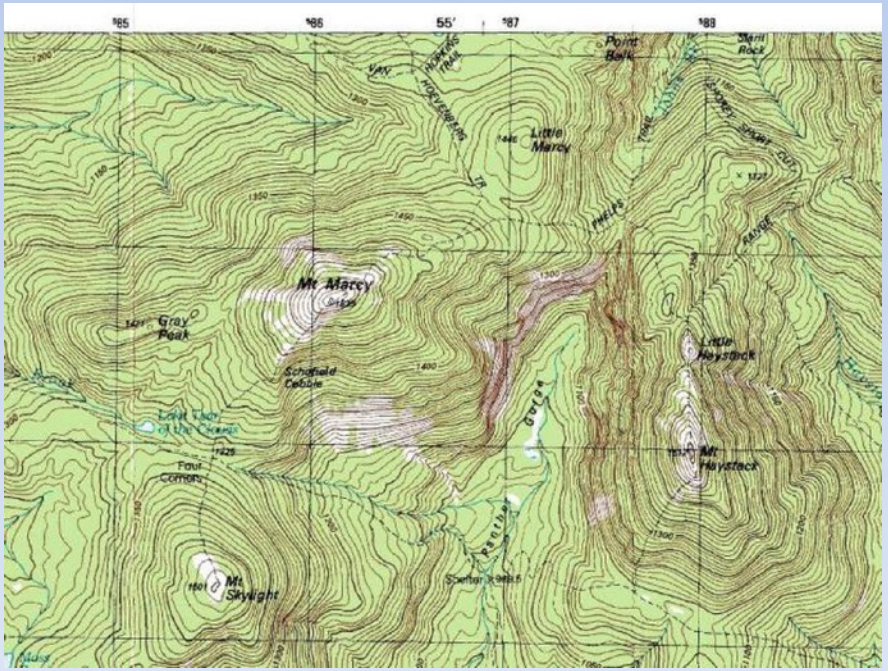
Live Sessions Week 2:

Essential Skills 3 and 4: Measuring and Estimating, and Map Reading



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Importance of these skills

- Apply to every discipline
- Measuring and estimating
  - Are the fundamental form of data collection.
- Map Reading
  - Essential to locate yourself or other things in a landscape, or for route planning.

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Essential Skill #3: Measuring and Estimating

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When to measure, when to estimate

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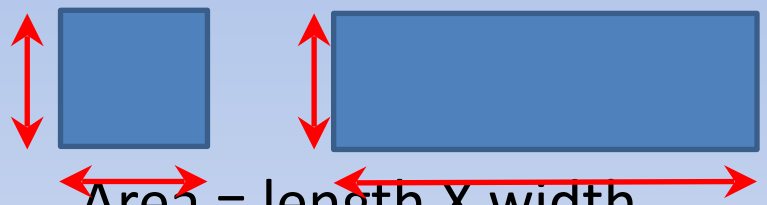
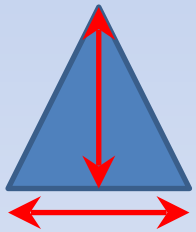
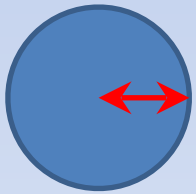
Why we measure… Areas



Area = length X width



Area = ½ X base X height



Area = π X radius^2

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Estimated: Area = 321,536 m² (32.15 ha)
Measured: Area = 360,302 m² (36.03 ha)

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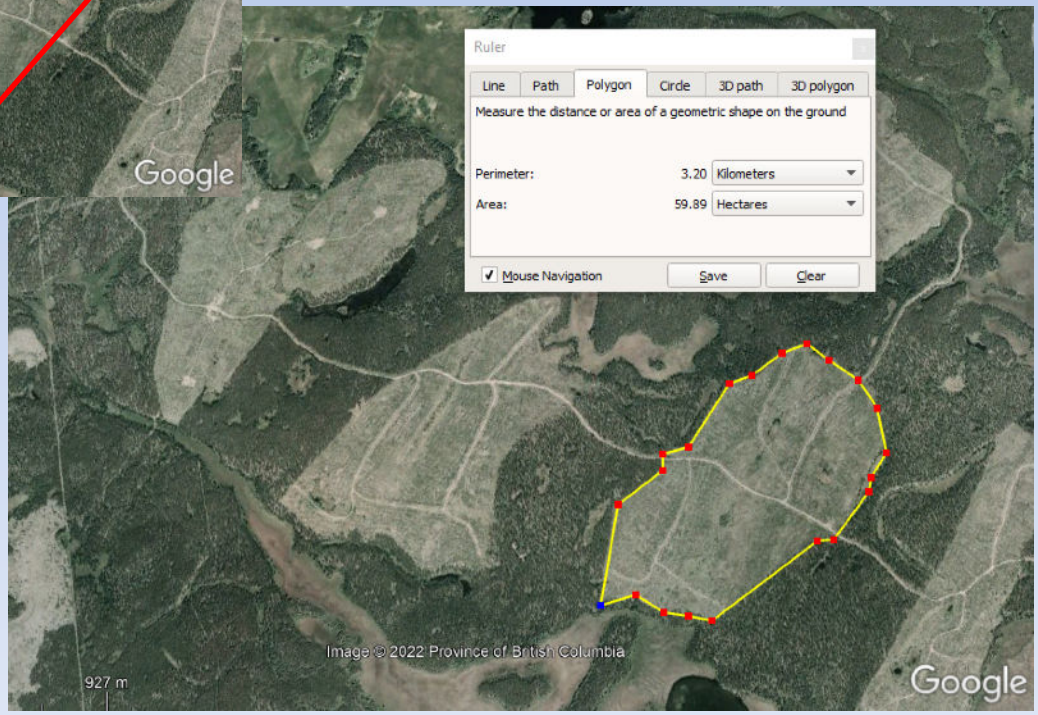

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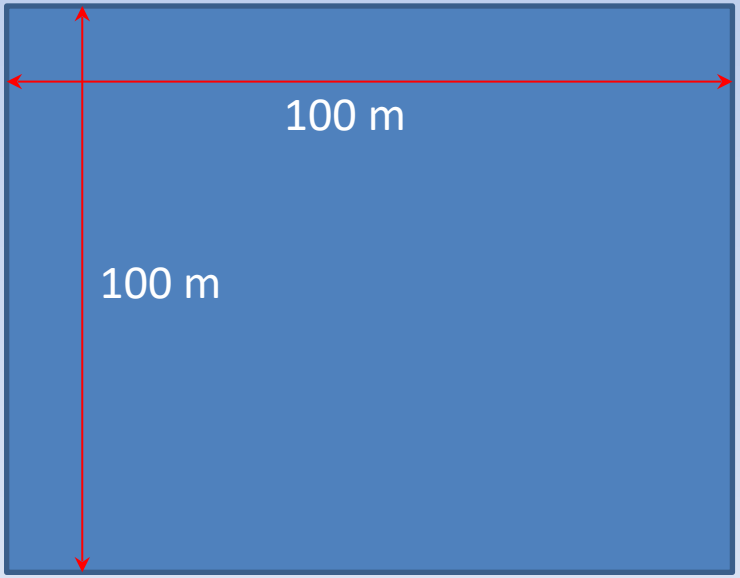
Why we measure… Density

1 hectare (ha) = 10,000 m^2 = 2.47 acres



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Location	Number of badger dens	Area surveyed	Density of dens (number per hectare)
Wyoming	180	15	12
Alberta	180	60	3

A special case: Catch per Unit Effort (CPUE)

Location	Number of fish caught
Trout Lake	15
Deer Lake	7

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Location	Number of fish caught	Time spent fishing (hours)	CPUE (number fish per hour)
Trout Lake	15	18	0.83
Deer Lake	7	2	3.5

Always include your level of effort (area, time) when doing survey work.

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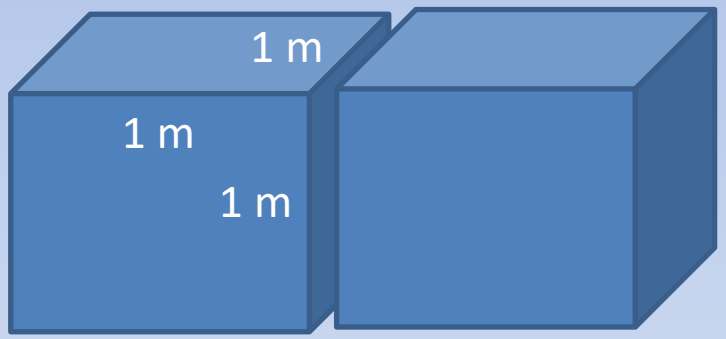
Why we measure… Volume

Direction of streamflow



Water discharge of 1 m^3/second

Start time

1 second later

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Summarizing data

Fish number	Length (inches)
1	12.25
2	14.30
3	8.9
4	9.5
5	5.6
6	7.8
7	8.0
8	8.8
9	9.2
10	7.5

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Fish number	Length (inches)
1	26.8
2	10.2
3	8.9
4	9.5
5	5.6
6	7.8
7	8.0
8	8.8
9	9.2
10	7.5

Sum of all fish lengths = 102.3

- Mean is sum of all numbers divided by total number of values used.
- = 102.3 inches ÷ 10
- = 10.23 (10.2) inches

- Mean length of fish = 10.2 inches

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Fish number	Length (inches)
1	5.6
2	7.5
3	7.8
4	8.0
5	8.8
6	8.9
7	9.2
8	9.5
9	10.2
10	26.8

Lengths ranked smallest to largest

- Median:
  - Rank numbers from smallest to largest
  - Determine value in middle of range
  - For even number take average of two central numbers (8.8 and 8.9 in this case)

- Median is 8.85 inches

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Fish number	Length (inches)
1	26.8
2	10.2
3	8.9
4	9.5
5	5.6
6	7.8
7	8.0
8	8.8
9	9.2
10	7.5

Mean = 10.2 inches

Median = 8.85 inches

Which to use?

