GEOG357 Project planning outline 2022

a. Geographic area (province / country / region) ?

b. Application area e.g. forestry, habitat (landcover), glaciers, urban

c. Image requirements – expected years, could include change but <u>not required</u>

d. Anticipated processing e.g. classification, ratios, transforms, indices

e. Expected outcomes e.g. extracted features or classes, and extracted values

Notes: area should be of interest – not limited to BC or Canada.

Image sources: Landsat 5, 7, 8, 9;   Other: ASTER, SPOT, Sentinel-2 from earthexploer.usgs.gov

1. Select imagery for area / date (s) – download, assemble, clip

General image processing steps covered in labs

Select bands and channels to maximise your feature contrast

Classify (multispectral) or threshold (single channel)

Create single DN channel or bitmap for information classes / features

Clean results -> sieve

Raster to Vector conversion and smooth

Manage attribute tables and results

Overlay vectors on initial imagery

Incorporate DEMs

2. Lab Steps for project

Week 1: Preview and Download imagery, convert to pix file and clip to fit – I recommend a screen size study area to avoid excessive pan and zoom e.g. max. ~ 1800 x1200 pixels

Week 2: Image processing: classification, ratios/indices, transform etc., (change detection) feature extraction, vector creation

Week 3: Final images and results – e.g. vectors overlain on optimal image, calculation and presentation of results; possible 3D images using DEM; possible inclusion of Google maps/earth image for context.

Dec 6: Write up text.

Project Output Summary

Introduction: A brief summary of your project – goals, area and result

Study Area and Data Source
- Study area description
- The data you need for the project (including image dates)
- Comments on image quality (clouds, time of year etc.)

Data methods and analysis
- brief description of methods (could use point form)
- the primary resulting channels from analysis e.g. ratio or classification

Results
- Discussion of results
- Final image display e.g. vectors on image
- Final conclusions of successes or limitation

submit project as word doc and pdf in case of minor edits, pdf for final presentation

Project examples in the following slides

Hugh Allen Wildfire 2018 - Sentinel 2 Bands 10 (SWIR 2), 4 (NIR), and 3 (Red)
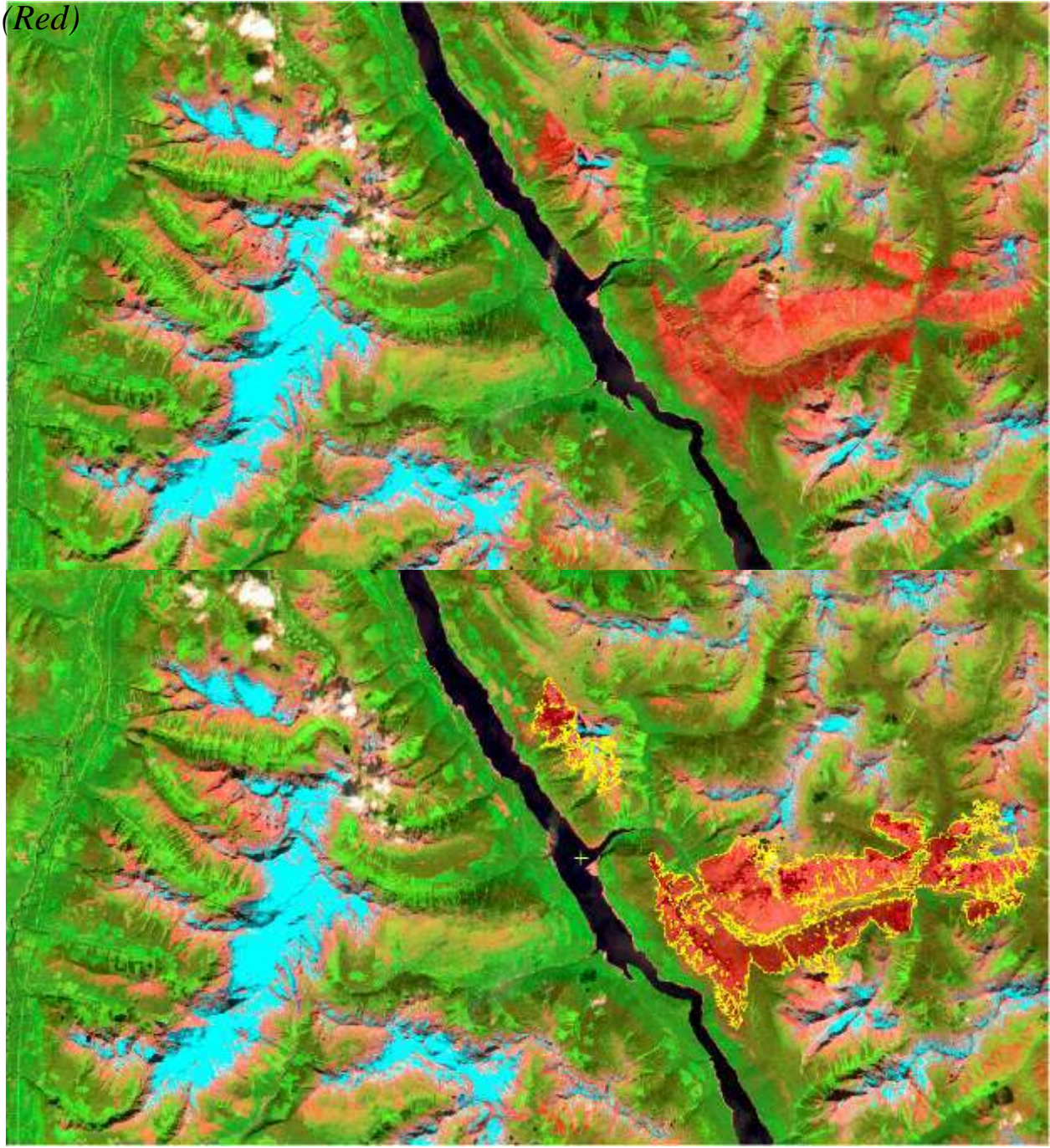
Hugh Allen Wildfire Normalized Burn Ratio (4-10)/(4+10)
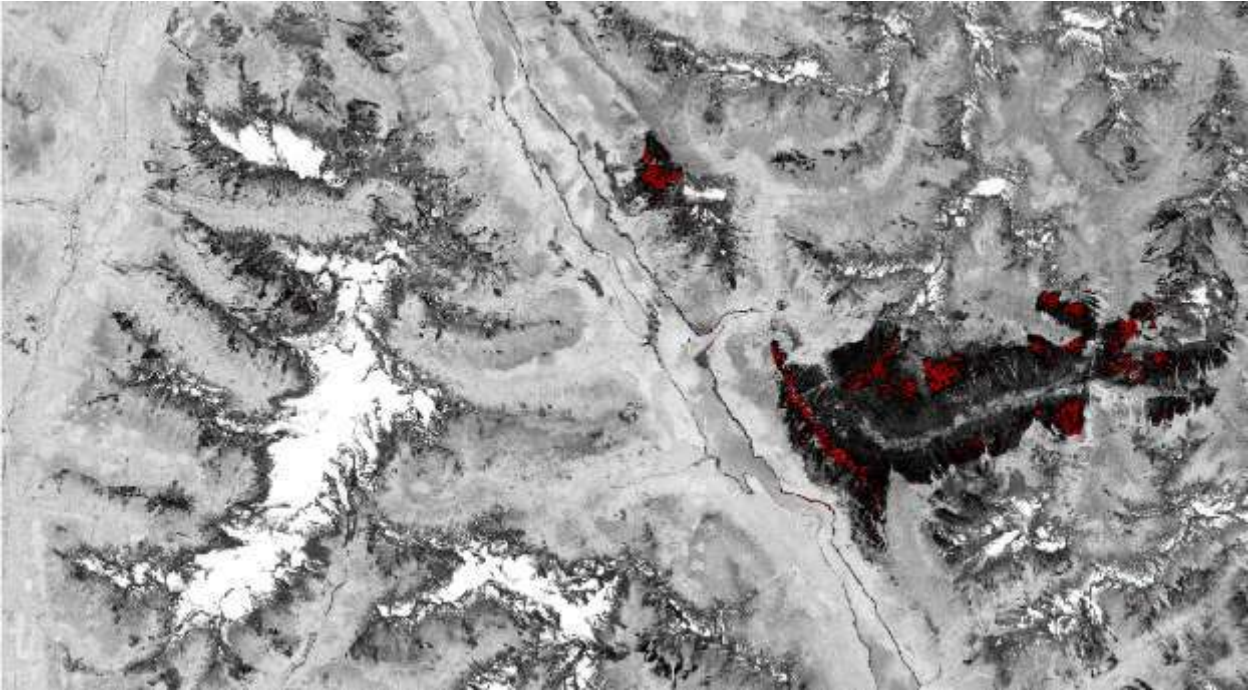
Normalized Burn Ratio and High Severity Burn Area Polygons

