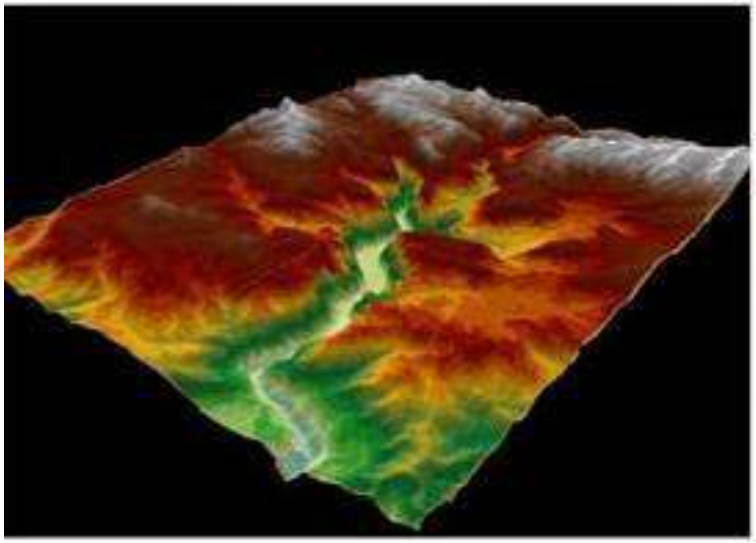
History of mapping II: the digital era

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

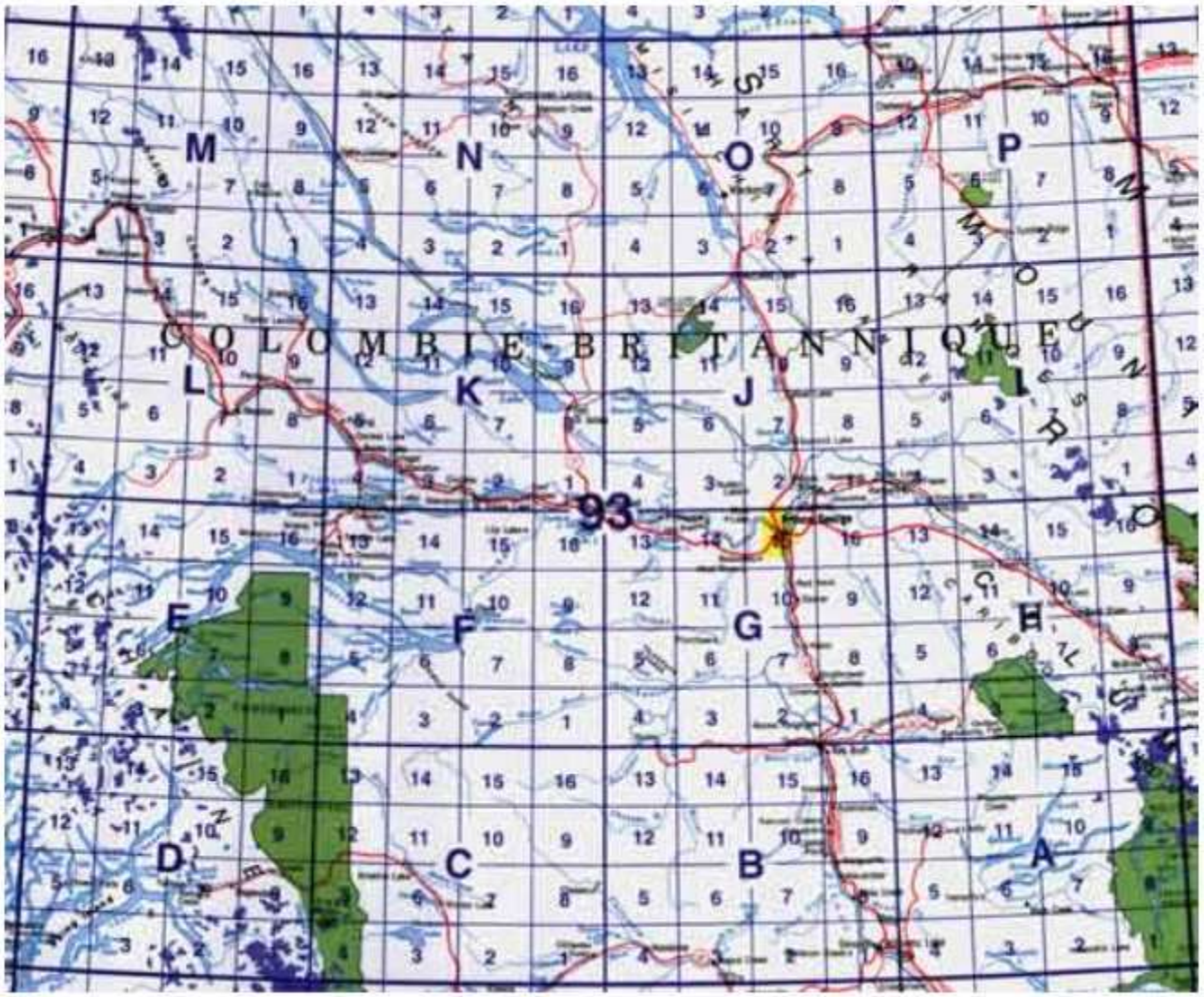
Or just don't print it – no hardcopy needed