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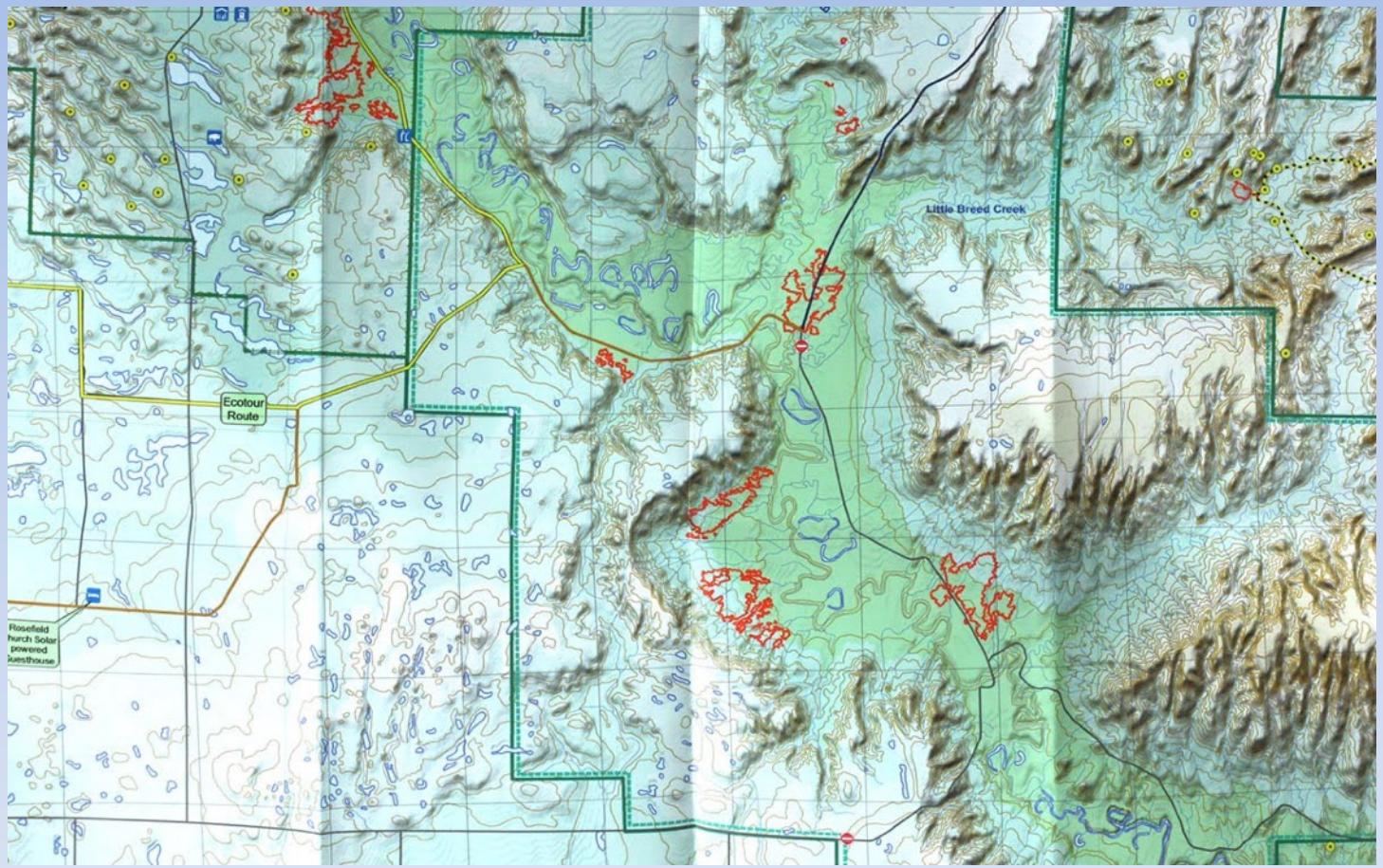
Essential Skill #4: Map Reading



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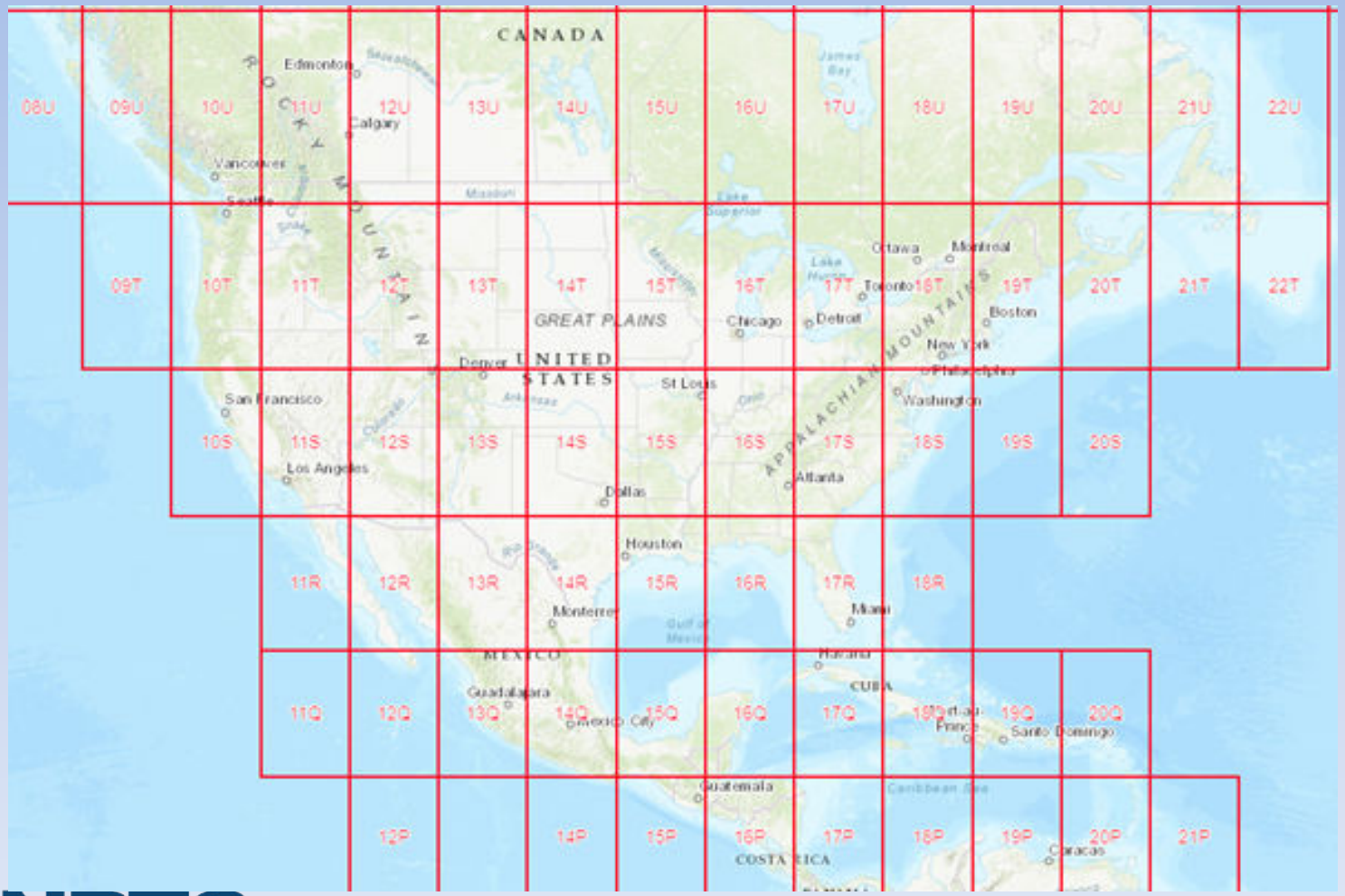
US National Grid



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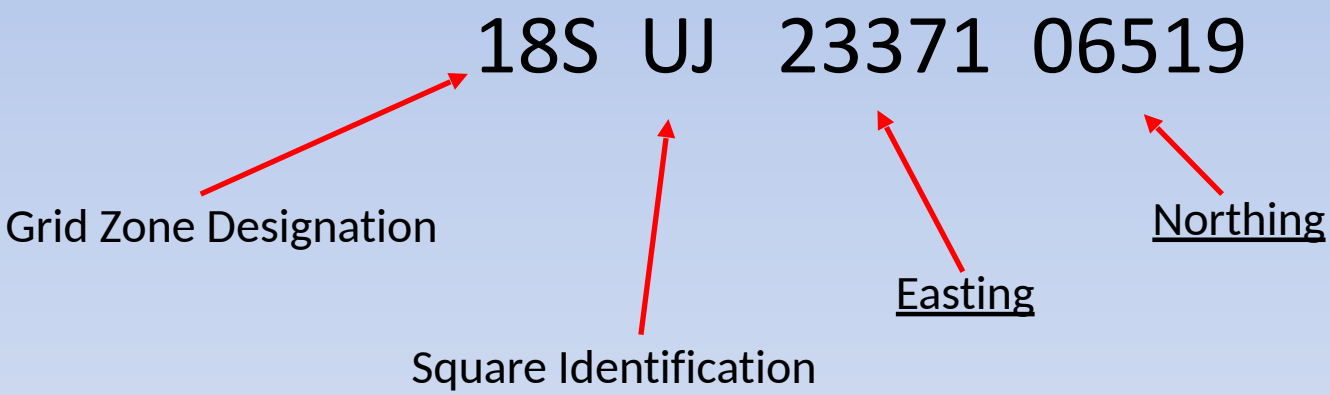
Based, in part, on UTM system