	Low Severity Burn	Medium Severity Burn	High Severity Burn
DN Values	0 to -0.23712133	-0.23712133 to -0.47424267	-0.47424267 to -0.711364

The total burn area was 102.27 kilometers squared or 10, 226.56 hectares. The severely burned area was 3.33 square kilometers or 333.47 hectares

Vegetation Regrowth on the Hope Slide(1965)

Generated bitmap for bare rock – selected only one bit2poly polygon

From the original 2.44km² area, there was some regrowth on 0.60km² ; remaining area of bare rock in the scar is 1.84km²
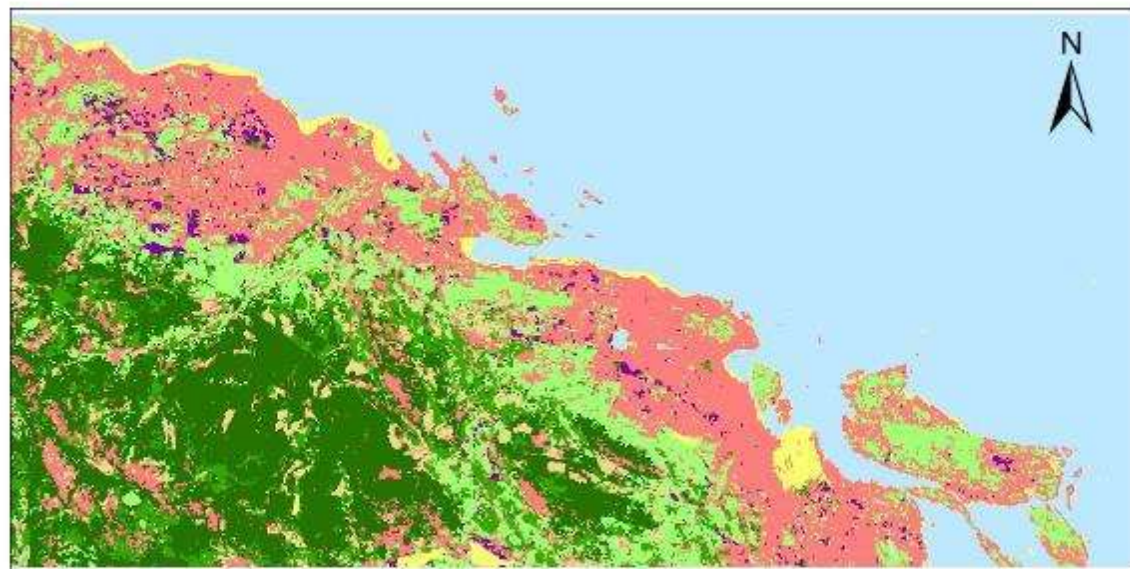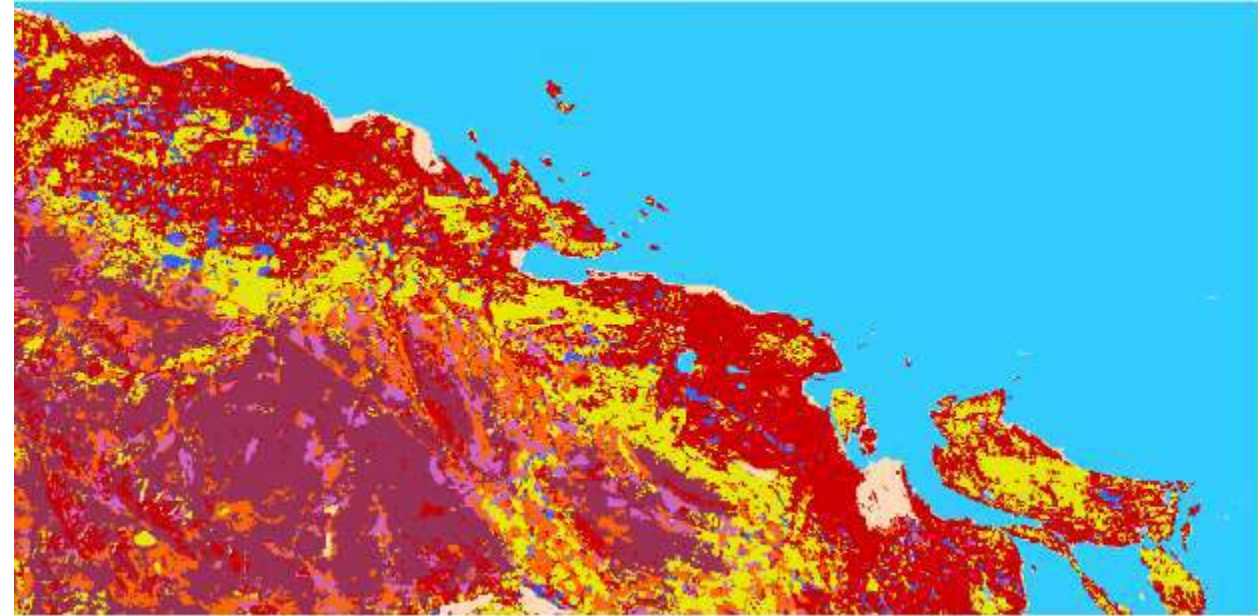
Land Cover mapping: Nanaimo 2020

