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2019

Unit 7

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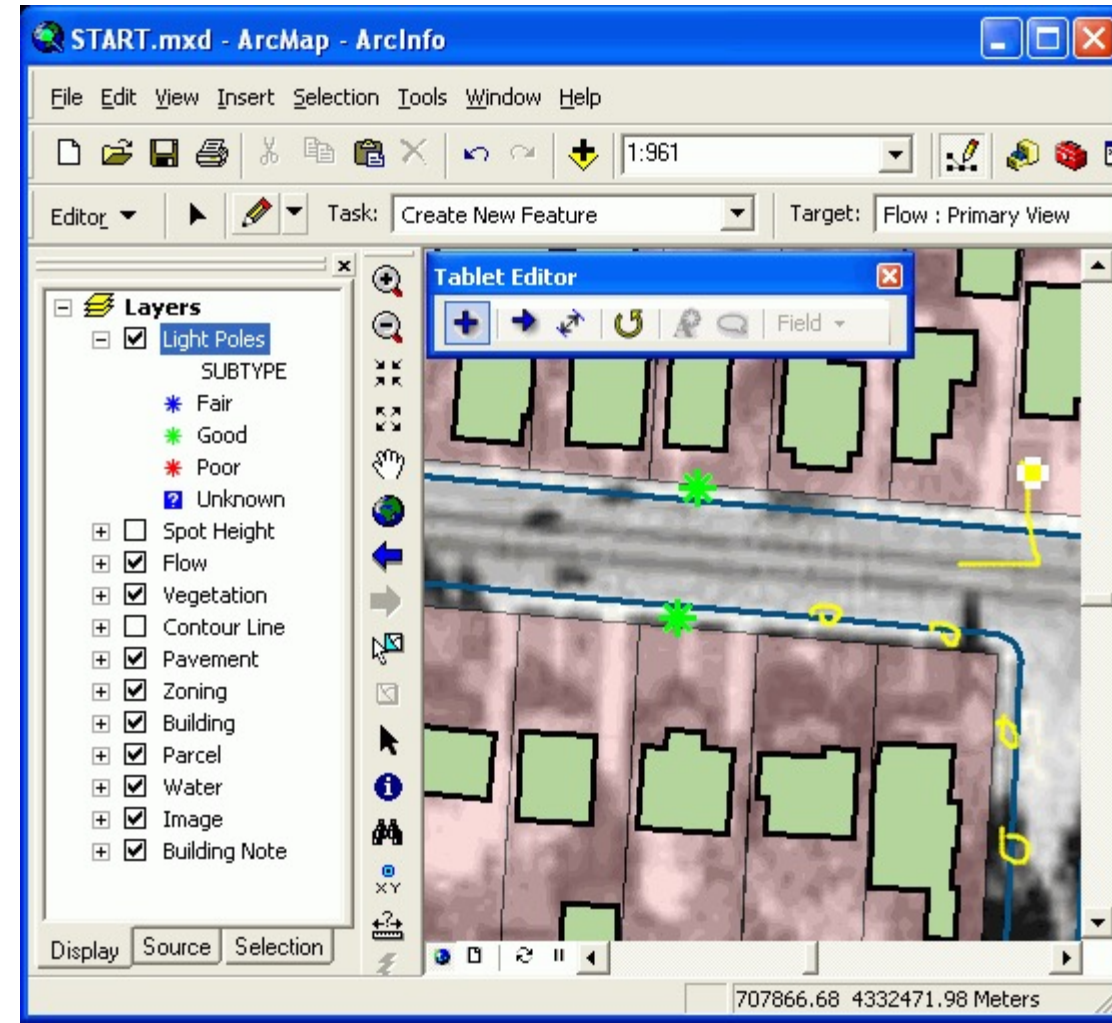
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Editing, Editing

Forrest J. Bowlick,
Intro GIS
UMASS



Overview

- MAP
- Recap Practical
 - Averages
 - Issues
 - Earn Back
 - Quick Poll
- Data Management
- Editing

UMassAmherst

Center for Teaching
& Learning

MAP Consultant: Claire
Hamilton

MAP

(Midterm Assessment Process)

INDIVIDUAL PORTION

Please go to the following URL to complete the assessment.

