ArcGIS
Deer Winter Range Analysis

Value: 5% (other five labs combined are worth 10%)

QUICK OVERVIEW:

1. **Issue**: determine the location and area of land suitable for **deer winter range** (DWR) and create a **buffer** around all areas suitable for DWR

2. **Learning Objectives**: to demonstrate proficiency in applying GIS analysis functions to solve a problem; to create an analytical model that clearly depicts the process required to obtain the end results; and to create an effective map layout

3. **Data**: spot heights and forest cover for Bowen Island

4. **Analysis**:
   a. Create the additional data layers required
   b. Conduct a suitability analysis to determine coincident area (i.e. meets all criteria); this will become a wildlife habitat reserve for DWR
   c. Buffer the suitable DWR area to create a special management zone

5. **Interpret Results**: be sure you understand all new map layers that you create

6. **Communicate Results**: create a map layout that clearly communicates your results

THE ISSUE

Deer winter range (DWR) is critical for deer survival and, therefore, it is imperative that adequate DWR be reserved from other uses, such as urban development, mining and timber harvesting. The suitability of DWR depends on several physiographic factors and forest cover conditions. The criteria for DWR are:

Physiography	Elevation:	≥ 425 meters
	Aspect:	135 – 225 degrees azimuth (inclusive)
	Slope:	40 – 120% (inclusive)
Forest Cover	Forest Age:	≥ 180 years
	Tree Species:	40 – 100 % (inclusive) Douglas-fir

Suitable DWR needs to satisfy all five criteria listed above.

Plus, a 100m special management buffer needs to be created around all suitable DWR.

LEARNING OBJECTIVES
You will further develop the following ArcGIS skill sets
- Interpolate a surface from spot heights
- Derive slope and aspect surfaces
- Convert data from vector to raster
- Combine data layers in such a way that all criteria are met
- Create buffers
- Create an effective map layout

DATA
You are provided with only the following data layers:
- Spot_Hts – point data that depicts elevations
- Forest – polygon layer that depicts polygon boundaries
- Forest Stands – a data table with the attributes for Forest

Note: All the layers are projected in the UTM, Zone10N, NAD83 coordinate system.

ANALYSIS & INTERPRETATION
You are to devise an analysis to determine area that meets all the criteria for suitable DWR and then create a buffer to further protect areas suitable for DWR. Be sure to interpret all data layers created along the way.

Two required intermediate layers are:
- DWR_phys – which depicts areas that meet elevation, slope and aspect
- DWR_Forest – which depicts areas that meet Douglas-fir% and age

Thus the DWR layer is simply the coincident area of these two layers.

COMMUNICATE RESULTS
You will need to create a map that clearly communicates the results of your analysis. This includes a map that clearly depicts Bowen Island with areas suitable for DWR plus the special management buffer – additional layers that provide useful background information should be included. Include map insets to help your audience understand the criteria used to determine the potential DWR. Also provide an estimation of the area (ha) contained in the DWR and buffer. *Bonus: provide an estimate of the volume of timber contained in the DWR area.*

Some careful planning is required to ensure the message stands out and required supporting information comprises the background. Include standard map elements, insets, tables and text as required. Your target audience includes both natural resource managers (i.e. colleagues) and the general public – plan your layout accordingly.

DELIVERABLES

1. The draft and final analytical models – the final model will require enough detail included so that somebody else can replicate your analysis exactly and should follow the directions provided on the Cartographic (Analytical) Modeling web page.

2. A map layout that meets the previously described criteria. Be sure to include all necessary map elements. Make sure that you design your map layout so that it clearly conveys the analysis that you performed; make the feature symbology meaningful and visually appealing.

3. A description of your cartographic design - describe how your layout is designed to suit the purpose (suitable DWR) and target audience (both professionals and laypersons).

Email your final project to Doug.Corrin@viu.ca and Tim.Naegele@viu.ca . Note, your model can be hand drafted and submitted in person (or slipped under my office door).

HELPFUL HINTS

- Project **set-up**:

    - Set map document to **relative path**

    - Set your **working directory** and save your map document there

    - Using **Options** set

        - extents to **same as Layer "Forest"**

        - cell size to **25**

- **Sketch a draft model** that you plan to follow to create DWR and the buffers. You will need this model before you ask for help. It is understood that edits may (will) be required.

- **Create the "missing data layers"**. There are five criteria for DWR – you have been supplied with only Spot_Hts and Forest. Thus you will need to create 5 raster layers to start.

    - To create raster layers from vector use Spatial Analyst > Convert > Features to Raster

    - Prior to creating slope and aspect you will have to interpolate an elevation surface from Spot_Ht; use the IDW method; use a cell size of 25m; use a fixed radius of 100m and a power of 2

- When you run **Distance** it is important that ONLY the pixels of interest (i.e. DWR) have a numeric value – all other pixels should be reclassified to **NoData**

- **Provide meaningful names** for all layers generated (e.g. DWR_Forest for a layer that meets both age and Fir% criteria)

Additional hints and requirements may be posted to the web site.