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")

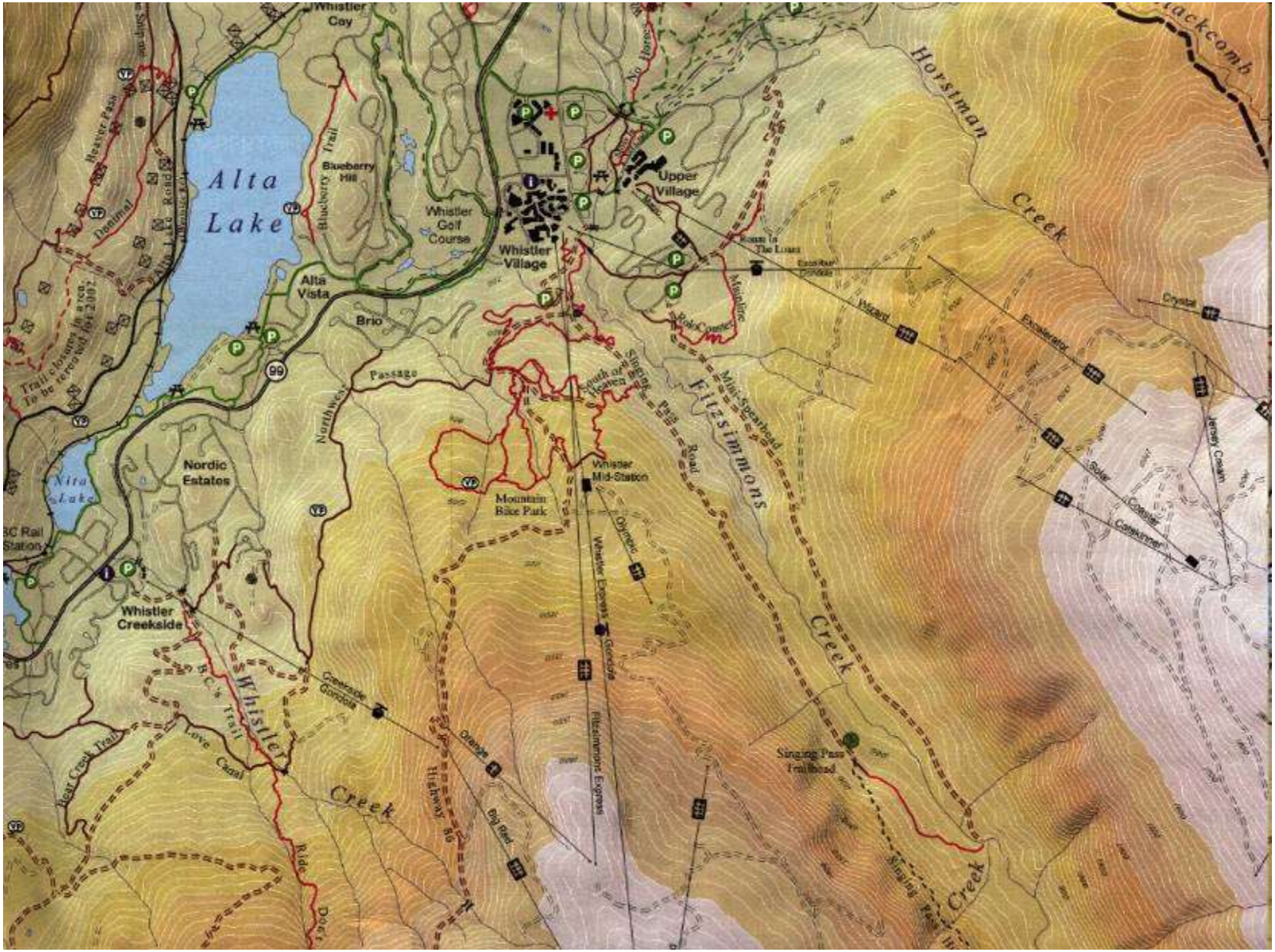


1:50,000 series

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.