<https://tinyurl.com/Bowlick-F19I>

Your instructor wants to hear your voice, and so do I. The more honest and specific you are, the more beneficial this process is for you, your classmates, and your instructor.

MAP

(Midterm Assessment Process)

GROUP PORTION

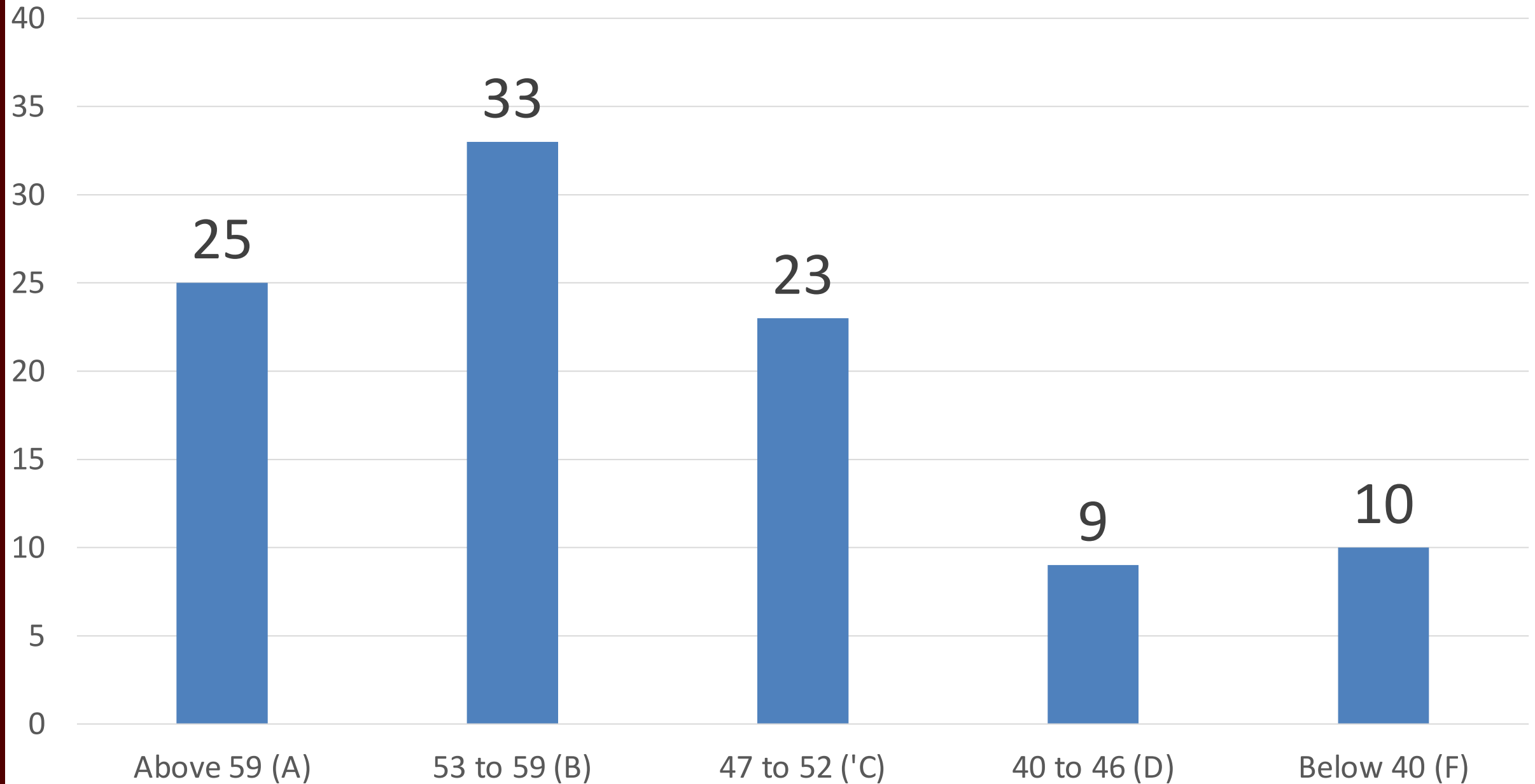
Please go to the following URL to complete the assessment with your small group (no more than 4 to a group please).

