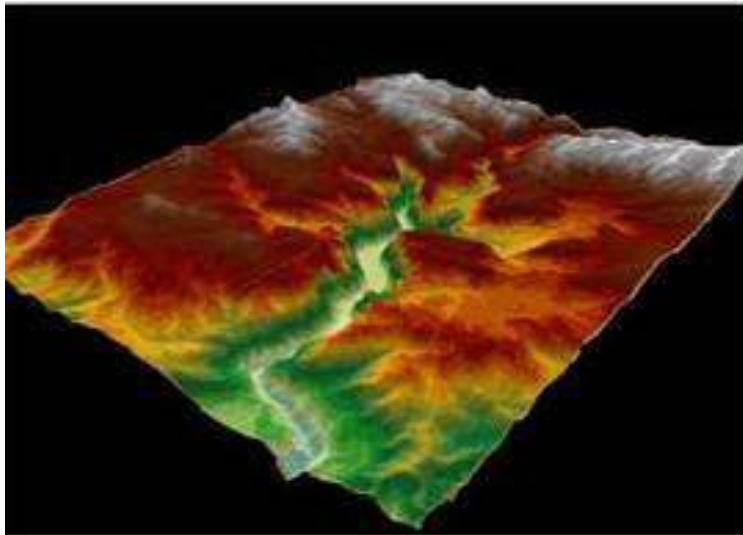


# History of mapping II: the digital era

<http://www.davidrumsey.com/GIS/3D.htm>



# The digital era and mapping changes

## 1975-95: transition

**1970s:** little affordable software, hardware or data

**1980s:** more software (including GIS) but still no data  
- PCs exist but expensive and not very powerful

**1989:** GPS operational

**1995:** growth of desktop computer mapping

- government stopped 'making maps' (Canada) and focused on providing data for others to use
- BC completed TRIM I data, distributed GIS data layers
- End of digitising tables / tablets, manual cartography
- First colour laser printers

