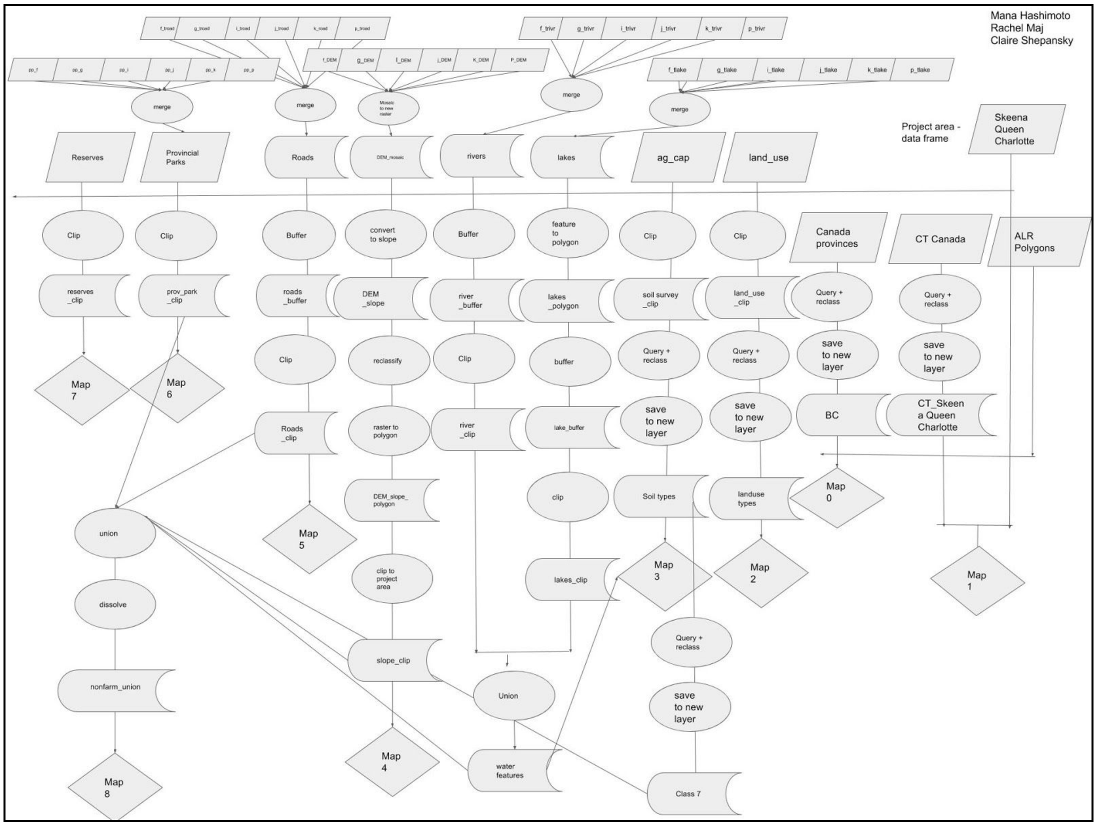
Map 8.1


Map 8.1: Viable ALR - Showing Features to be Eliminated
Skeena Queen Charlotte ALR Region
N
1:500,000
1:200,000
Roads
Roads Buffer
Lakes
Rivers
Water Features Buffer
Class 7 Soils
Slope Greater than 30 Degrees
Provincial Parks
Viable ALR Land
Skeena Queen Charlotte Regional District
Initial shapefile area - 43,189.79 hectares
Area of eliminated areas- 7,848.11 hectares
Sum of final area - 35,341.68 hectares
Source:
1) "ALR Shapefiles", http://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis . Agricultural Land Commission (ALC). (31/10/2015)
2) "BC Census Divisions", https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2011-eng.cfm. Statistics Canada. (Nov. 2011) Version 1
3) "BC Parks, Ecological Reserves, and Protected Area", http://catalogue.data.gov.bc.ca/dataset/bc-parks-ecological-reserves-and-protected-areas. Ministry of Forests, Lands and Natural Resource Operations - GeoBC, DataBC. (09/03/2015).
4)"Terrain Resource Information Management Program--(TRIM)", http://hdl.handle.net/11272/10166. BCGOV ILMB Crown Registry and Geographic Base Branch V3 (06/03/2015).
Map created by: Mana Hashimoto, Rachel Mai, Claire Shepansky

Map 8.2


Map 8.2: Viable ALR - Showing Eliminated Areaa
Skeena Queen Charlotte ALR Region
N
1:500,000
1:200,000
Viable ALR land
Eliminated ALR Land
Skeena Queen Charlotte Regional District
Initial shapefile area - 43,189.79 hectares
Area of eliminated areas- 7,848.11 hectares
Sum of final area - 35,341.68 hectares
Source:
1) "ALR Shapefiles", http://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis . Agricultural Land Commission (ALC). (31/10/2015)
2) "BC Census Divisions", https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2011-eng.cfm. Statistics Canada. (Nov. 2011) Version 1
3) "BC Parks, Ecological Reserves, and Protected Area", http://catalogue.data.gov.bc.ca/dataset/bc-parks-ecological-reserves-and-protected-areas. Ministry of Forests, Lands and Natural Resource Operations - GeoBC, DataBC. (09/03/2015).
4)"Terrain Resource Information Management Program--(TRIM)", http://hdl.handle.net/11272/10166. BCGOV ILMB Crown Registry and Geographic Base Branch V3 (06/03/2015).
Map created by: Mana Hashimoto, Rachel Mai, Claire Shepansky

Flowchart of Analysis



Team member contributions

As established in our project proposal and agreed upon by all team member, the team member contributions are as follows:

- Mana Hashimoto: Creation of maps 5, 6. Writing executive summary, error and uncertainty sections of the report. Citing data sources used.
- Rachel Maj: Creation of map 7. Researching census data questions. Writing introduction and further recommendations sections of the report. Editing final report to ensure it was cohesive.
- Claire Shepansky: Creating maps 0 - 4, 8. Completion of final maps following the template created. Creation of the final shapefile. Making the flowchart.
- Each team member was responsible to do the calculations and questions corresponding to the maps they made in the body of the report.