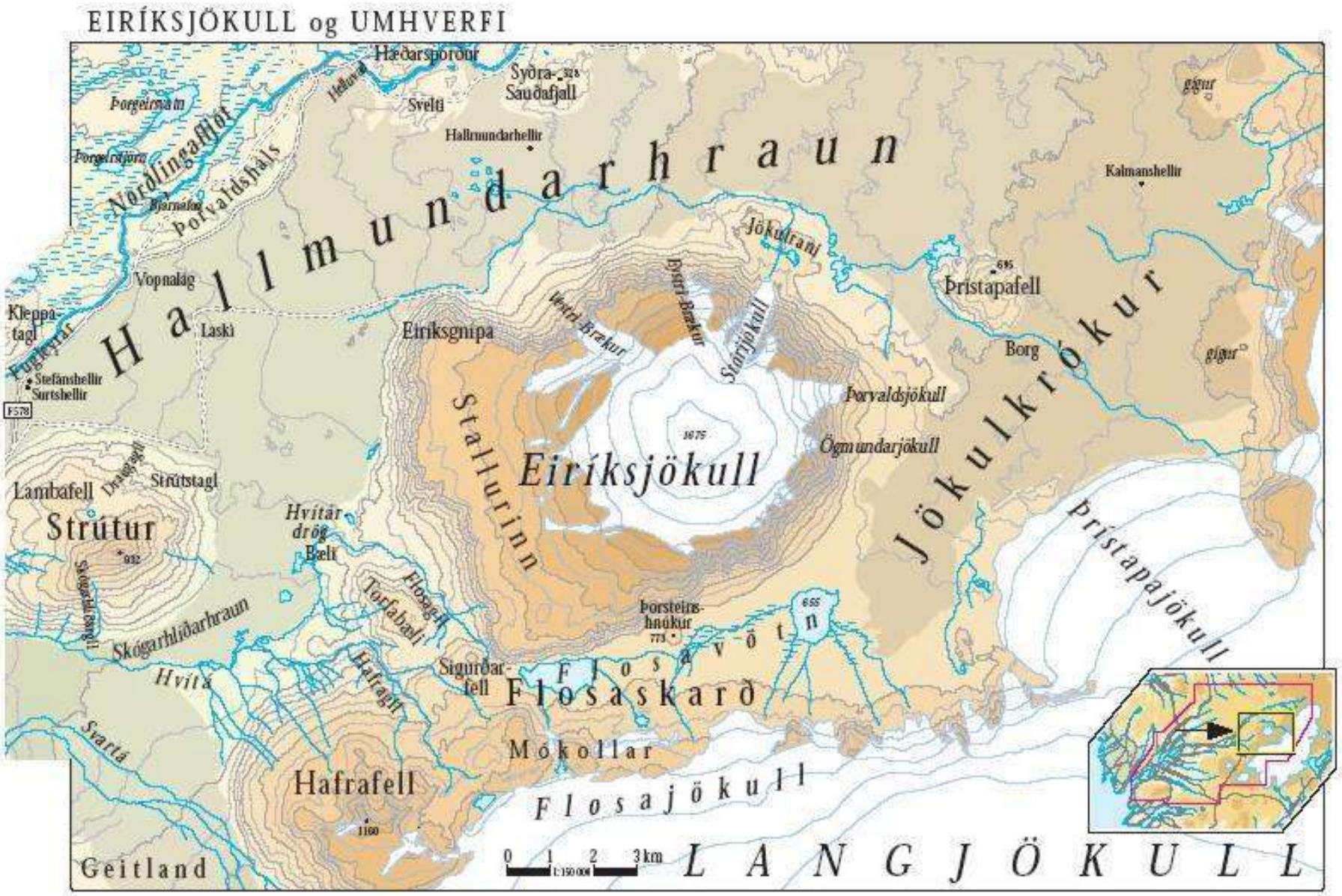
- Graphic Design programs do not address **spatial georeferencing**.
- Data layers can be overlain but do not have geographic coordinates.