# Digital plotting - Laser or ink-jet printers

~50cents per page - letter / tabloid



**Or just don't print it –  
no hardcopy needed**

**leave it onscreen  
(‘softcopy’)  
- No print cost**

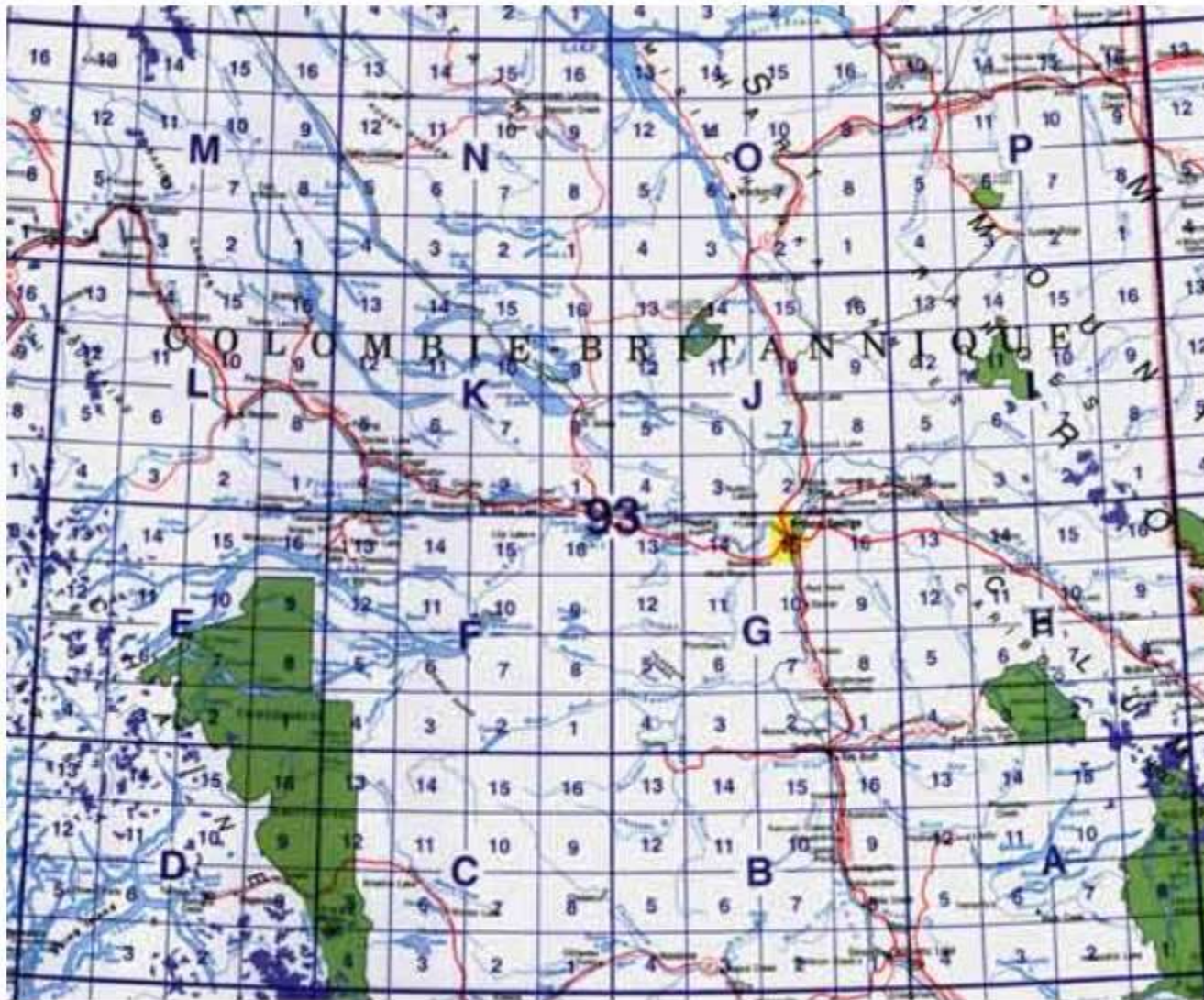


Digital plotting: 'small runs' -> ink-jet plotters ~\$5-10/sq.ft  
Large runs -> offset printing (printing plates) - \$000s