Legend

- water
- urban
- decid forest
- agriculture
- beach
- open fields
- cleared forest
- mixed forest

Kilometers
0 2 4   8   12   16

Remote Sensing Final Project
UNBC Fall 2020

Training Site Editor

Class   Edit   Tools

ID	Value	Name	Color	Threshold	Bias	Imported Sig	Description
1	1	water		3.00	1.00		
2	2	urban		3.00	1.00		
3	3	decid forest		3.00	1.00		
4	4	agriculture		3.00	1.00		
5	5	beach		3.00	1.00		
6	6	open fields		3.00	1.00		
7	7	cleared forest		3.00	1.00		
8	8	mixed forest		3.00	1.00		

Classification	Percentage of Land Use including Water	Percentage of Land Use Excluding Water
Water	44.20%	0.0%
Urban	18.21%	32.64%
Deciduous Forests	10.56%	18.92%
Mixed Forest	12.98%	23.26%
Cleared Forest	6.05%	10.85%
Beach	1.79%	3.22%
Agriculture	3.83%	6.87%

Central Cariboo Complex Wildfire Burn Area near Williams Lake, BC (2017)

Central Cariboo Complex Wildfire near Williams Lake, BC - Burn Area
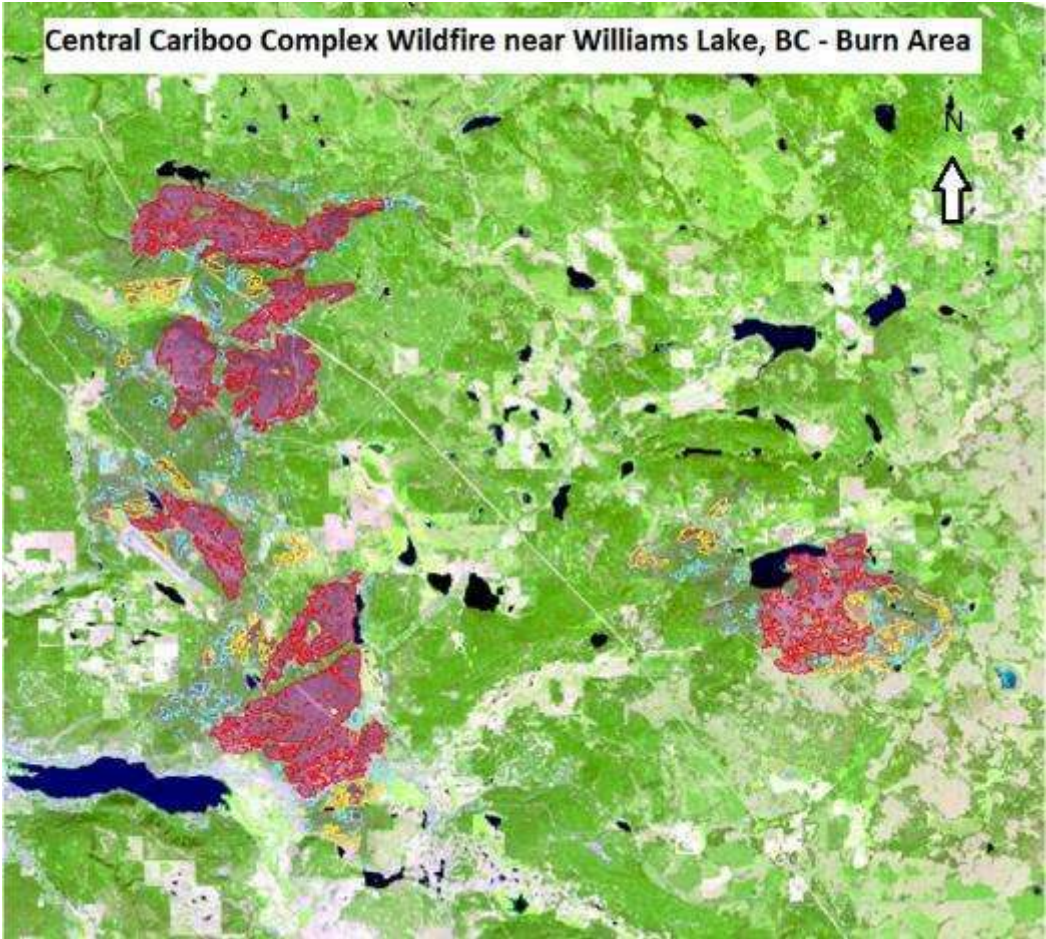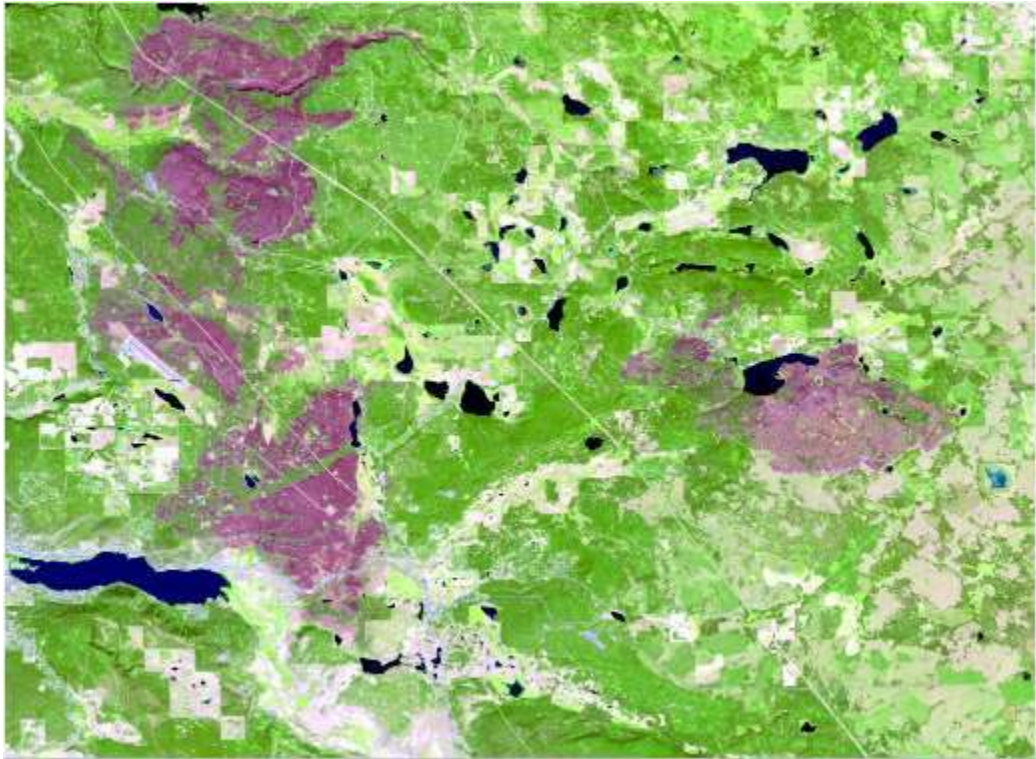
Bitmap results of the Normalized Burn Ratio
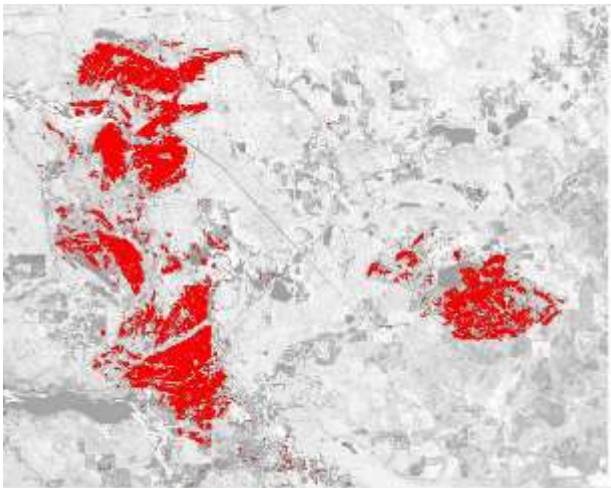
Query	Burn Area (ha)	Records
Area >= 244.08	4519.041	8/745
Area <244.08 and Area >9.897	752.373	25/745
Area < 9.897	509.474	712/745

