Outline of steps to estimate fisher parameters

1. Get VEG\_COMP\_R1\_POLY\_2020
2. Query for habitat attributes

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| Habtiat category | Habitat zone | Query for habitat attribution |
| Denning | SBS wet | (species\_cd\_1 %in% c( 'ACT') | species\_cd\_2 %in% c( 'ACT') | (species\_cd\_1 %in% c('SX') & species\_pct\_1 == 100)) & crown\_closure >= 30 & quad\_diam\_125 >= 28.5 & basal\_area >= 29.7 & proj\_age\_1 >= 125 & bec\_zone\_code == 'SBS' & bec\_subzone %in% c('wk','mk','mm','mw','mc') |
| SBS dry | species\_cd\_1 %in% c( 'ACT') | species\_cd\_2 %in% c( 'ACT') | (species\_cd\_1 %in% c('SX') & species\_pct\_1 == 100)) & crown\_closure >= 20 & quad\_diam\_125 >= 28 & basal\_area >= 28 & proj\_age\_1 >= 125 & bec\_zone\_code == 'SBS' & bec\_subzone %in% c('dw','dh','dk') |
| Dry forest | ((species\_cd\_1 %in% c( 'ACT') | species\_cd\_2 %in% c( 'ACT') & proj\_age\_1 >= 135) | (species\_cd\_1 %in% c( 'AT') | species\_cd\_2 %in% c( 'AT') & proj\_age\_1 >= 135)| ((species\_cd\_1 %in% c('FDI', 'FD') & species\_pct\_1 == 100) & proj\_age\_1 >= 207 & crown\_closure >= 20 & quad\_diam\_125 >= 34.3)) & ((bec\_zone\_code == 'SBPS' & bec\_subzone %in% c('xc','mc','dc','mk')) | (bec\_zone\_code == 'IDF' & bec\_subzone %in% c('dk','dc','mw','dw','ww')) | (bec\_zone\_code == 'MS' & bec\_subzone %in% c('xc','xk','dv','dm', 'dk', 'dc'))) |
| Movement | SBS wet | (crown\_closure + shrub\_crown\_closure >=50 & crown\_closure > 30) & bec\_zone\_code == 'SBS' & bec\_subzone %in% c('wk','mk','mm','mw','mc') |
| SBS dry | (crown\_closure + shrub\_crown\_closure >=50 & crown\_closure > 30) & bec\_zone\_code == 'SBS' & bec\_subzone %in% c('dw','dh','dk') |
| Dry forest | (crown\_closure + shrub\_crown\_closure >=50 & crown\_closure > 30) & ((bec\_zone\_code == 'SBPS' & bec\_subzone %in% c('xc','mc','dc','mk')) | (bec\_zone\_code == 'IDF' & bec\_subzone %in% c('dk','dc','mw','dw','ww')) | (bec\_zone\_code == 'MS' & bec\_subzone %in% c('xc','xk','dv','dm', 'dk', 'dc'))) |

1. Make rasters at 1 ha resolution
2. Get the fisher density (2004) data. select \* from public.fisher\_density\_2004 where bgc\_zone != 'BWBS' and beclabel != 'SBS wk 2';
3. Make hexagon grid (Line 185) with area = 30 km2 this equates to cell size 5886
   1. Give the hexagon grid a unique id called fid
   2. Intersect the hexagon grid with the fisher density 2004 where 'very high', 'high', 'med', 'low'. This finds all hexagons that contain the fisher density 2004 polygons
   3. Intersection of the hexagon grid with fisher density 2004 to get the area of a fisher capability class within a hexagon (Line 204 convert to km2)
4. Using the area by each fisher capability class within a hexagon estimate the number of fisher by fisher capability class

#Apply the fisher density per each fisher capability rating

#very high = (((76% + 100%)/2)/100) \* 16.3 per 1000 km2 = 14.322 per 1000 km2

#high = (((51% + 75%)/2)/100) \* 16.3 per 1000 km2 = 10.269 per 1000 km2

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| Fisher capability class | Calculation to estimate number of fisher per hexagon and fisher capability class |
| ‘very high’ | (areaFisherCap/1000)\*14.344 |
| ‘high’ | (areaFisherCap/1000)\*10.2690 |
| ‘med’ | (areaFisherCap/1000)\*6.1640 |
| ‘low’ | (areaFisherCap/1000)\*2.5265 |

Note: areaFisherCap is in km2 – converting to 1000 km2 by dividing by 1000

1. Sum up the number of fisher within a hexagon via summing the number of fisher by capability class within a hexagon. This is called n\_fish
2. Extract the total area of each habitat category (denning, movement etc) using the rasters created in 3.
3. Calculate the relative probability of occupancy
   1. Get the permanent open areas raster
   2. Get the ‘openess’ polygons via SELECT shape FROM public.veg\_comp\_lyr\_r1\_poly2020 where proj\_age\_1 <= 12 and proj\_age\_1 >= 0 and bec\_zone\_code in ('SBS', 'IDF', 'MS', 'SBPS')
      1. Rasterize to 1 ha
   3. Get the total area of ‘permanent open areas’ + ‘openess’ within each hexagon
   4. Calculate the rpo via exp(-0.219\*((out4$openess/3000)\*100))/(1+exp(-0.219\*((out4$openess/3000)\*100)))/0.5 (Line 226)
4. Calculate abundance as out4$abund<-out4$n\_fish\*out4$p\_occ (Line 269).
5. Intersect with the TSA spatial boundaries to get summaries by TSA