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UTM Geo-referencing

- Zones
  - Earth divided into 60 equal spaced zones

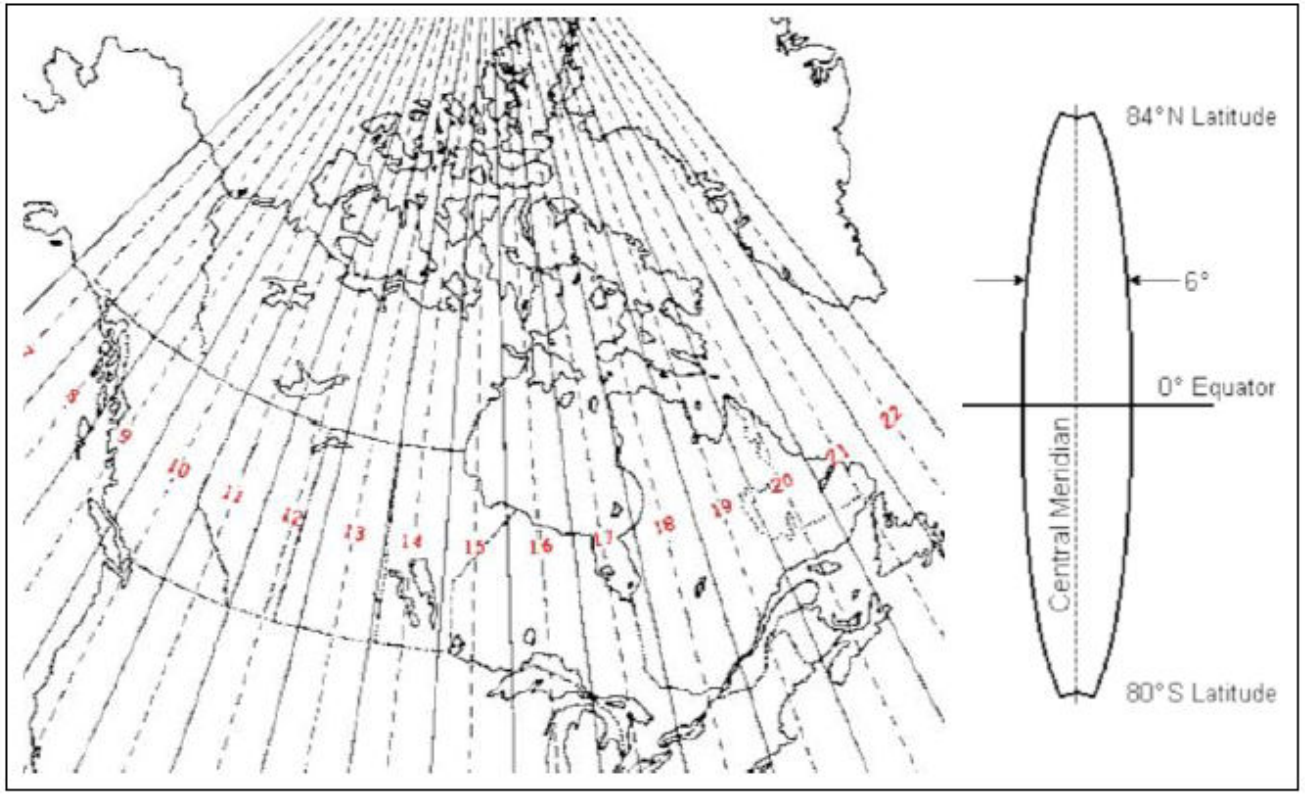


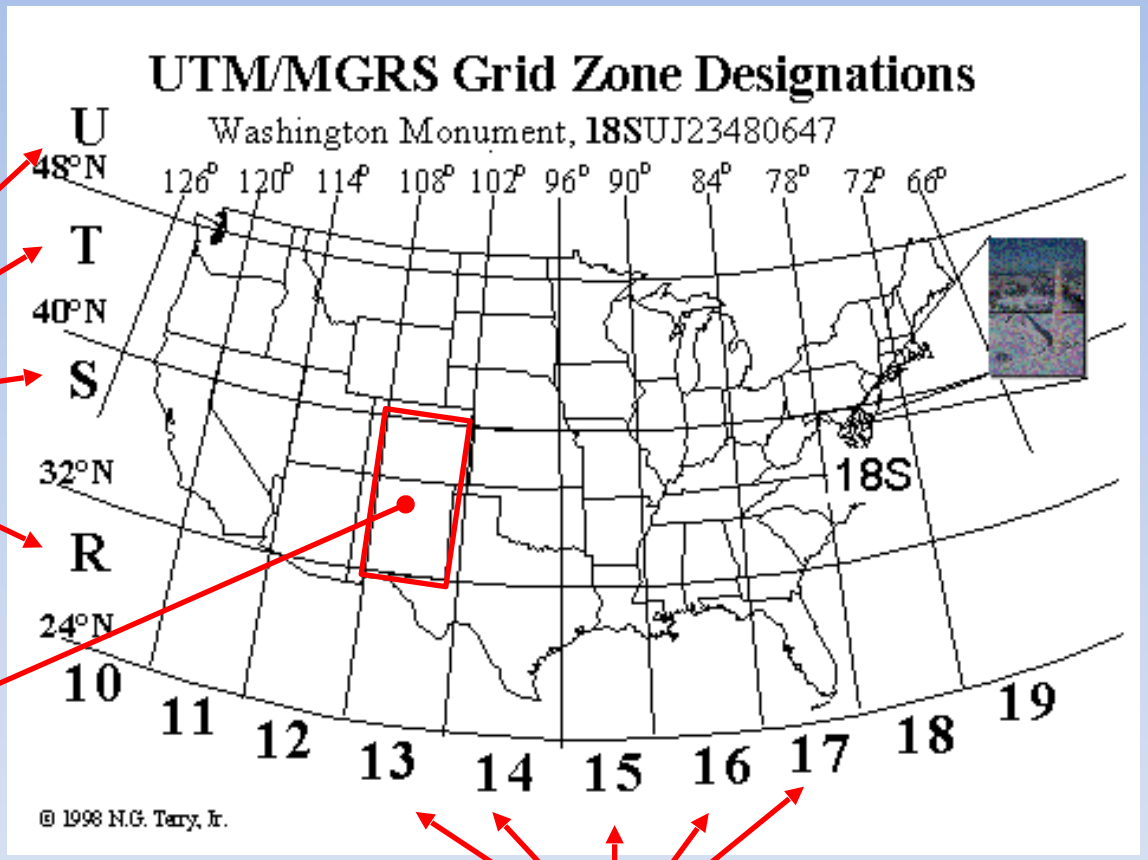
Figure 11. UTM Grid Zones for Canada

Grid Zone Designations

Latitude Bands

(8° wide; read south to north)

Example: 13S



UTM zones

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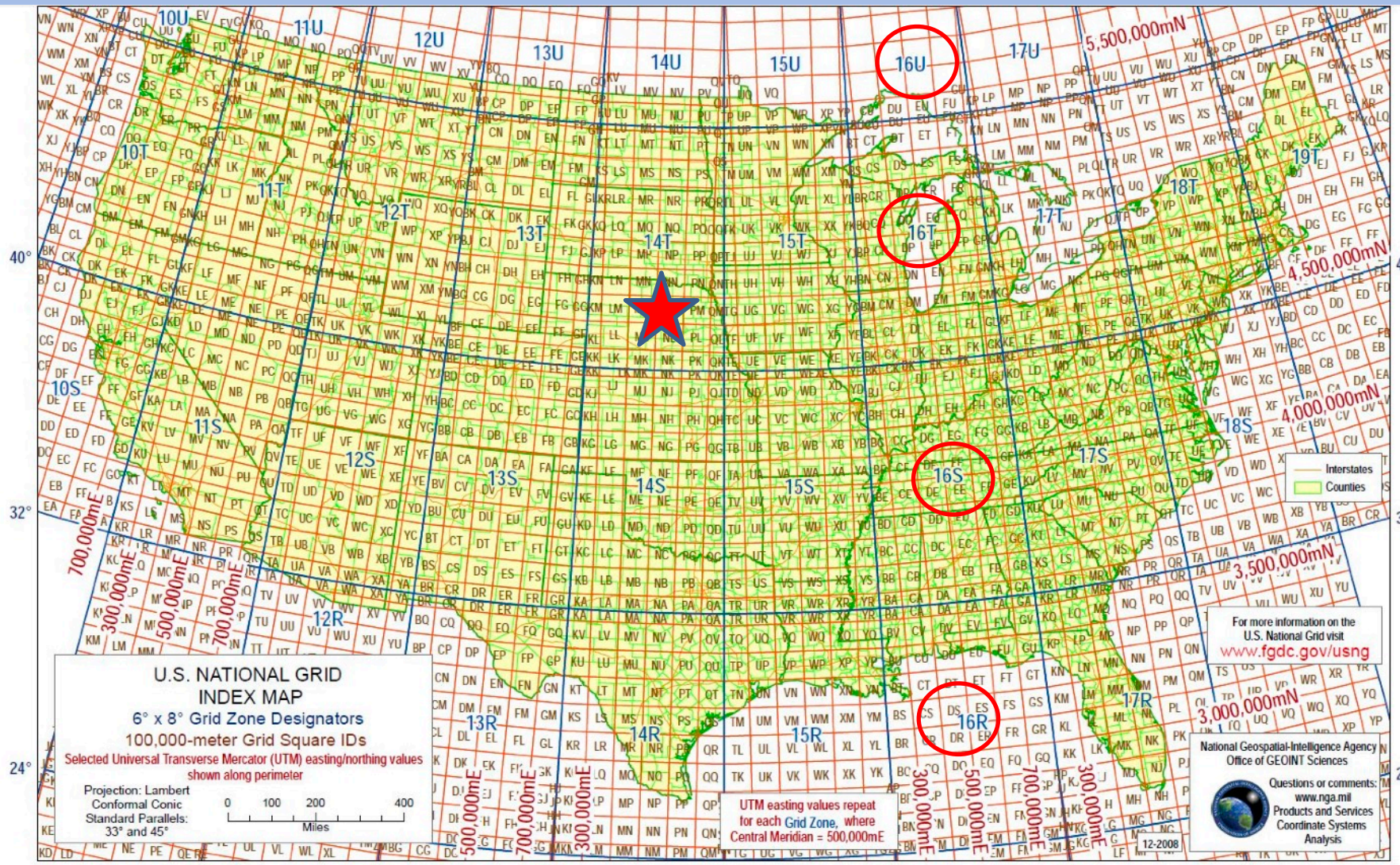
National Grid with Grid Zone Designations