Summary of total burn area in hectares, based on polygon size.

Classification of Spruce Beetle Infested Trees in Southeastern BC - 2018/2020 images: NDVI difference
Spruce beetle polygons from supervised classification: lakes, bare rock, ice/snow, open vegetation, forest, diseased spruce
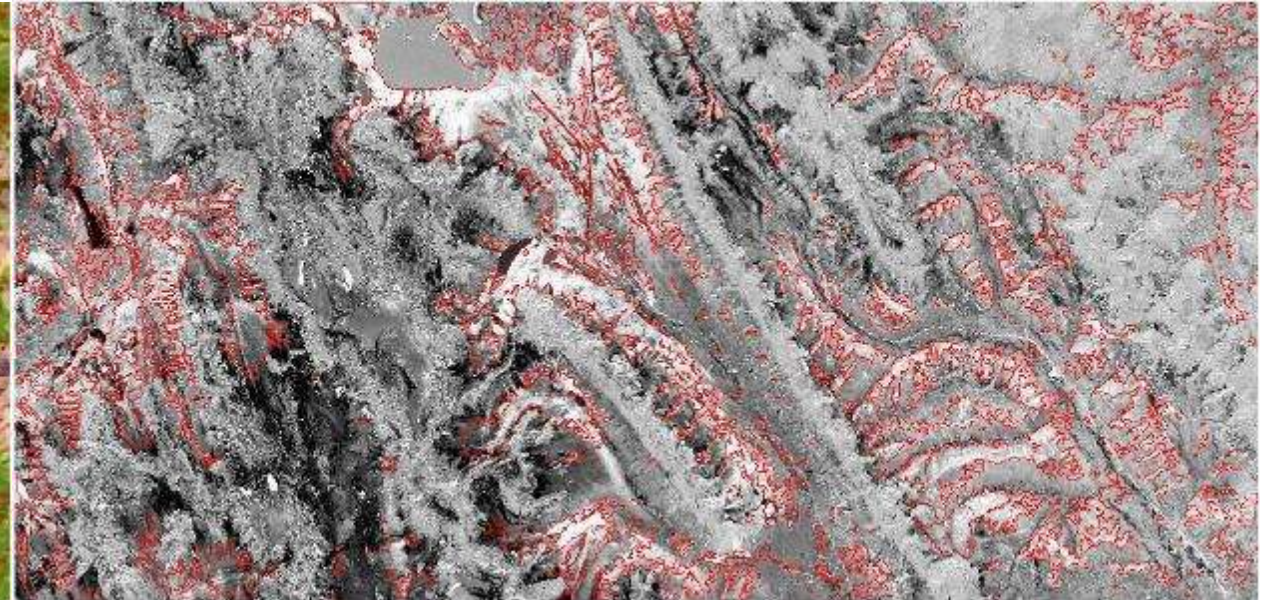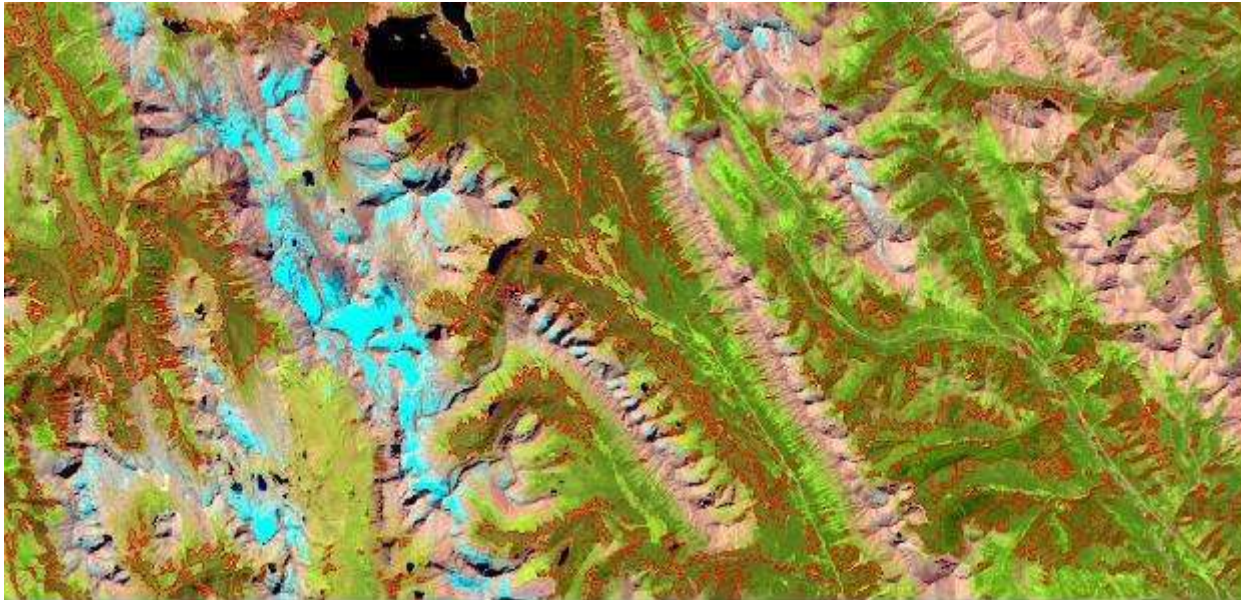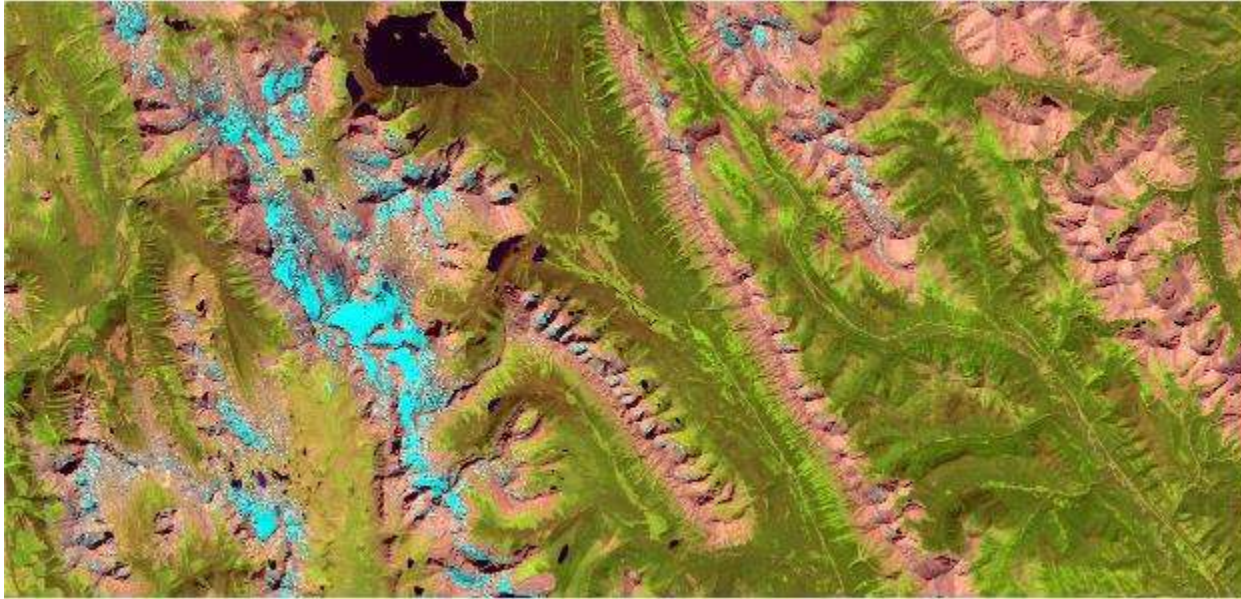
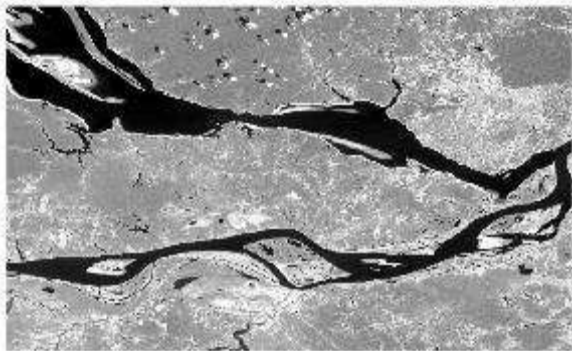# Seasonal Changes on Width at the Confluence of the Rio Negro and Rio Solimões, Amazon Basin, Brazil