Examples: Adobe Illustrator and CorelDraw - Ottawa

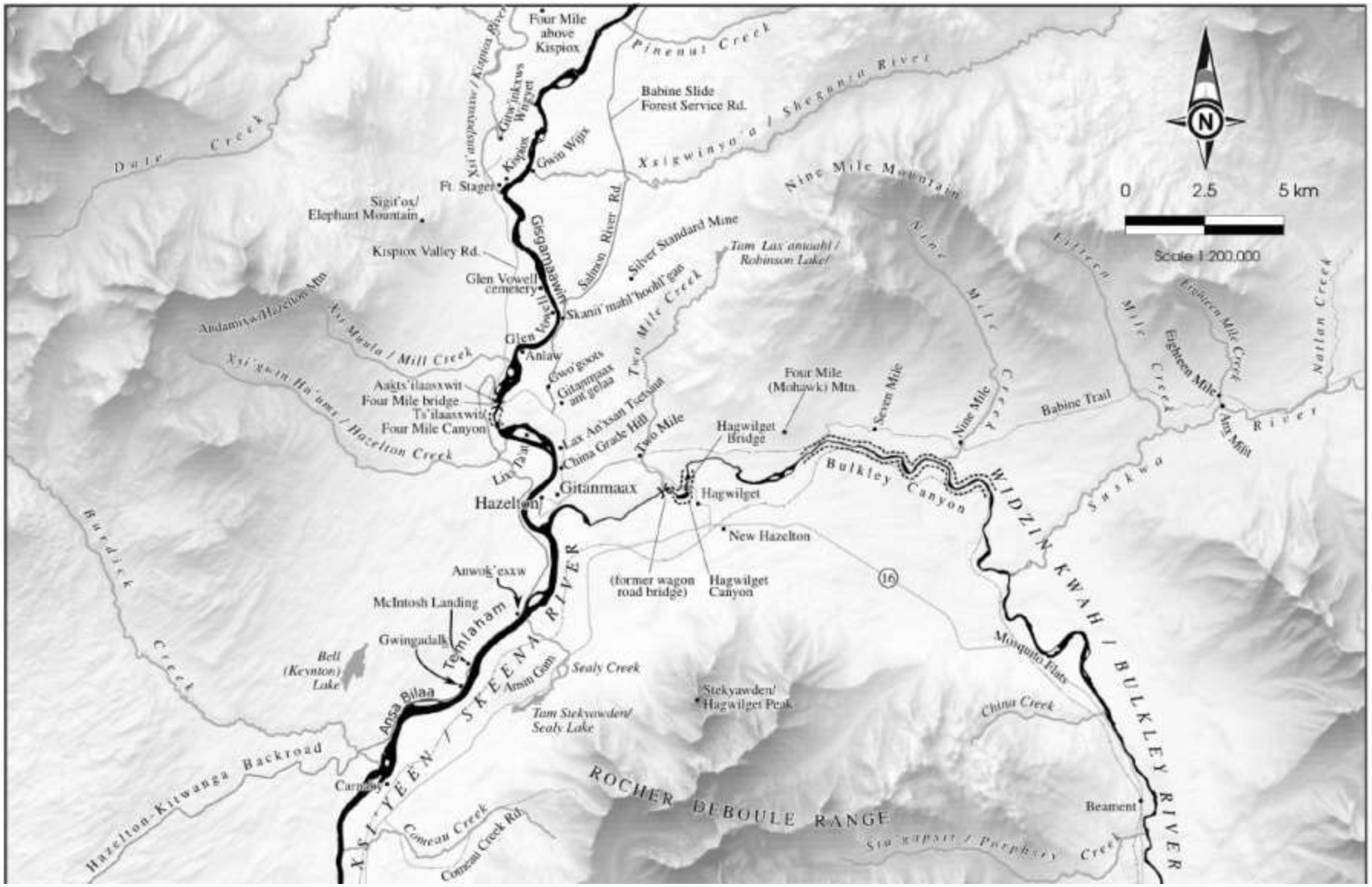
Inkscape (Linux, Macintosh, Windows) - free

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

Iceland travel map – made with Illustrator (Gudmund Ingvarsson)



Northern BC example, by Morgan Hite using Inkscape software



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.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.

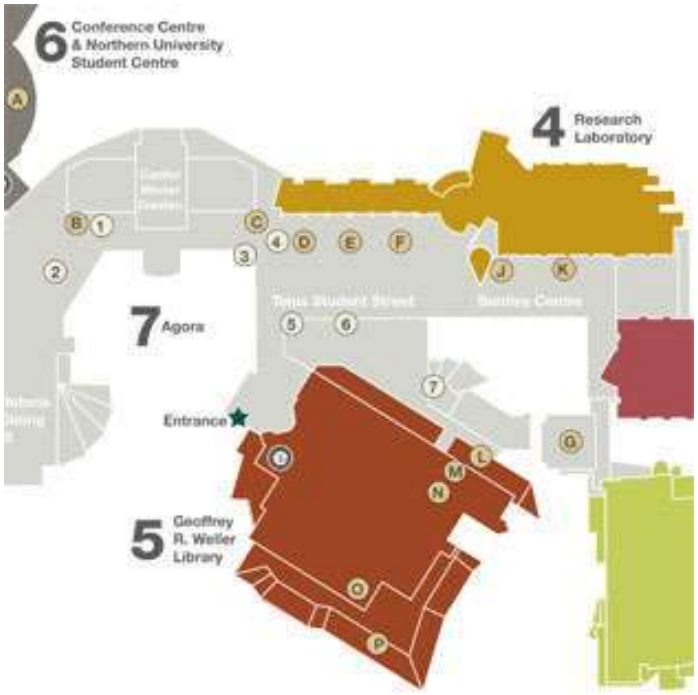
The two industry examples are:
AutoCad (architecture) and Microstation (forestry).