**Poster size plotter (48 x 36")**



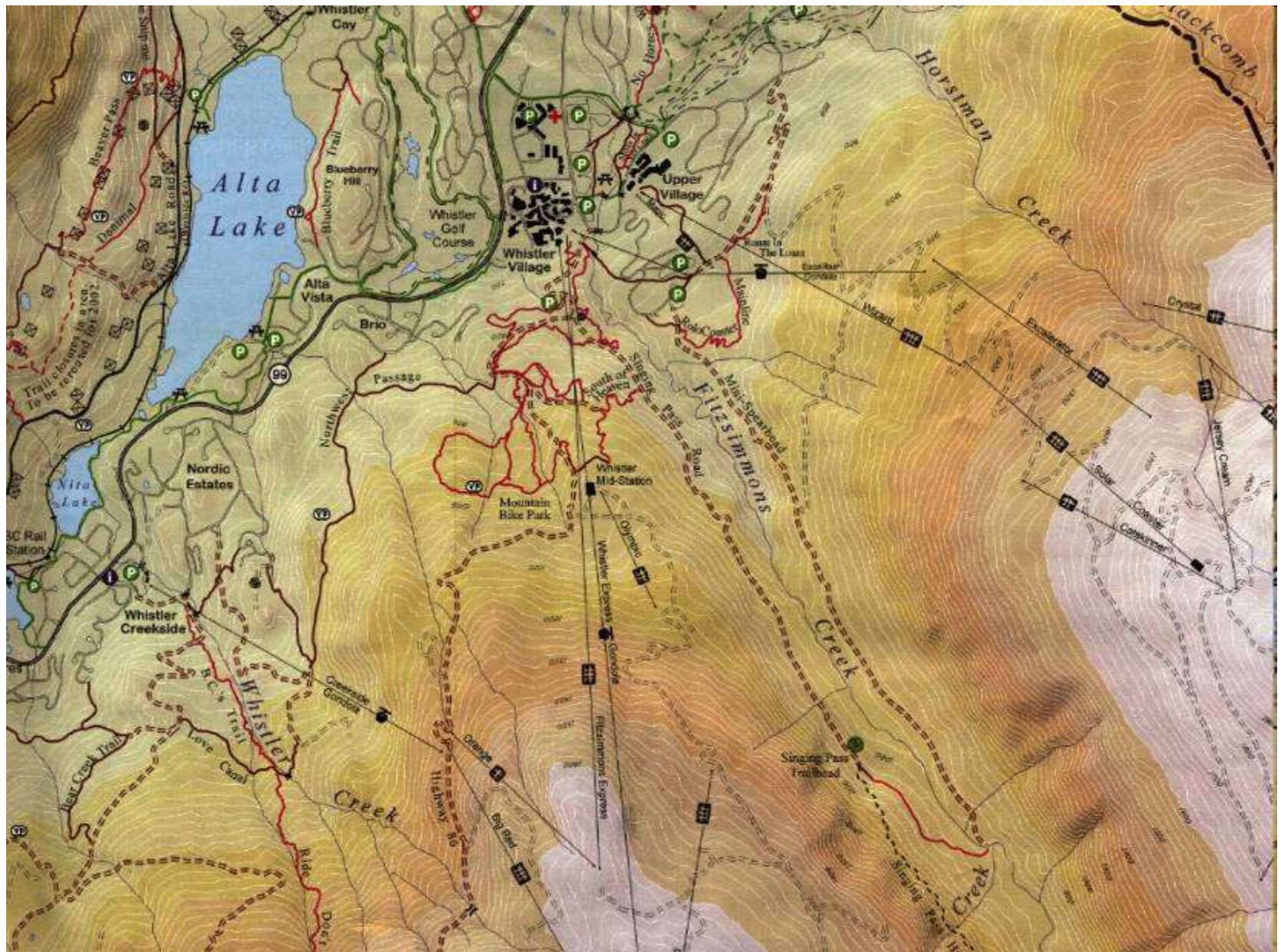


**1:50,000 series**

**Completed 1995 for provinces, 2012 for Territories  
available by 2000 but cost \$500 per map sheet; free from 2009**



# BC TRIM Digital mapping 1:20,000 1990s ->



# The digital era and mapping changes II

**2000s:** Data more freely available (post 2005)

**2005:** Map viewers e.g. Google Maps/Earth

**2008:** Landsat (NASA) data free

**2009:** NTDB data free (free at last ...) and BC TRIM

**2010s:** new data sources e.g. UAVs (drones); LiDAR

- more satellite images, higher resolution
- Mapping in the cloud
- Open source (free) software



# Mapping software

## a. Draw programs

These are the simplest, and may be appropriate for simple location maps.

Many display 'bitmap' /raster images, not suitable for fine line detail.

Free with Operating System

MacDraw, Paintbrush (Mac)

Paint (Windows)

GIMP (Linux, Mac, Windows)

MapMaker (google maps)

Sketchup (google Earth)

<http://cartographersguild.org/>





## b. Graphic design programs

- more options than draw programs and better cartographic output
- They can store data on separate 'layers' to generate a series of maps.
- Intended for general graphics design, not specifically mapping. But they are widely used for maps in books, magazines and newspapers, and courses teaching cartographic design.
- Graphic Design programs do not address **spatial georeferencing**.
- Data layers can be overlain but do not have geographic coordinates.