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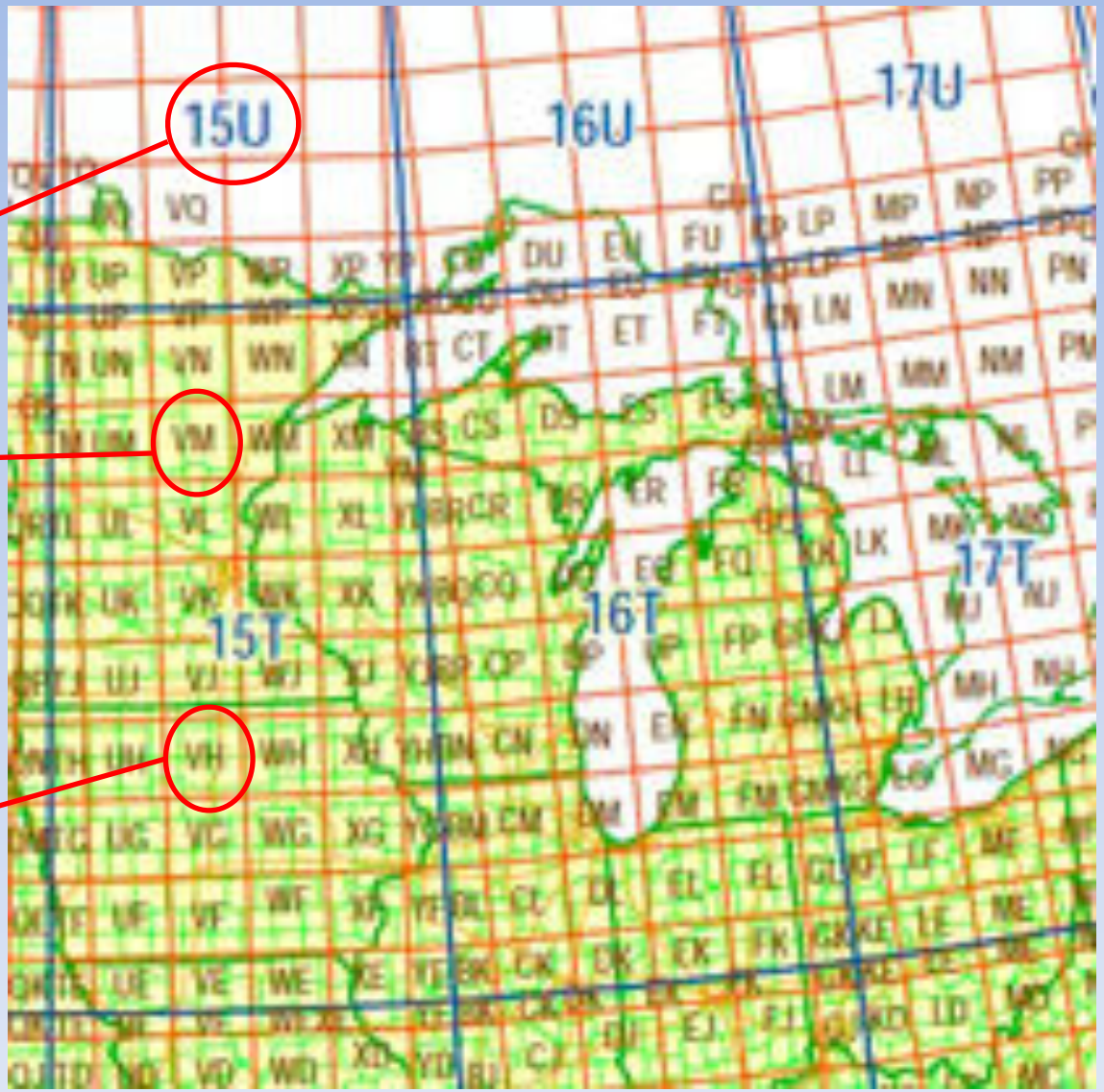
Square Identification

Grid zone designations

Square identification

Example: 15T VH



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Scales (example 15T VH from before)

- Grid Zone Designation covers: ~4,000 km^2
  - E.g., 15T

- Square Identification covers: 100 km^2
  - E.g., VH

What about finer resolution?

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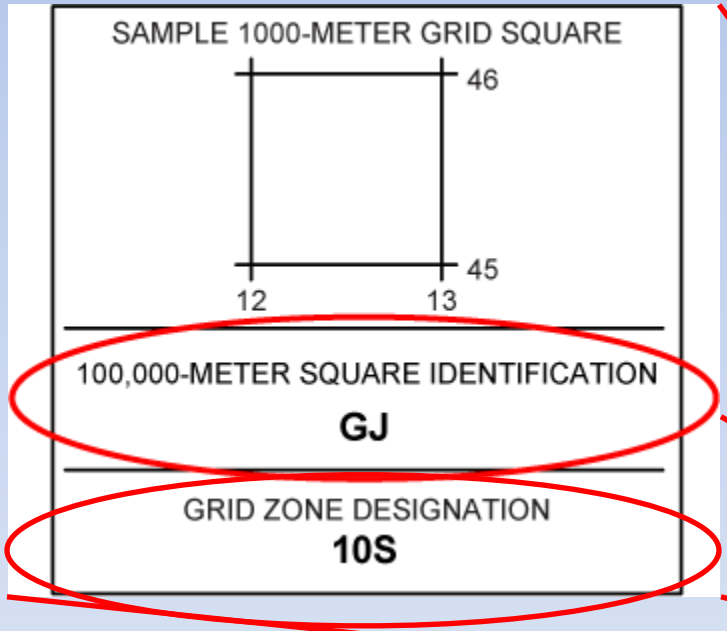
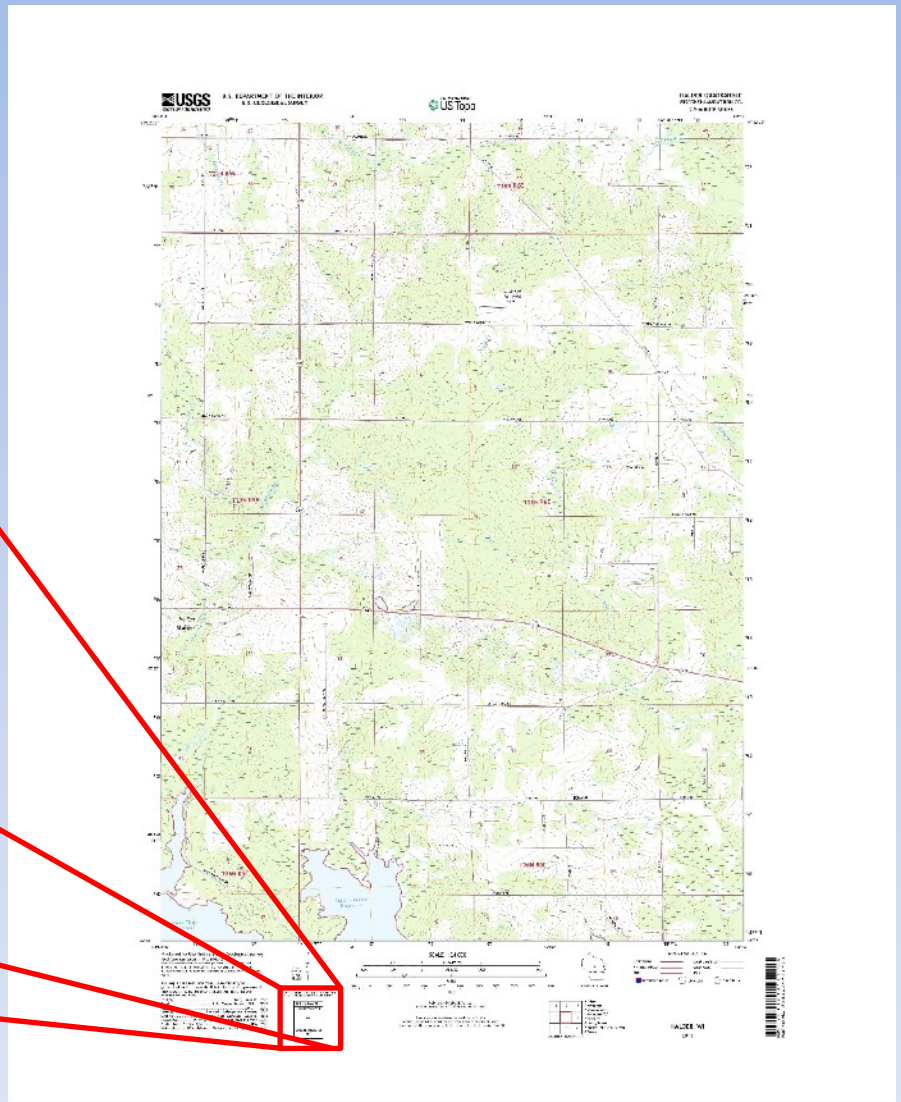
Grid Zone Designation and Square Identification of Map





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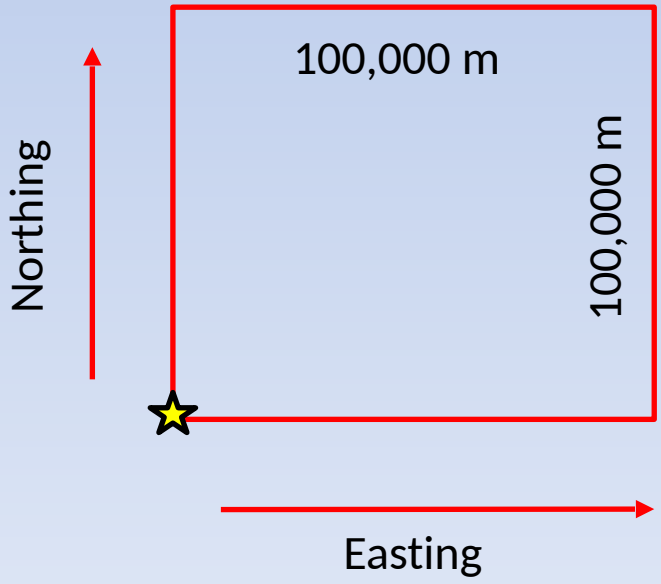
Working within the Identification Square

Use UTM easting and northing

- Measured from the lower left corner of the Identification Square



Always given first, before northing

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Working within the Identification Square (cont'd)

- Any point is given as distance (metres) from that lower left corner
- Presented as up to 5 digit numbers

- E.g. 23371 06519

is a point 23,371 m east and 6,519 m north of the lower left point of the Identification Square.