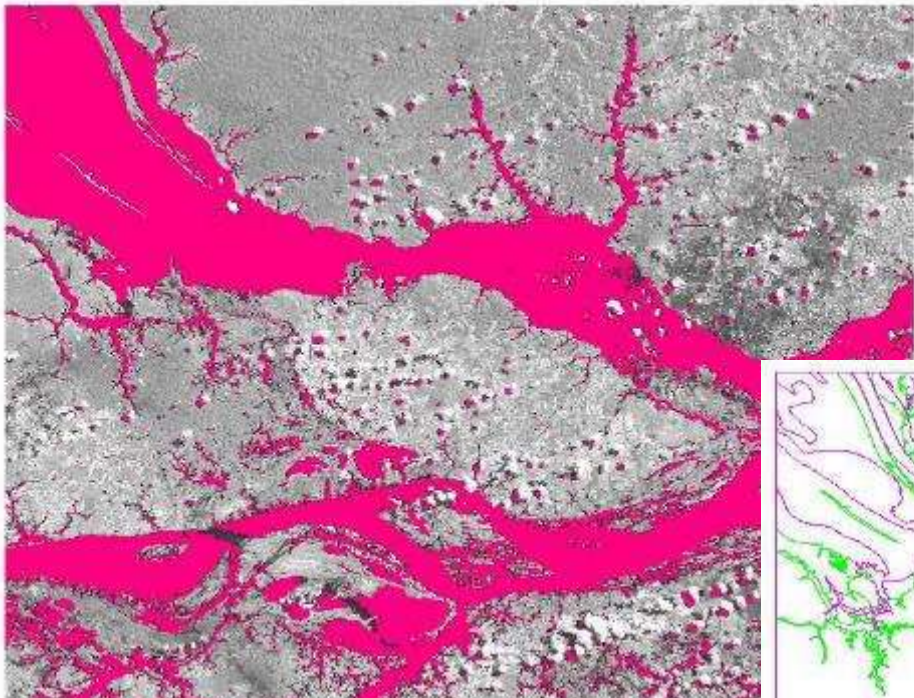July 08,2009 Landsat 5
(Flood season)
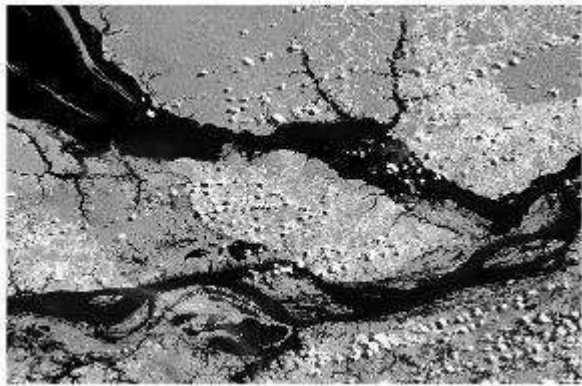
November   29,2009
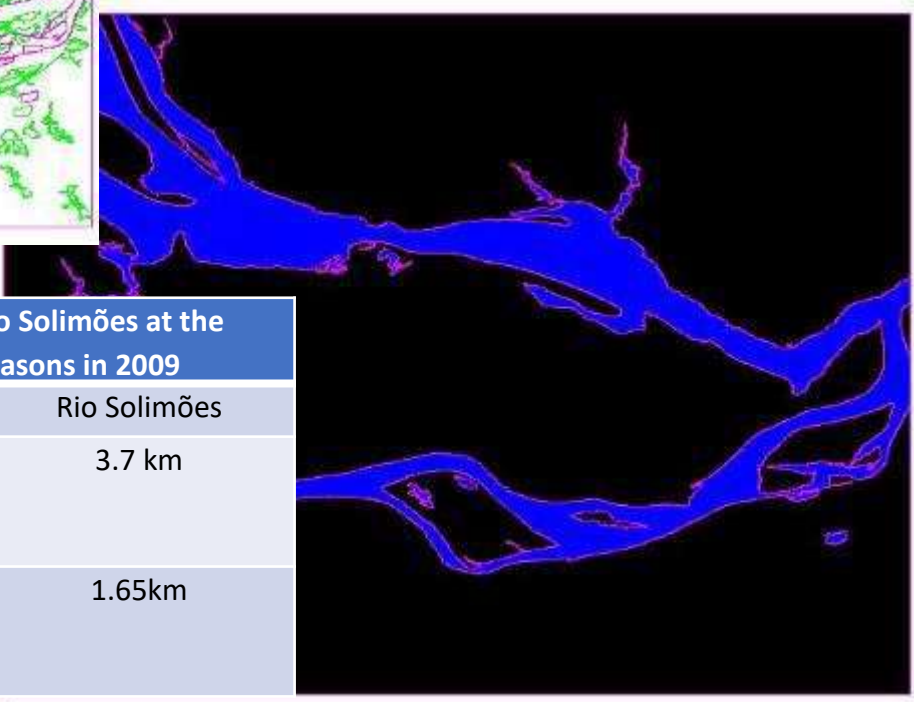