Examples: Adobe Illustrator and CorelDraw - Ottawa

Inkscape (Linux, Macintosh, Windows) - free

Free base maps: <http://d-maps.com/>

—





[illegible]

## c. Desktop mapping programs

developed specifically for mapping and can import geo-referenced data

Examples: [Mapinfo](#)

GPS mapping: [OZIexplorer](#) [Fugawi](#) (free)

Some mapping programs have 3D (DEM) options: [OZIexplorer3D](#)

SimplyMap: <http://geographicresearch.com/simplymap/>

A Canadian company - [Avenza](#) - has created 'Map Publisher' to work as an add-on with Illustrator, or Geographic Imager for Photoshop (see next slide) .. This adds georeferencing





## Map Publisher example

Jeff Clark  
 Spatial Vision Group  
 North Vancouver, British Columbia  
[www.spatialvisiongroup.com](http://www.spatialvisiongroup.com)

<http://www.avenza.com/resources/map-gallery>



## d. Computer-assisted design (CAD) programs

These were initially intended for architectural and municipal design, and therefore reach a market larger than just for mapping applications.

The two industry examples are:

[AutoCad](#) (architecture) and [Microstation](#) (forestry).

The data formats (.dxf and .dgn) are standard formats for importing and exchanging data with GIS programs.

Attributes describe design not features

CAD programs do not do 'GIS' analysis  
e.g. cannot create hillshading, buffering

They can involve georeferencing





## Urban planning and design before the invention of AutoCAD, 1950-1980



General Motors Technical Center in Warren Michigan.