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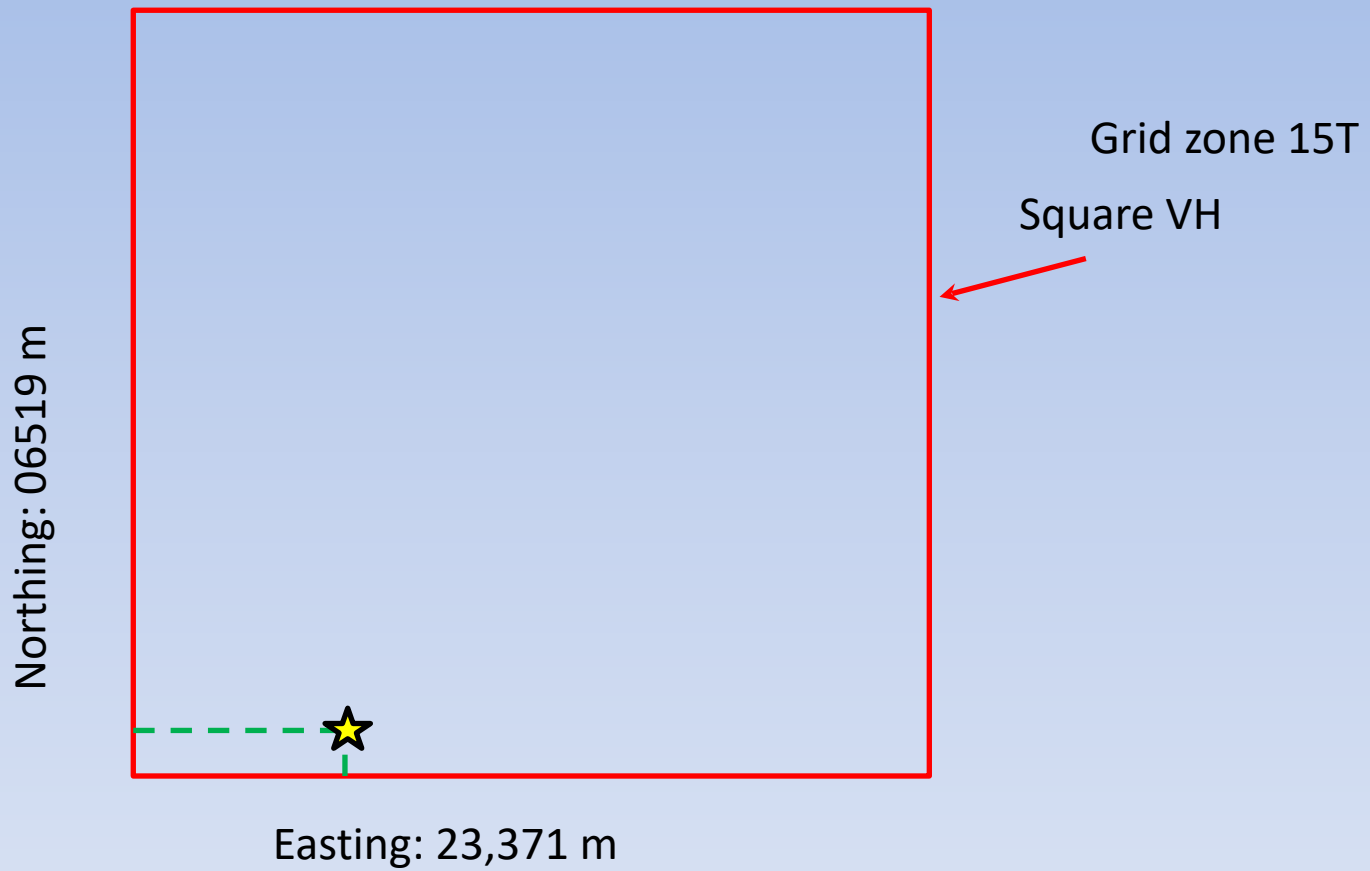
Working within the Identification Square (cont'd)



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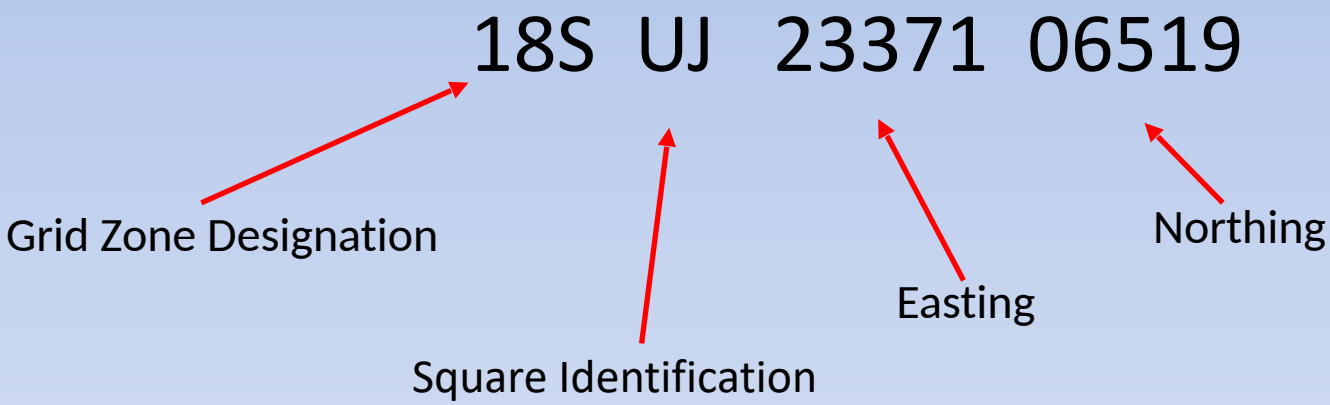
- To provide the full geographic location we include:



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Working within the Identification Square (cont'd)

- Number of digits used indicates precision (resolution) of location

Easting	Northing	Size of square	Area of resolution
2	0	10,000 m per side	100 km^2
23	06	1,000 m per side	1 km^2
233	065	100 m per side	10,000 m^2
2337	0651	10 m per side	100 m^2
23371	06519	1 m per side	1 m^2

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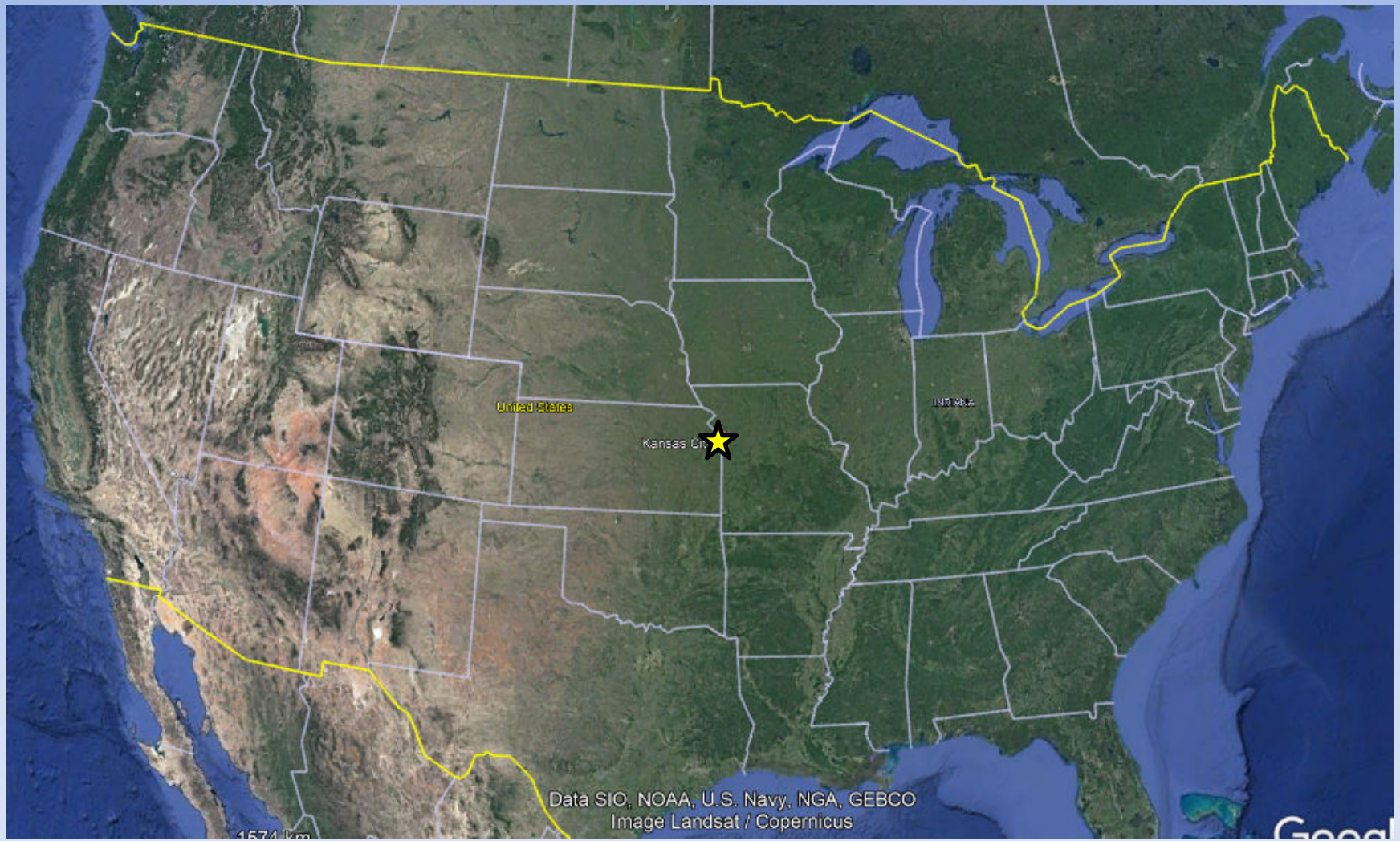
Working through an example – Kansas City