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:

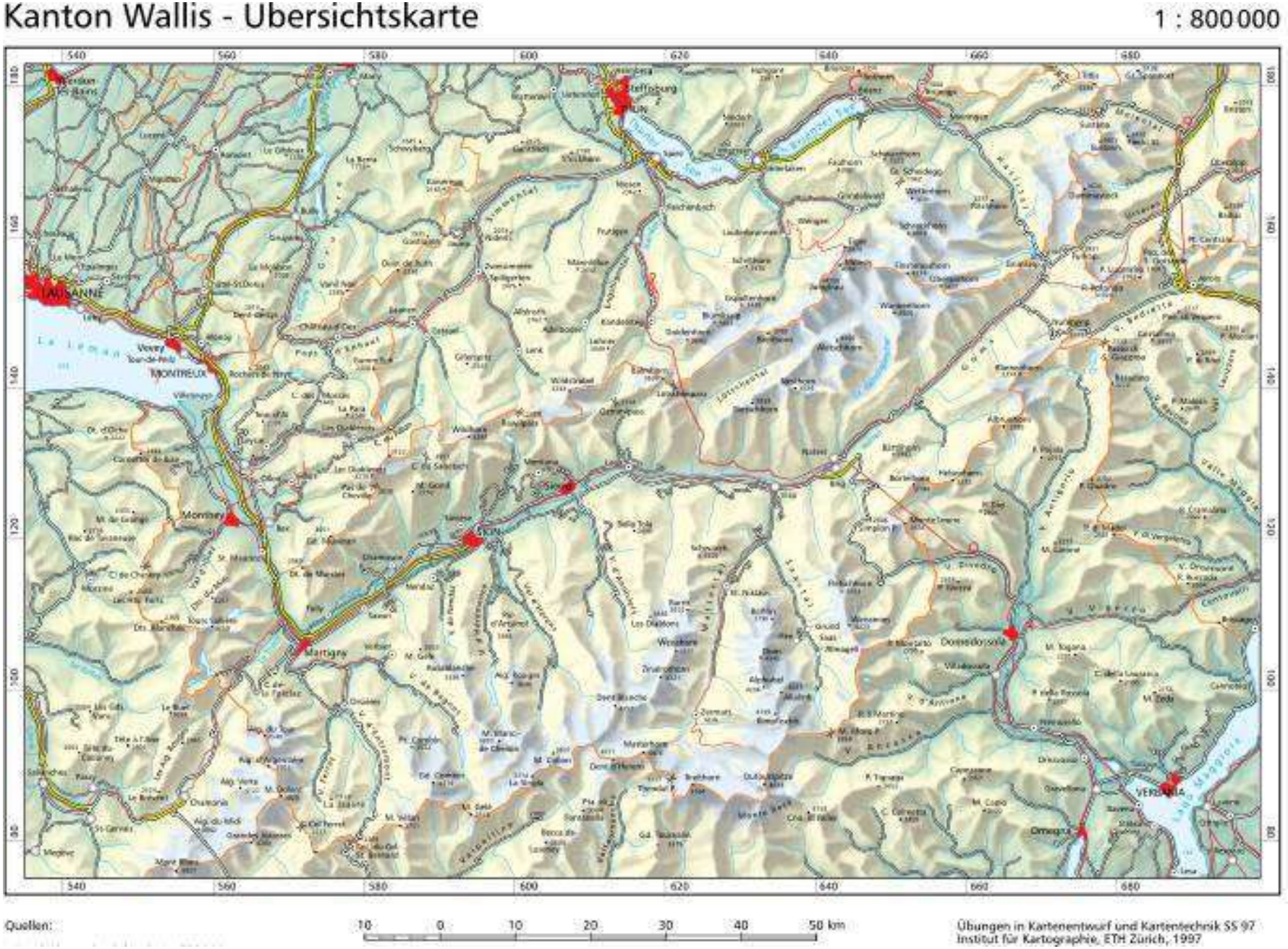
- analysis e.g. shaded relief, overlay
- database management
  (e.g. mapping by attributes)
- Management of different projections