<https://rarehistoricalphotos.com/life-before-autocad-1950-1980/>

## e. GIS programs : designed for mapping and analysis

These differ from mapping programs as they can also perform:

- analysis e.g. shaded relief, overlay
- database management  
(e.g. mapping by attributes)
- Management of different projections

1	plot_id	stand	sp1	sp2	stand_age	age_cl	stand_ht	height_cl
2	1	341	*	"	0	0	0	0
3	2	653	'S'	'AT'	140	7	32	4
4	3	461	*	"	0	0	0	0
5	4	654	'AT'	'EP'	120	6	28	3
6	5	732	*	"	0	0	0	0
7	6	653	'S'	'AT'	140	7	32	4
8	7	651	'AT'	'EP'	60	3	18	2
9	8	652	'S'	'PL'	30	2	14	2
10	9	780	'EP'	'AT'	80	4	24	3
11	10	739	'AT'	'S'	90	5	23	3
12	11	320	*	"	0	0	0	0
13	12	320	*	"	0	0	0	0
14	13	461	*	"	0	0	0	0
15	14	636	'PL'	'S'	90	5	19	2
16	15	530	*	"	0	0	0	0

e.g. ArcGIS, QGIS, Idrisi, CARIS

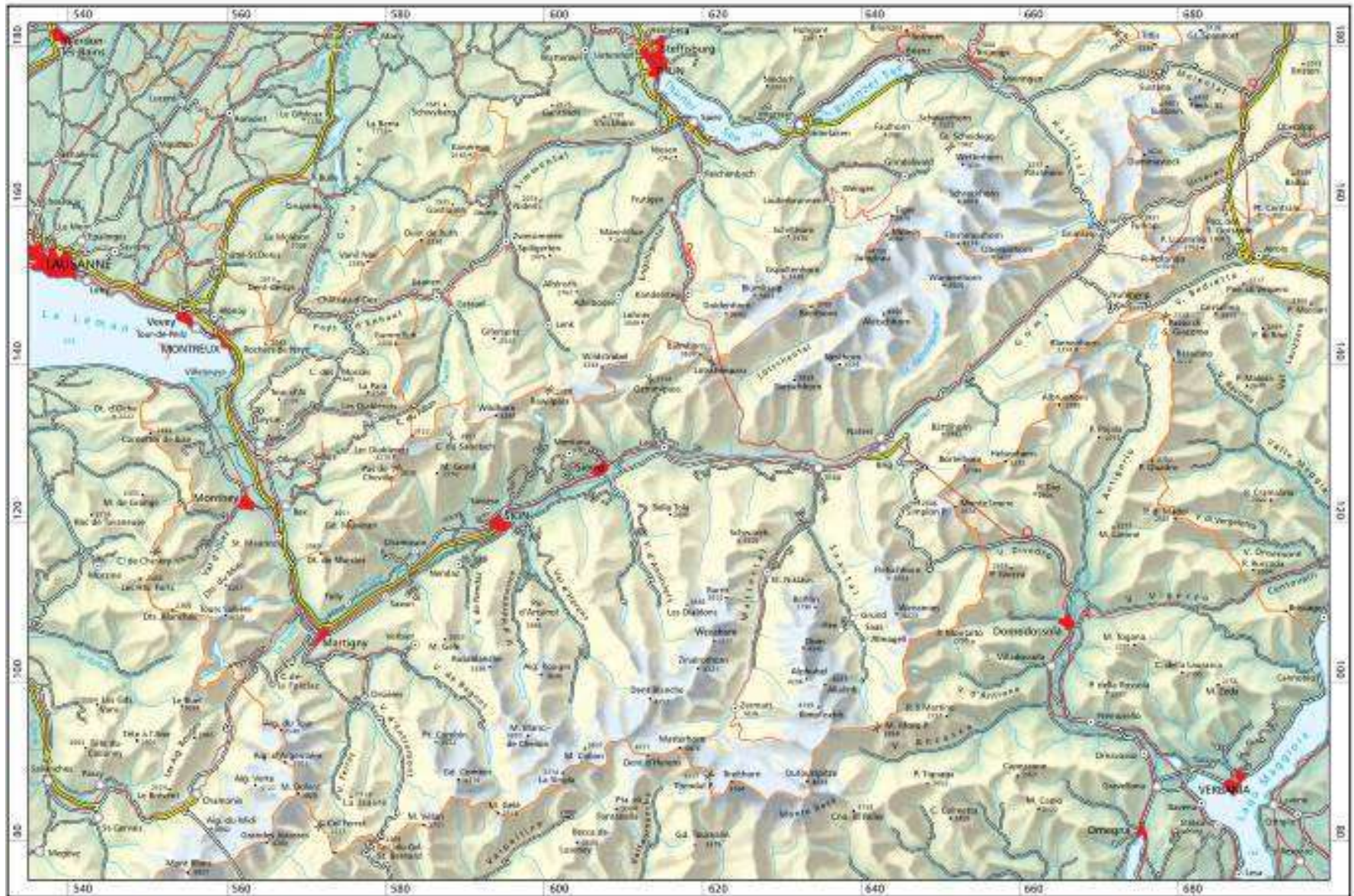
It was once common to import GIS files into graphic design programs for final output, but is less common now as GIS vendors have 'beefed up' output options.