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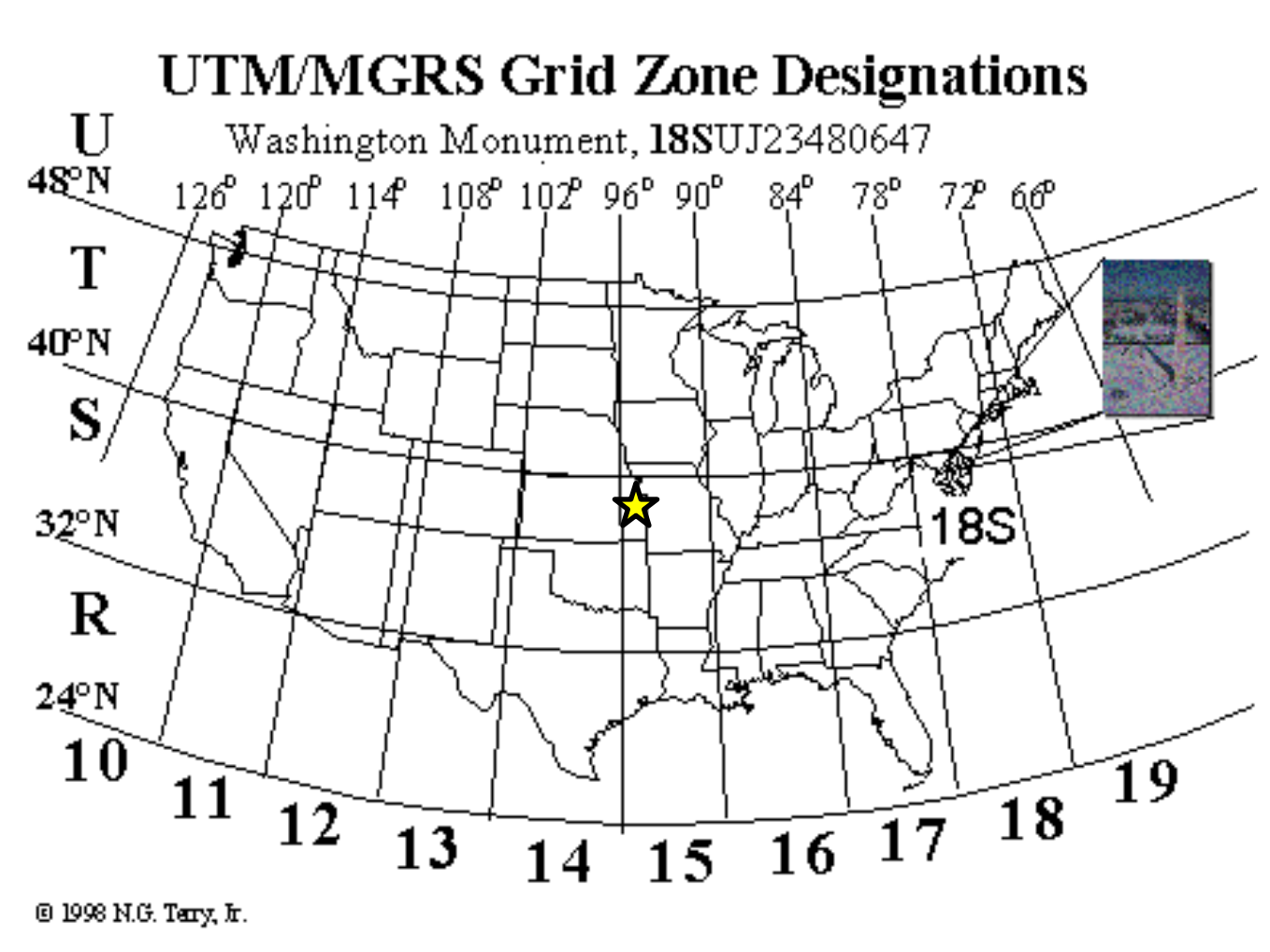
Grid Zone Designation – Kansas City



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Square Identification – Kansas City

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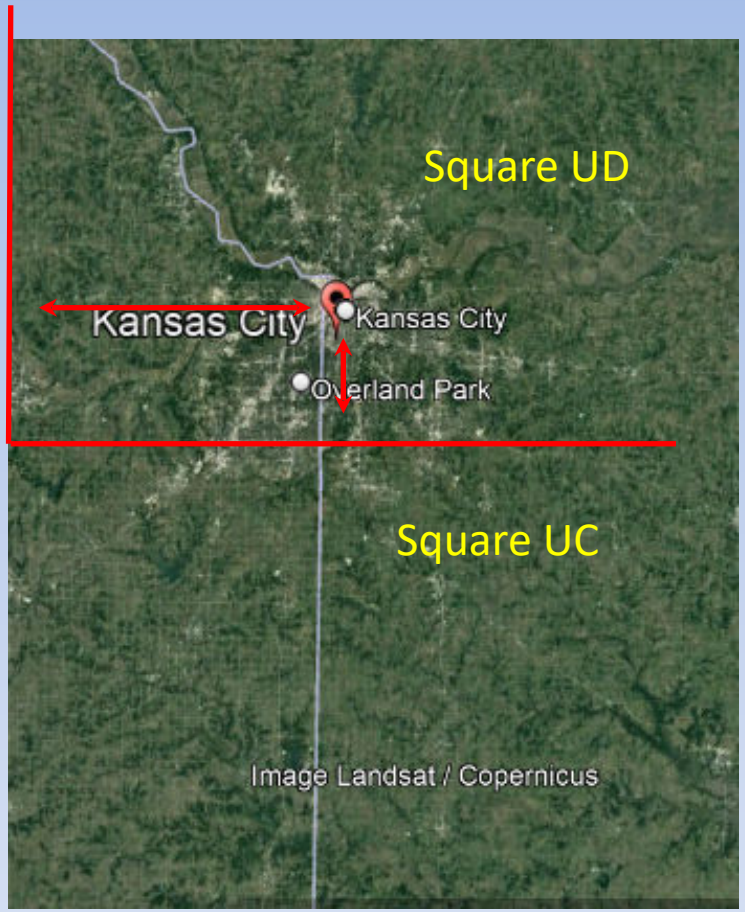
Easting and Northing – Kansas City

- Easting is: 63495 m
- Northing is: 29059 m
- Thus, Kansas City at:
- 15S UD 63495 29059



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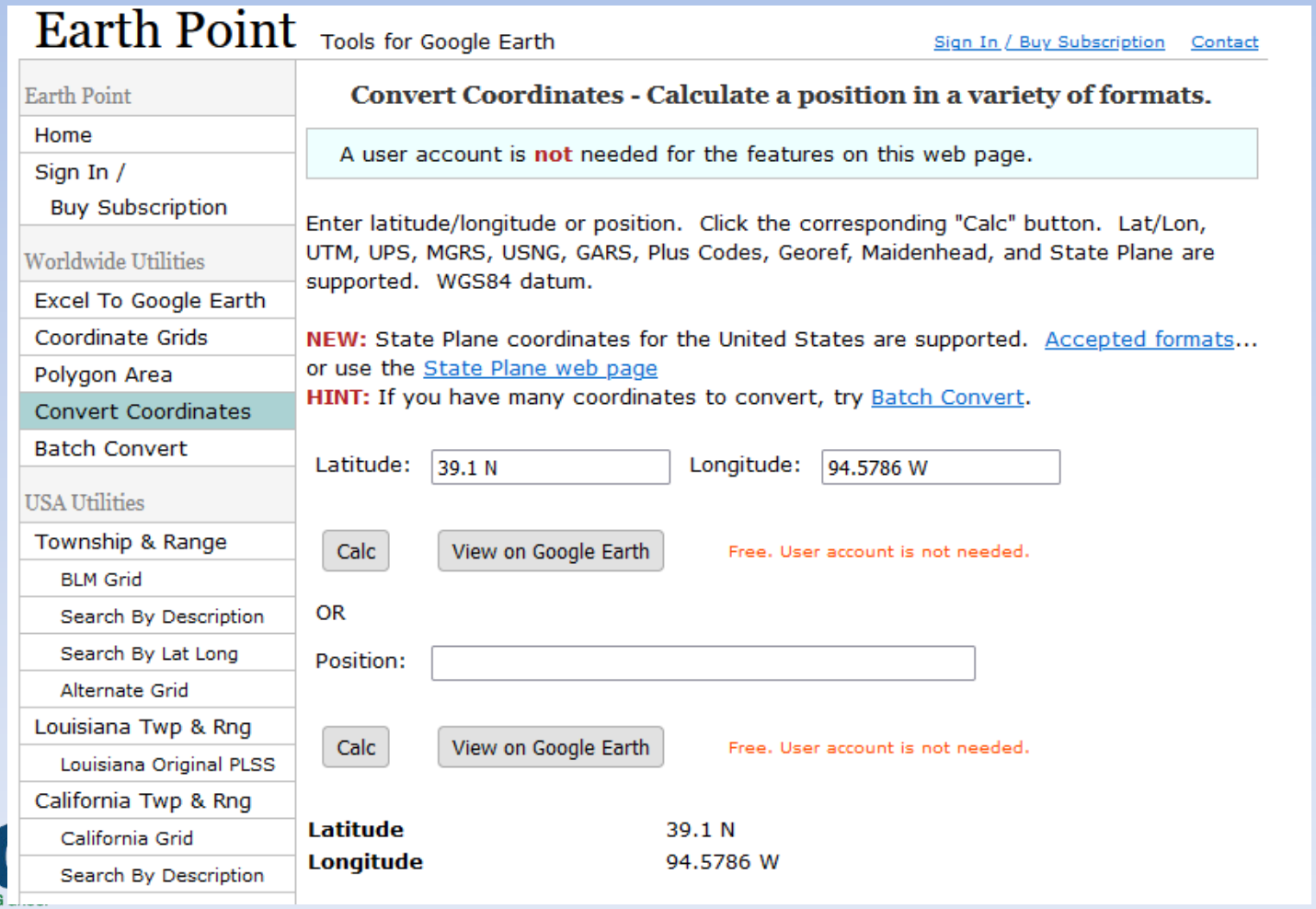
A useful converter among systems from latitude/ longitude