	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

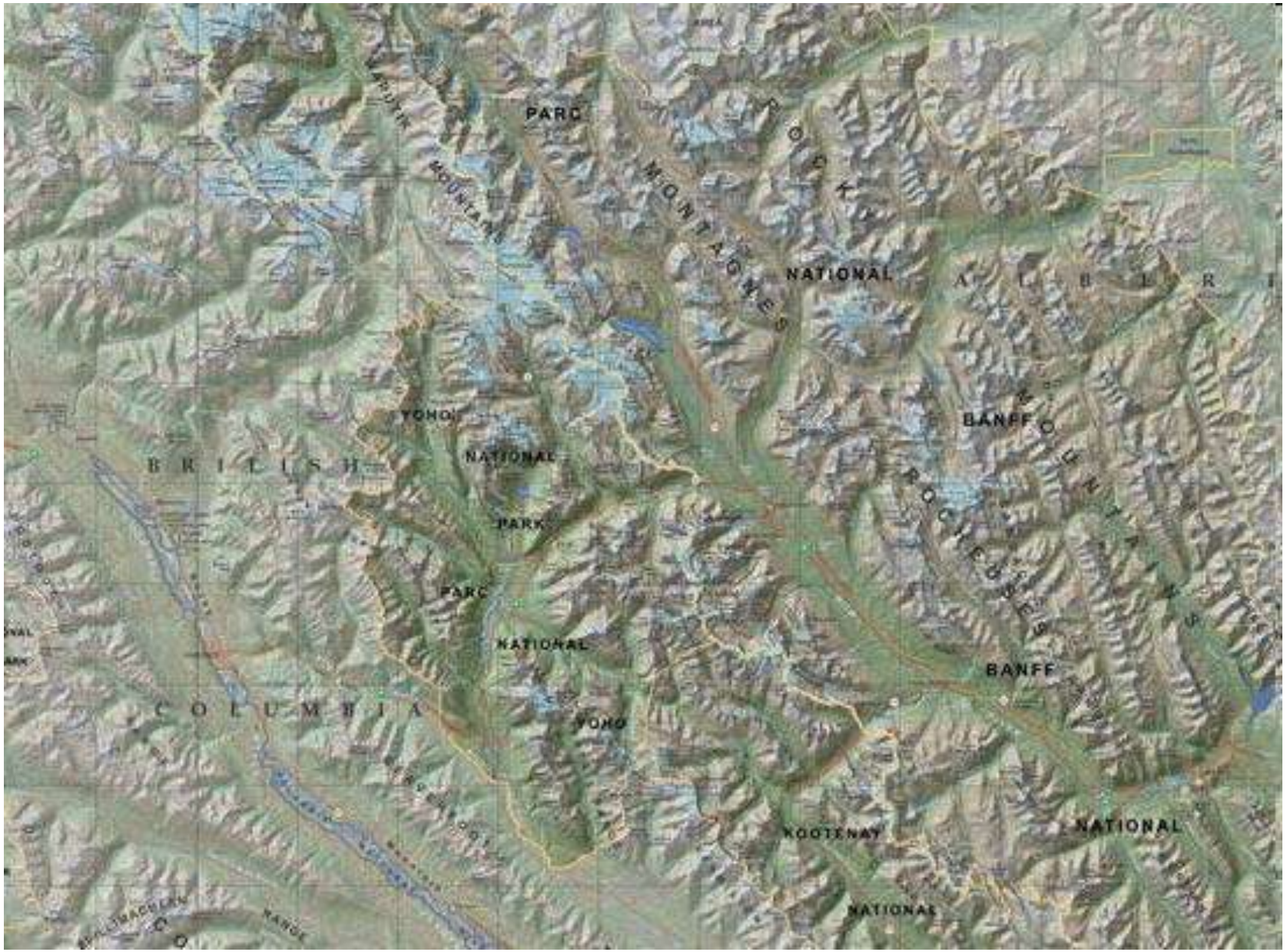
It was once common to import GIS files into graphic design programs for final output, but is less common now as GIS vendors have 'beefed up' output options.