# Data acquisition through ArcGIS; design with CorelDraw (Andreas Neumann)

## Kanton Wallis - Übersichtskarte

1 : 800 000



Quellen:

1:250 000, 1:50 000, 1:25 000

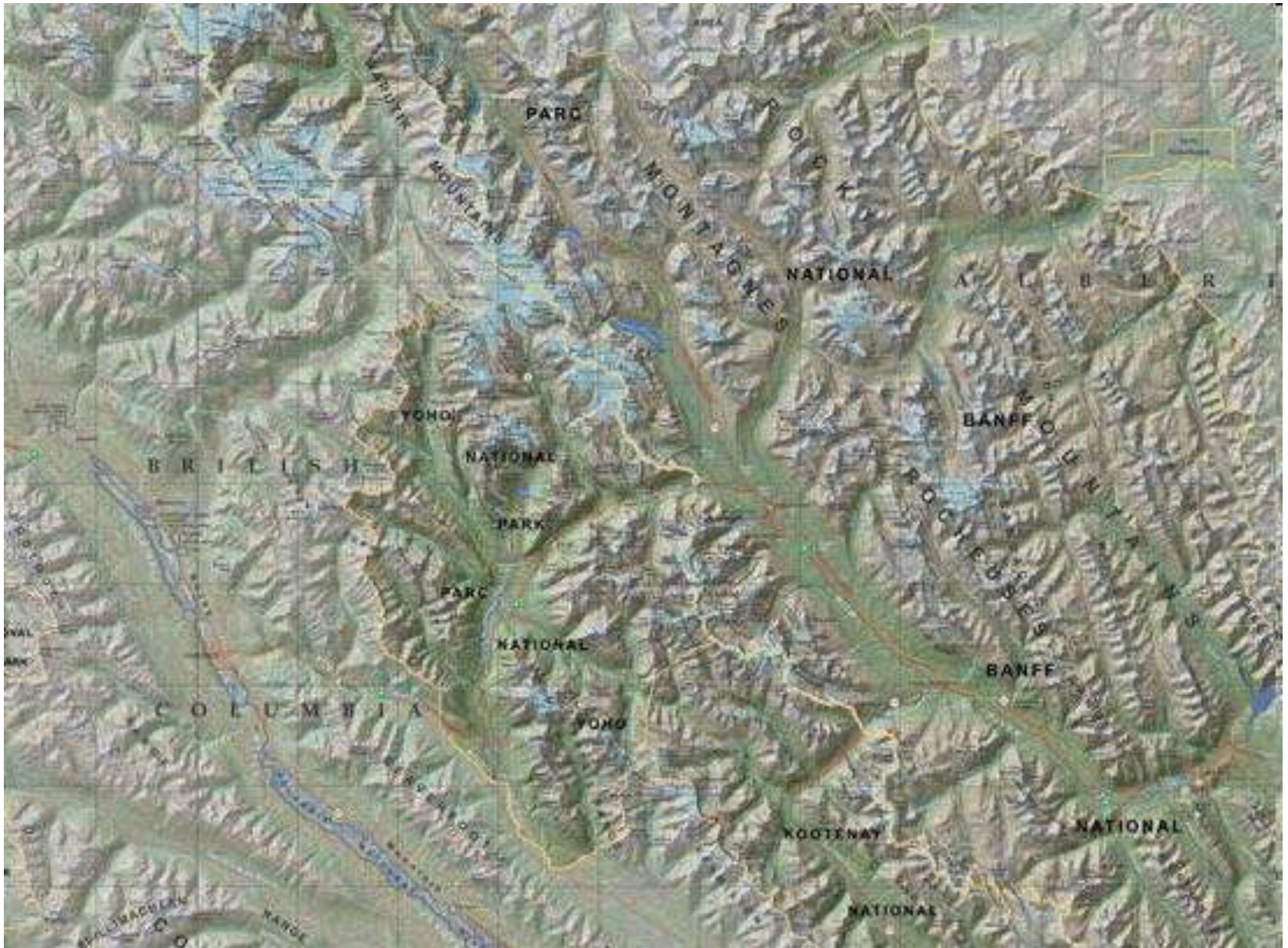
10 0 10 20 30 40 50 km

Übungen in Kartenentwurf und Kartentechnik SS 97  
Institut für Kartographie, ETH Zürich, 1997



Layer import and design using ArcMap, final design in Photoshop  
ESRI Canada 2010 mapbook: April **Banff, Yoho and Kootenay National Parks**

<http://www.esricanada.com/english/9487.asp>





## Trails of Prince George: *Forests for the World*

- |                                      |            |     |  |
|--------------------------------------|------------|-----|--|
| ===== Major Trail =====              | Main Trail | ●   | Map, Marker Post or Natural History Sign |
| - - - - - Secondary Trail            |            | —   | Gate/Barrier                             |
| - - - - - Single-track Trail         |            | ▲   | Spot Height, metres above sea level      |
| - - - - - Route (may be overgrown)   |            | ☐   | Picnic Shelter                           |
| — Wood Chipped Surface/Skid Line     |            | Ren | Natural History Panel Key Word           |
| J3 Trail Junction Label: On Map only |            |     |  |

Data Sources:  
 Shaded Relief, Contours, Lakes: City of Prince George Open Catalog,  
<http://princegeorge.ca/cityservices/online/odc/Pages/Terms.aspx>  
 Map Design, Trail and Infrastructure Survey and Data Analysis by  
 the map author, © Nancy Doreen Alexander  
 Contact: ndigart@gmail.com

Grid Tic Interval: 500 m  
 Contour Interval: 5 m  
 UTM Zone 10 N  
 Datum WGS84

0 100 Metres

Grid North  
 West ← East  
 South  
 Magnetic Declination:  
 18°51', 2011

To UNBC

Water Tower

Platform

Dock and Viewing Deck

Dock

Shane Lake  
 813 m

Reflecton Lake

To Greenway Trail & UNBC Trailhead

To Greenway Trail

To Greenway Trail

To Greenway Trail

510000

511000

510500

5972000

5971500

5971000

807 m

Farmer

J3A

640 m

Who's Home

J4

869 m

Jack

J5

850 m

Reno

J6

885 m

Pioneers

J7

869 m

Normans

J8

827 m

Animal Life

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832 m

J10

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J11

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J12

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# f. Online web mapping

[https://en.wikipedia.org/wiki/Web\\_mapping](https://en.wikipedia.org/wiki/Web_mapping)

Online seamless maps / map viewers – zoom / interactive  
-created using programming code and input display layers