- https://www.earthpoint.us/convert.aspx

Lat/Long
Input Page



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Output Page

Calculated Values - based on Degrees Lat Long to seven decimal places.

Position Type	Lat Lon
Degrees Lat Long	39.1000000°, -094.5786000°
Degrees Minutes	39°06.00000', -094°34.71600'
Degrees Minutes Seconds	39°06'00.0000", -094°34'42.9600"
UTM	15S 363495mE 4329059mN
UTM centimeter	15S 363495.30mE 4329059.92mN
MGRS	15SUD6349529059
Grid North	-1.0°
GARS	171LU46
Maidenhead	EM29RC04NA60
GEOREF	FJLK25280600
Plus Code	86F74C2C+2H
Plus Code Extended	86F74C2C+2HRXRXR

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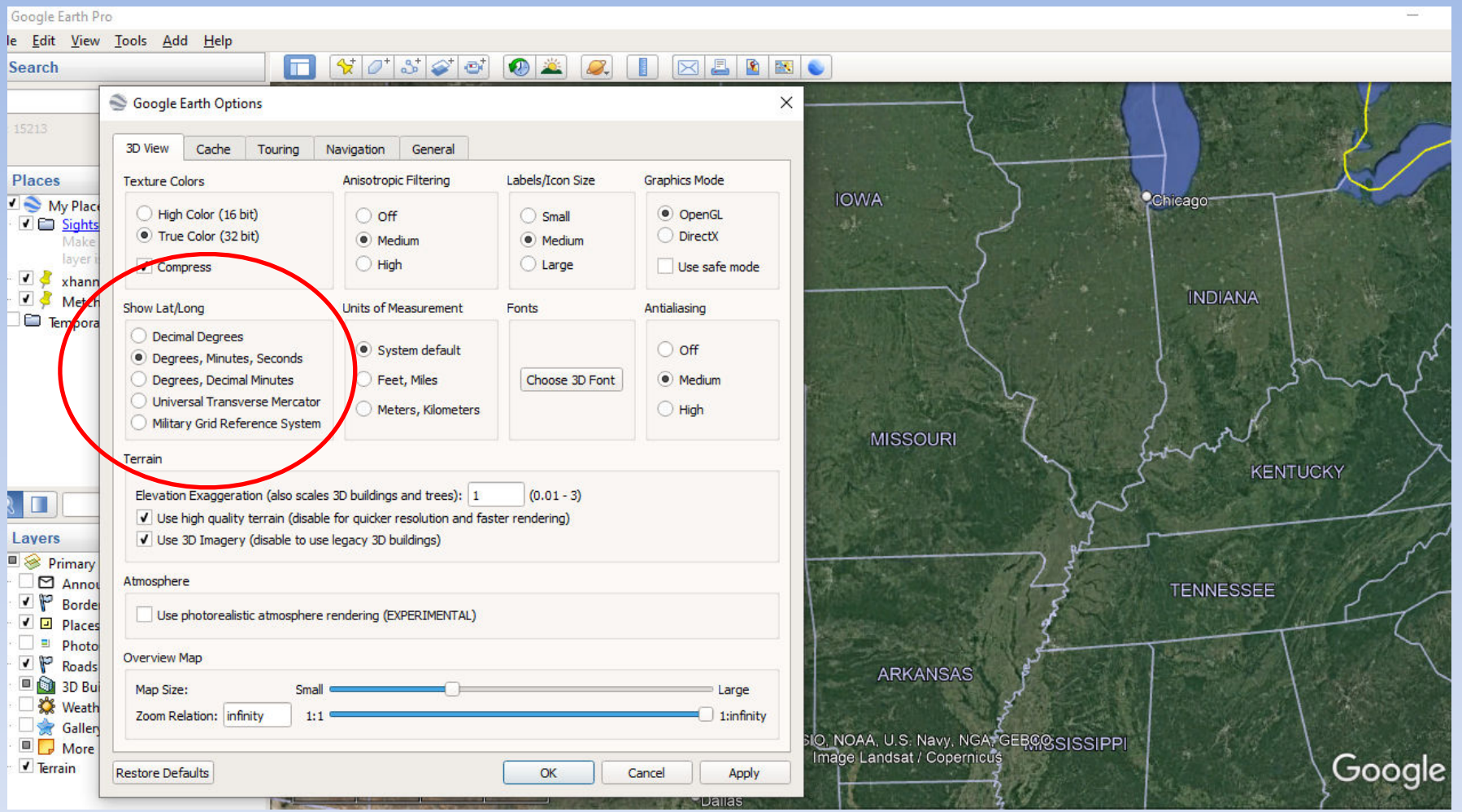

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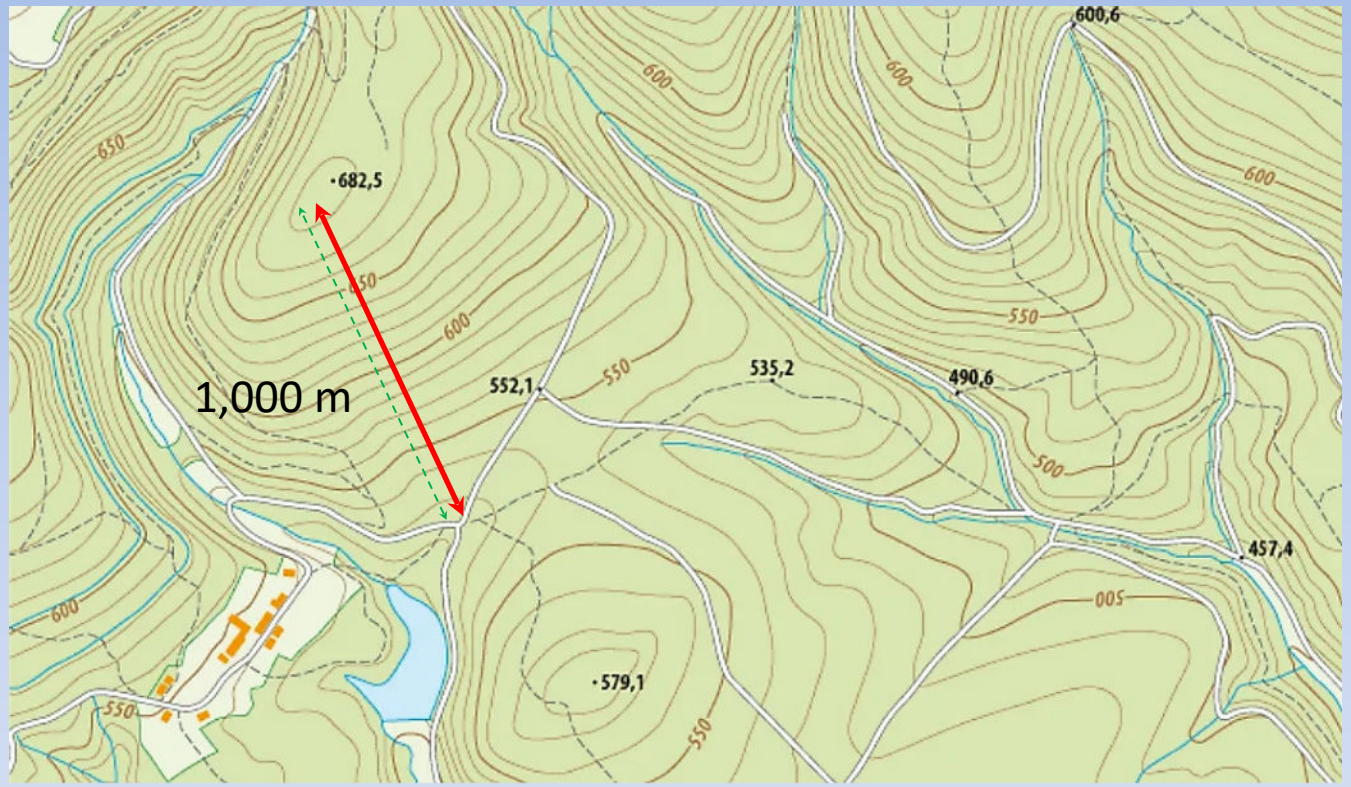
5 cm at scale of 1:20,000 = 1,000 m