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

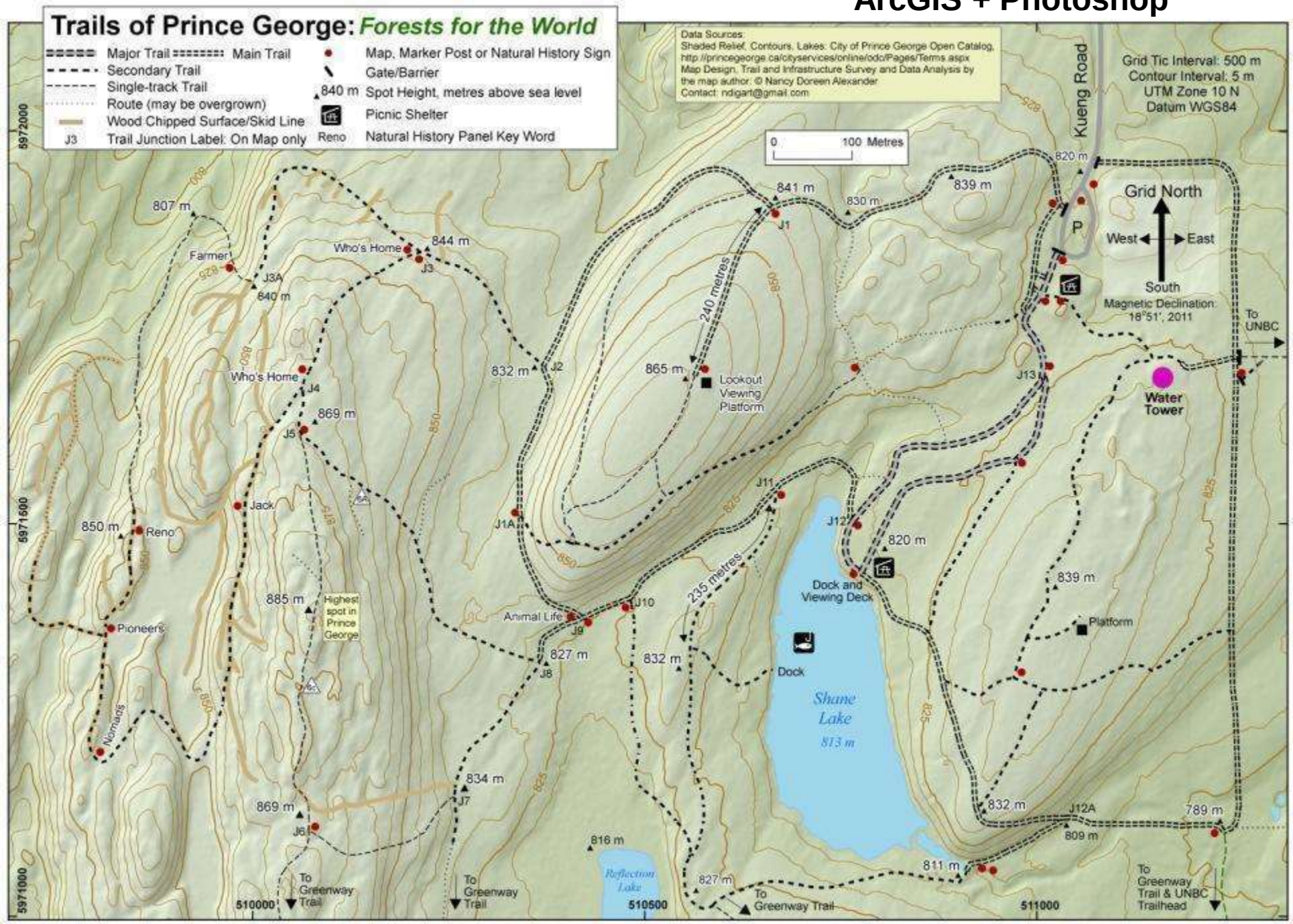


Layer import and design using ArcMap, final design in Photoshop
ESRI Canada 2010 mapbook: April **Banff, Yoho and Kootenay National Parks**