e.g. Google Maps, Openstreetmap

Proprietary: ArcGIS online

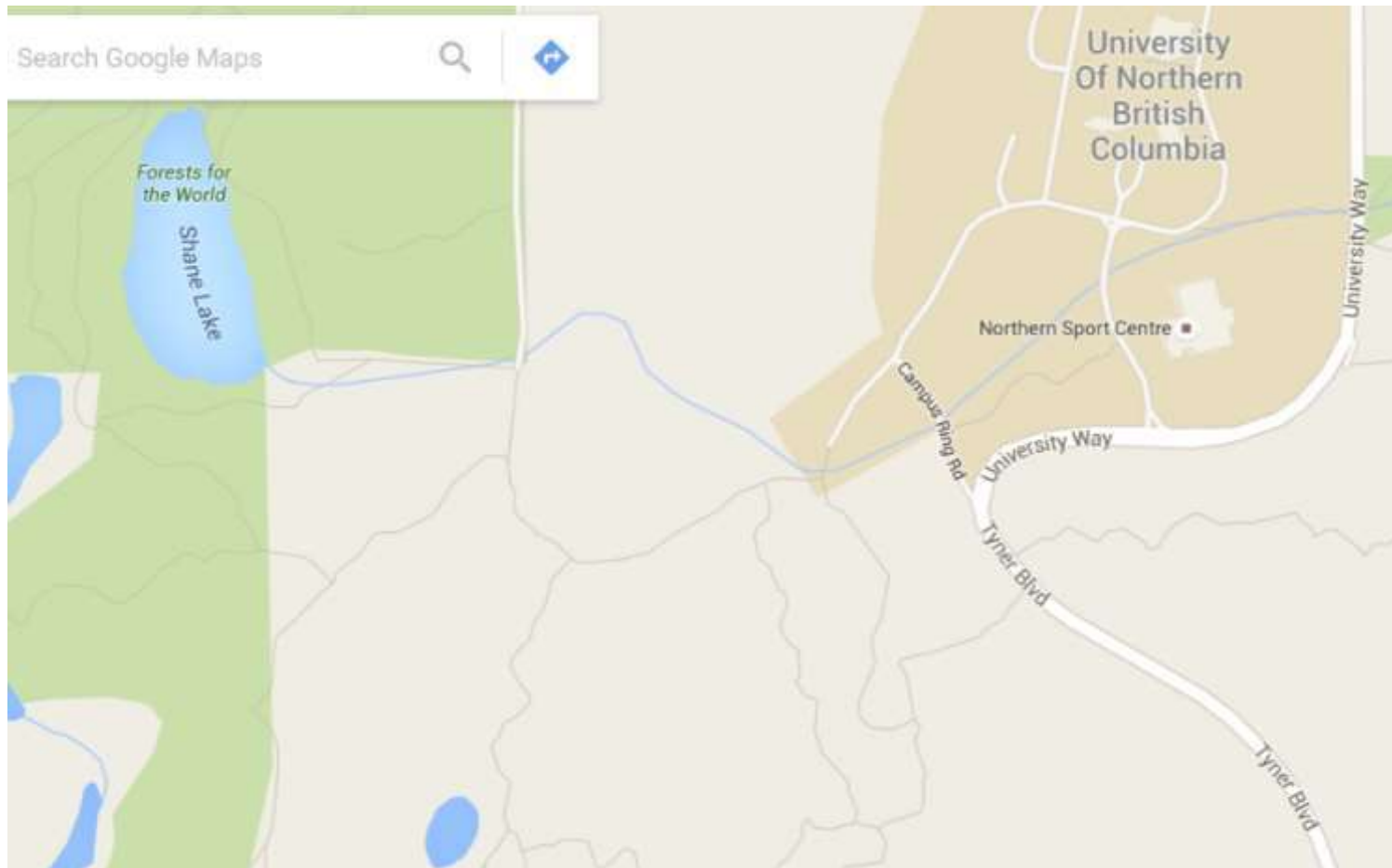
## **Open Source**

QGIS2Web:	GIS based web mapping for QGIS
Leaflet:	JavaScript Library for interactive maps
GDAL:	Geospatial Data Abstraction Library
OpenLayers:	open source JavaScript
MapWindow:	opensource GIS application
MapBox:	online custom maps
CartoDB:	cloud computing in a web browser

# Advantages of digital cartography: ... compared to manual cartography

Digital mapping – easier to update (but not always done)

Google maps – updated regularly by local users using GPS



# Advantages of digital cartography:

- Less graphic / artistic skills needed
- Colours / patterns easier to apply
- Easier to make changes and updates
- Easier to import layers and print
- Conversion of map projections
- Integration of geomatics -mapping, GPS, imagery
- Mapping is 'cool' ? (if the system works well)



# Disadvantages of digital over manual

- So much new to learn .. complex systems
- Maps can be produced by anyone ... 😊
- Hardware/software needed - and can crash
- Why does this software HATE ME ??