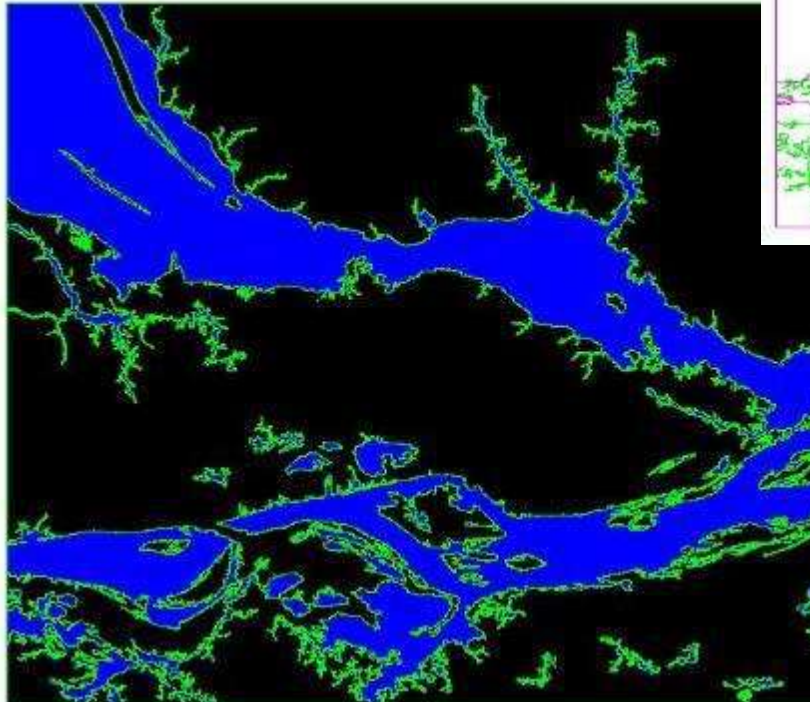Landsat 5 (Dry season)
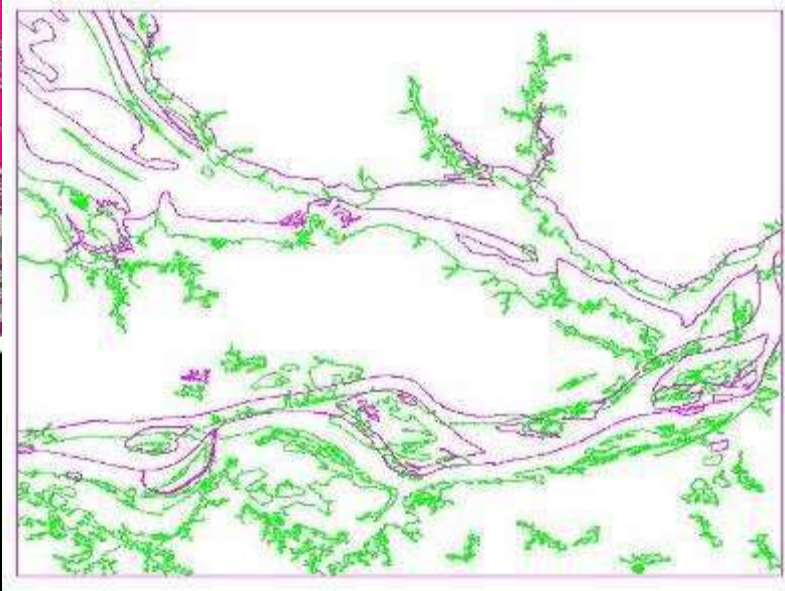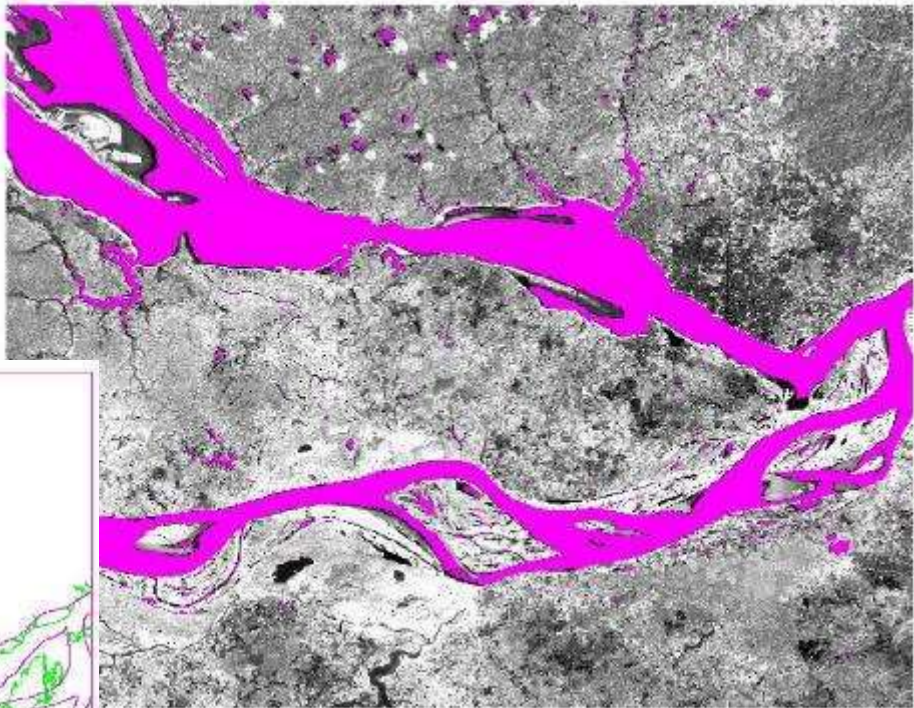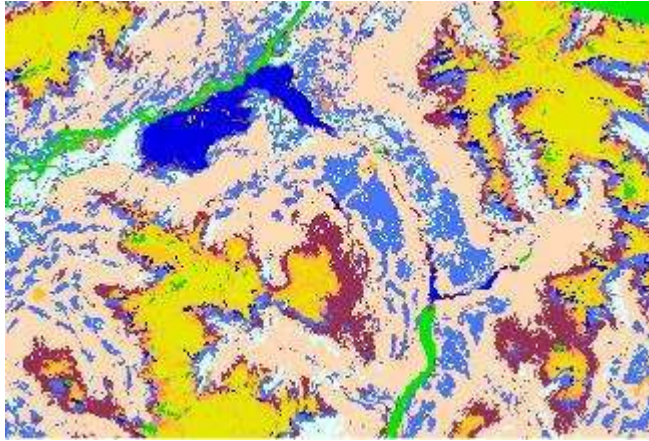
NDWI