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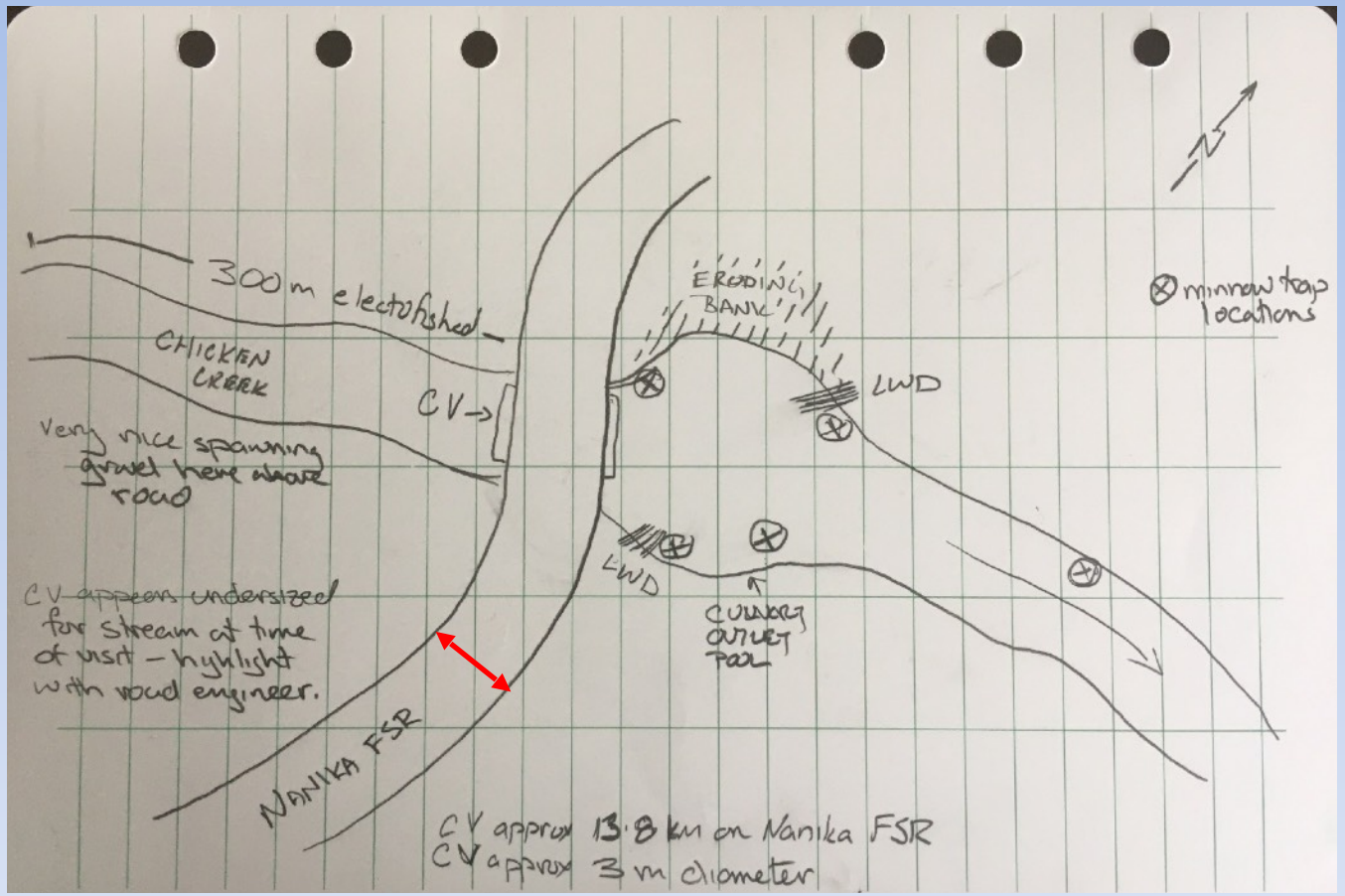

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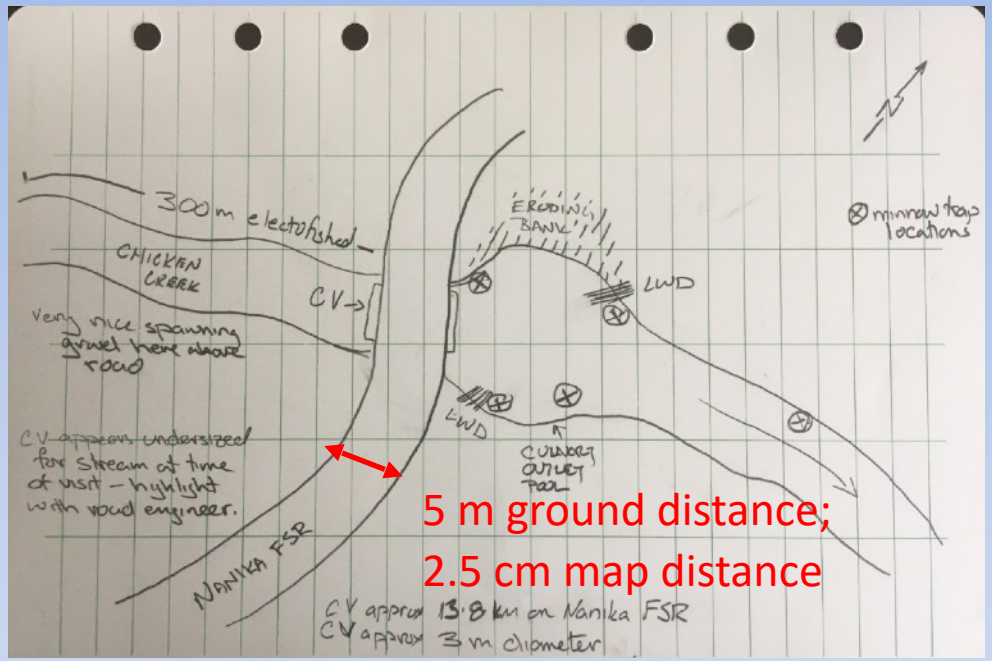

Convert ground distance units to map units:

5 m = 500 cm

Divide ground distance by map distance

500 cm ÷ 2.5 = 200

Scale is 1:200

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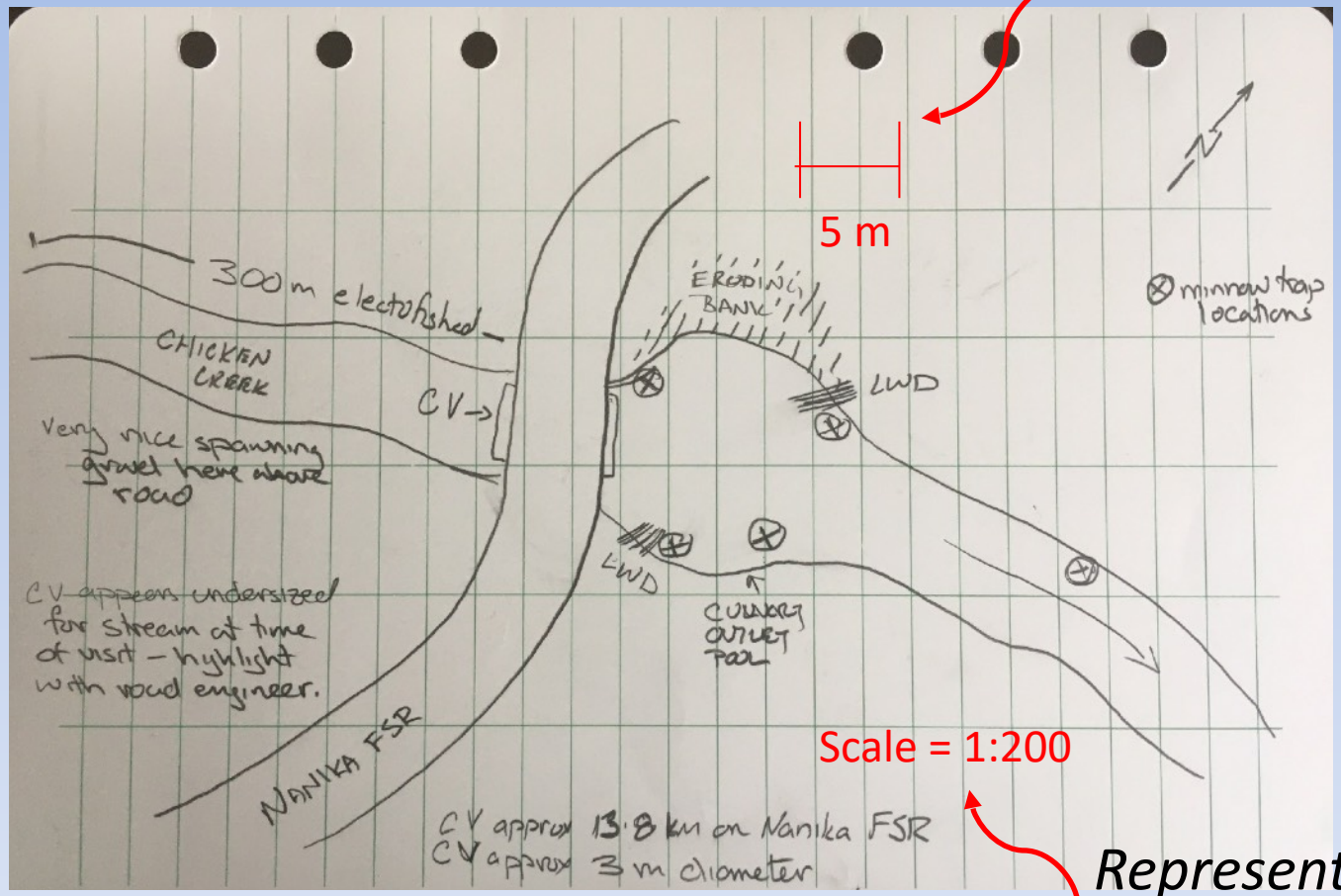
Graphical scale



Representative fraction

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Essential Skills 3 and 4: summary

This week we focused on:

- Estimation in addition to measurements
- Some basic data summary methods
- The US National Grid as a mapping system
- The uses of map scale

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