# The promises of digital cartography

- Fast updating... (?) ->

- **Seamless databases**



- early 2000s - download Map data by sheet e.g. NDTB/TRIM
- .. and then merge / mosaic
- post ~ 2015 - download by AOI (Area of interest)

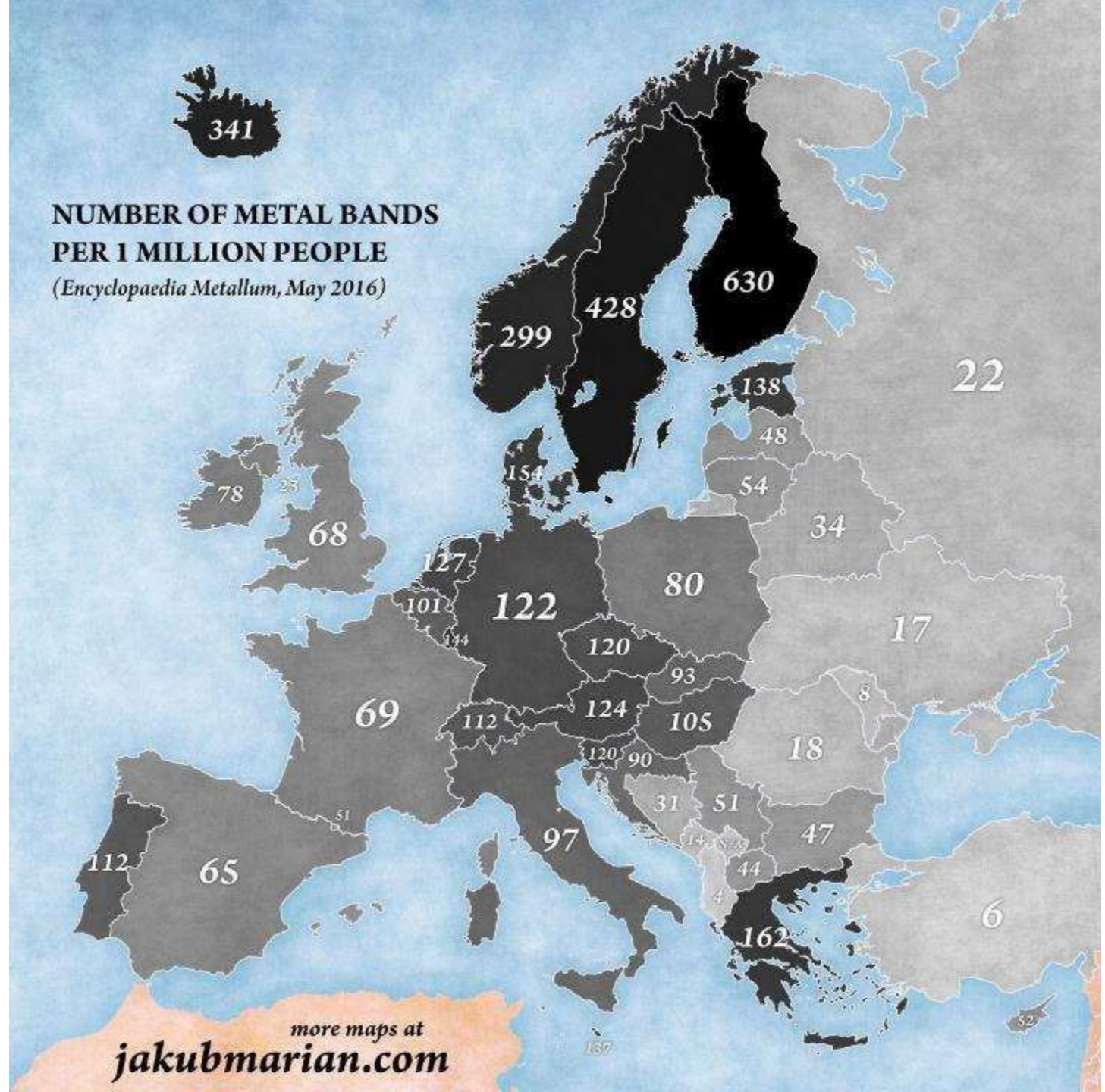
# Changes in Cartography in the late 20<sup>th</sup> -21<sup>st</sup> centuries

-> much bigger than the breakup of the Soviet Union





## Base map + spreadsheet



# Google Maps Error Sees Wrong House Demolished

Demolition workers were supposed to knock down 7601 Cousteau Drive, but Google Maps directed them one block away to 7601 Calypso Drive. I mean, this is just the worst," Diaz told North Texas news outlet WFAA. "it's not a big deal" say Billy L. Nabors Demolition, whose motto is *'We could wreck the world; but Jesus Saves'*