Bitmaps and vectors : wet and dry season

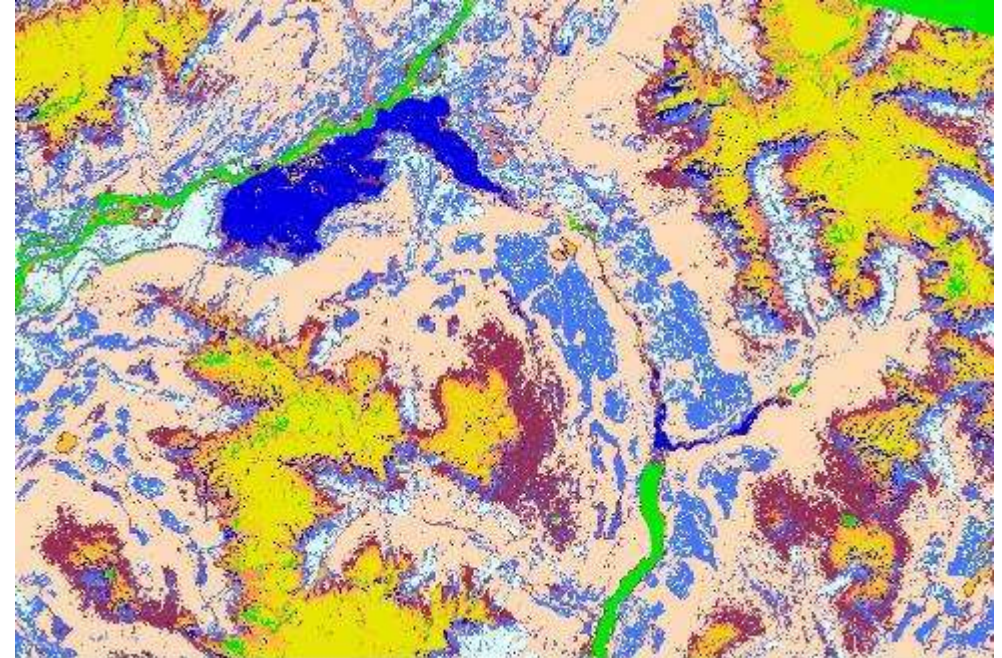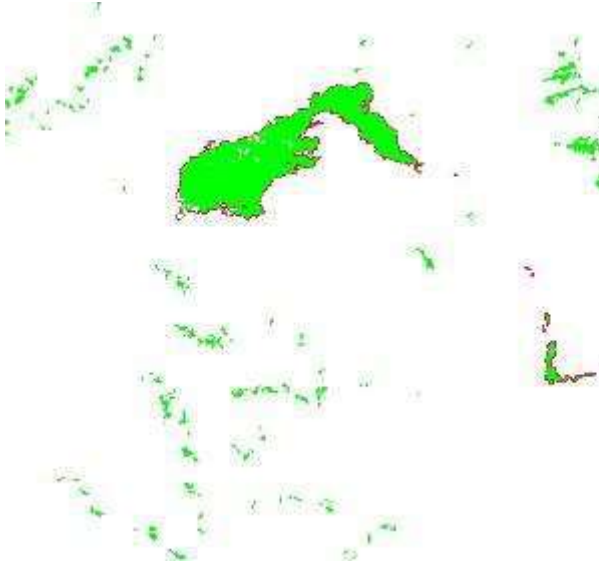| Table 1- The width of the Rio Negro and Rio Solimões at the confluence between the wet and dry seasons in 2009		
	Rio Negro	Rio Solimões
Wet Season- Landsat 5 image from July 08,2009	2.55 km	3.7 km
Dry Season- Landsat 5 image from November 29,2009	2.15 km	1.65km