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



ArcGIS + Photoshop



f. Online 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

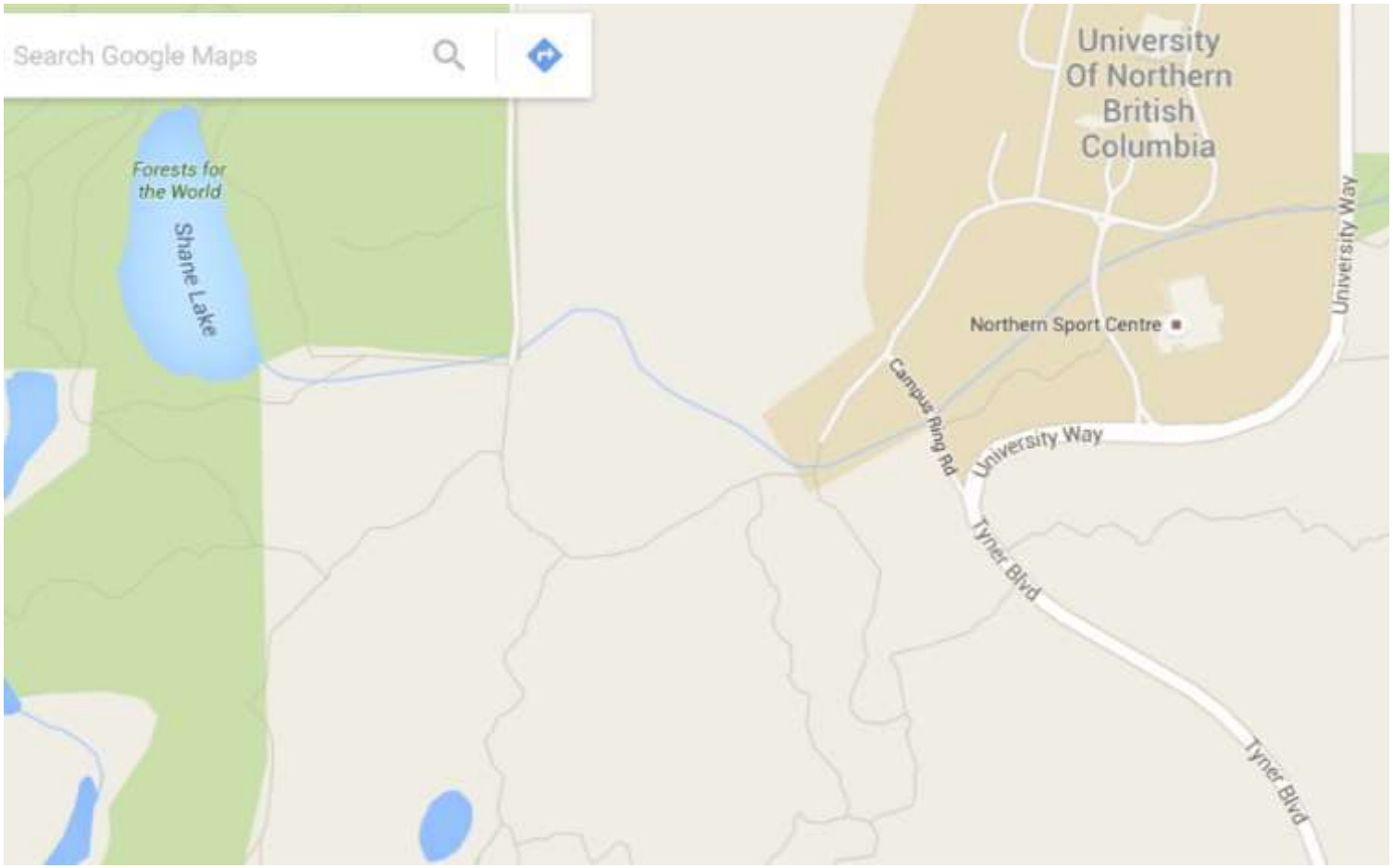
Open Source

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**

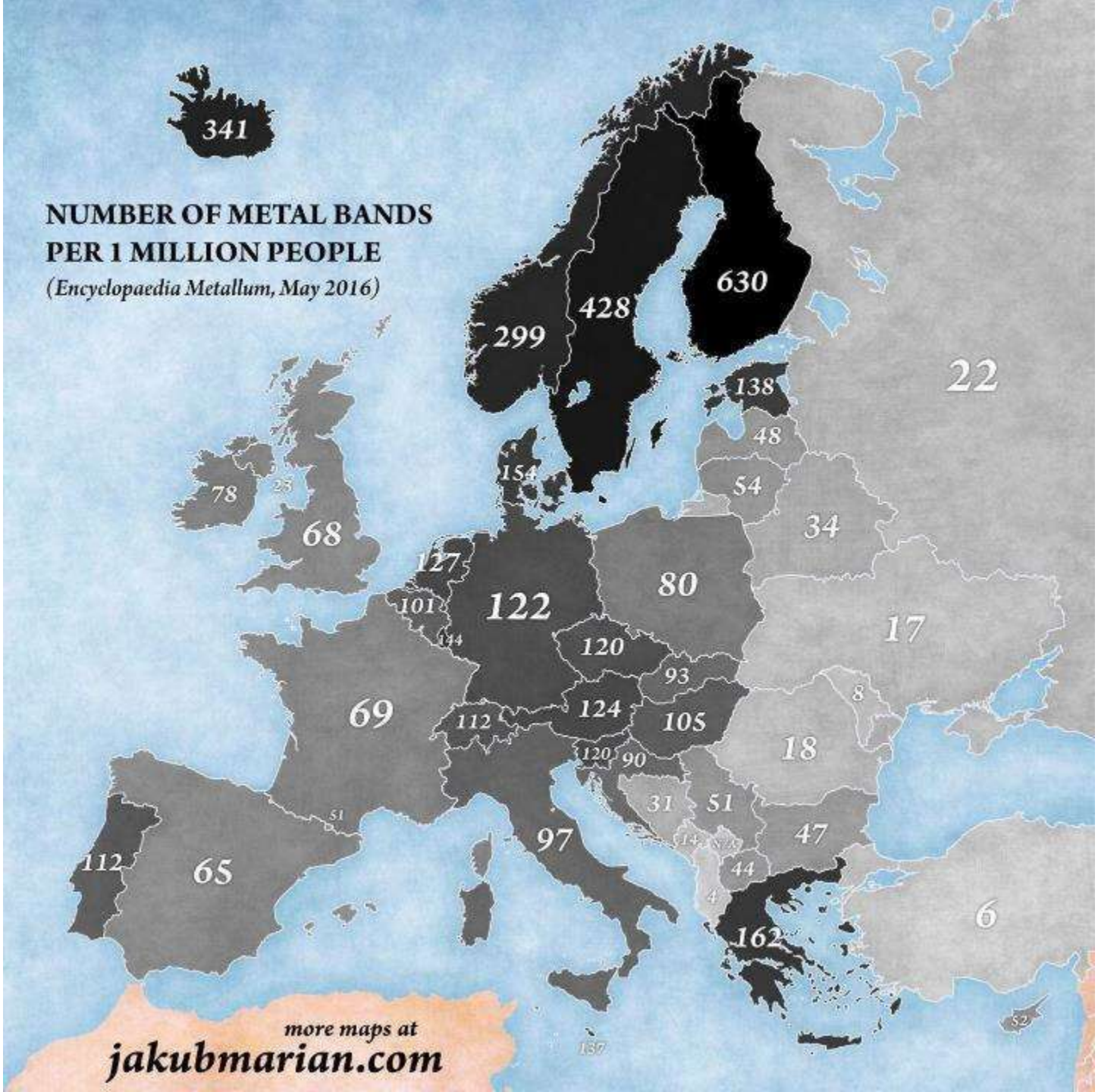
- early 2000s – download Map data by sheet e.g. NDTB/TRIM
-.. and then merge / mosaic
- post ~ 2015 - download by AOI (Area of interest)

Changes in Cartography in the late 20th -21st centuries

-> much bigger than the breakup of the Soviet Union

Many new map types from digital data tables

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'*

http://www.newsweek.com/google-maps-error-sees-wrong-house-demolished-mistake-440256