Extraction of Lava Bed Area in Nisga'a Memorial Lava Bed Provincial Park (~1700 eruption)
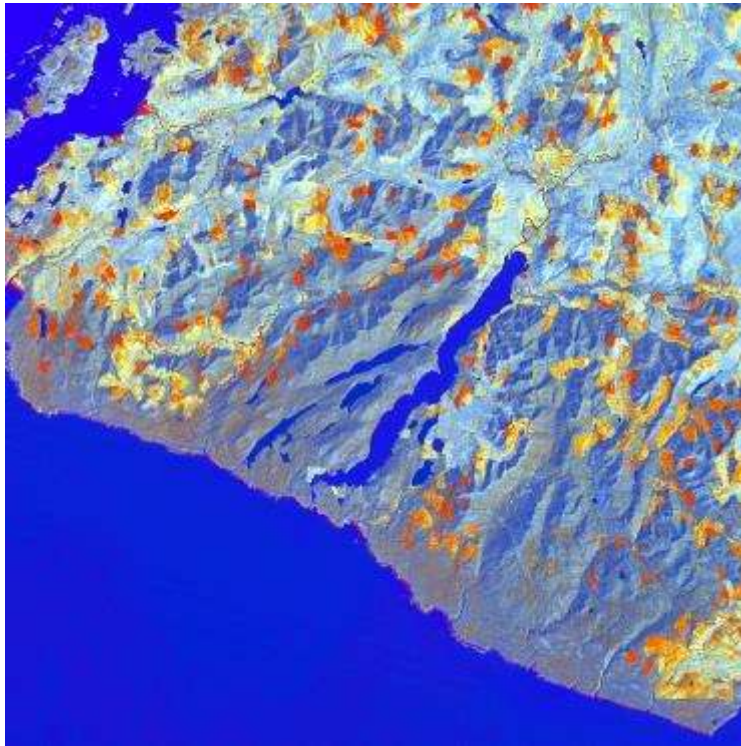

Legend:
- Lava bed
- Water
- Coniferous Forest
- Ice and Snow
- Bare Rock
- Cut Block
- Deciduous Forest
- Townsite
- Alpine

Sieved classification

Lava beds polygons

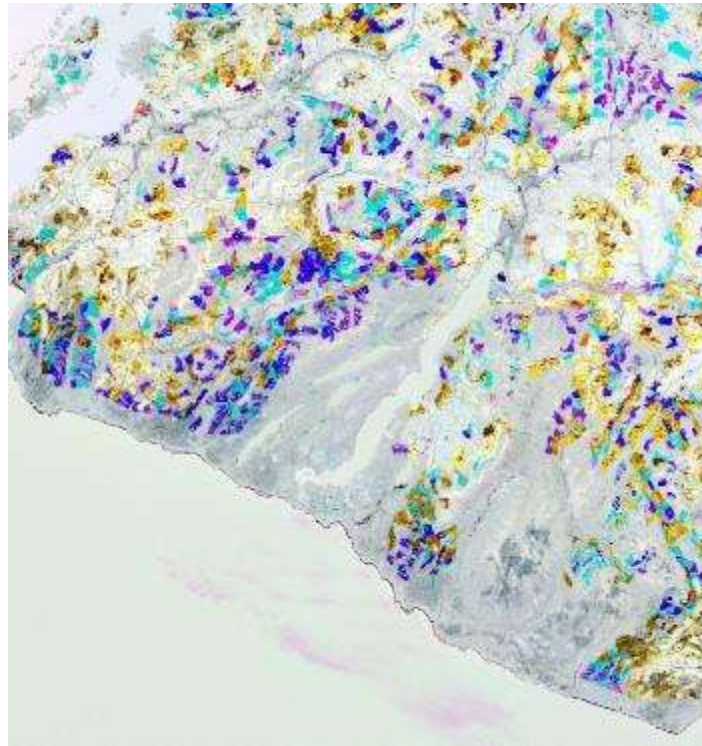# Anthropogenic changes in vegetation occurring around the West Coast Trail
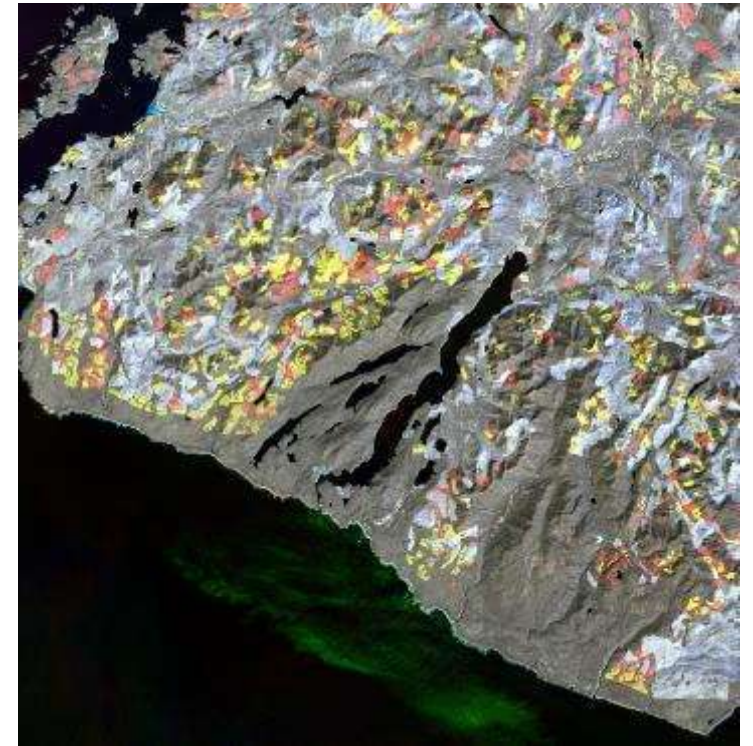

1995

2010

Tassel Cap images to extract cutblocks for 1995, 2004 and 2010

Tasseled Cap transformation for 1995: Brightness in red gun, greenness in green gun, and wetness in blue gun

Wetness: 2010 in red gun, 2004 in green gun, and 1995 in blue gun (linear stretch).

Brightness: 2010 in red gun, 2004 in green gun, and 1995 in blue gun (adaptive stretch).

Final composite showing 1995 band 543 with 2004 clearcut bitmap in yellow and 2010 clearcut bitmap in 50% transparent red