<https://tinyurl.com/Bowlick-F19Group>

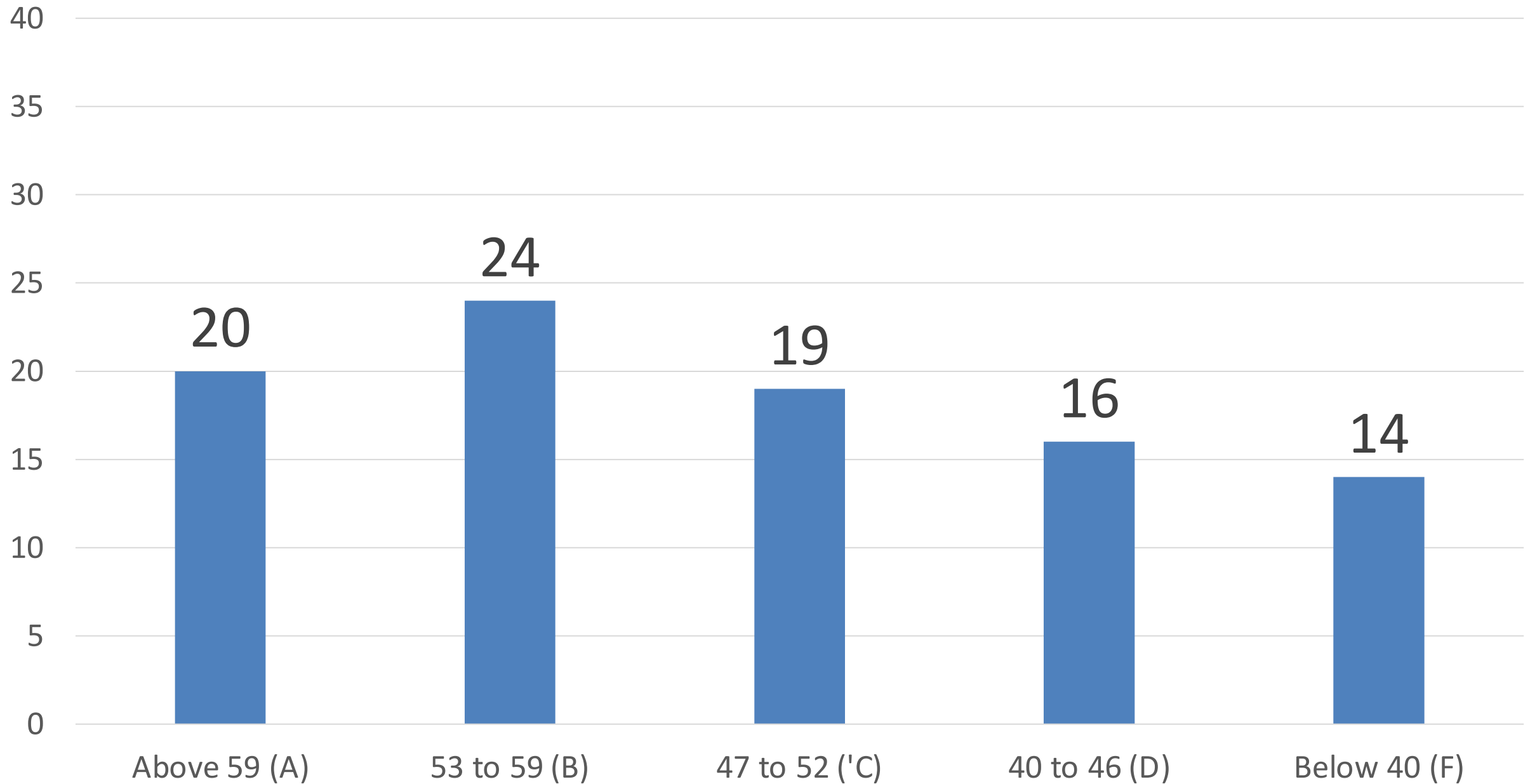
Your instructor wants to hear your voice, and so do I. The more honest and specific you are, the more beneficial this process is for you, your classmates, and your instructor.

Tx.ag/gis7c

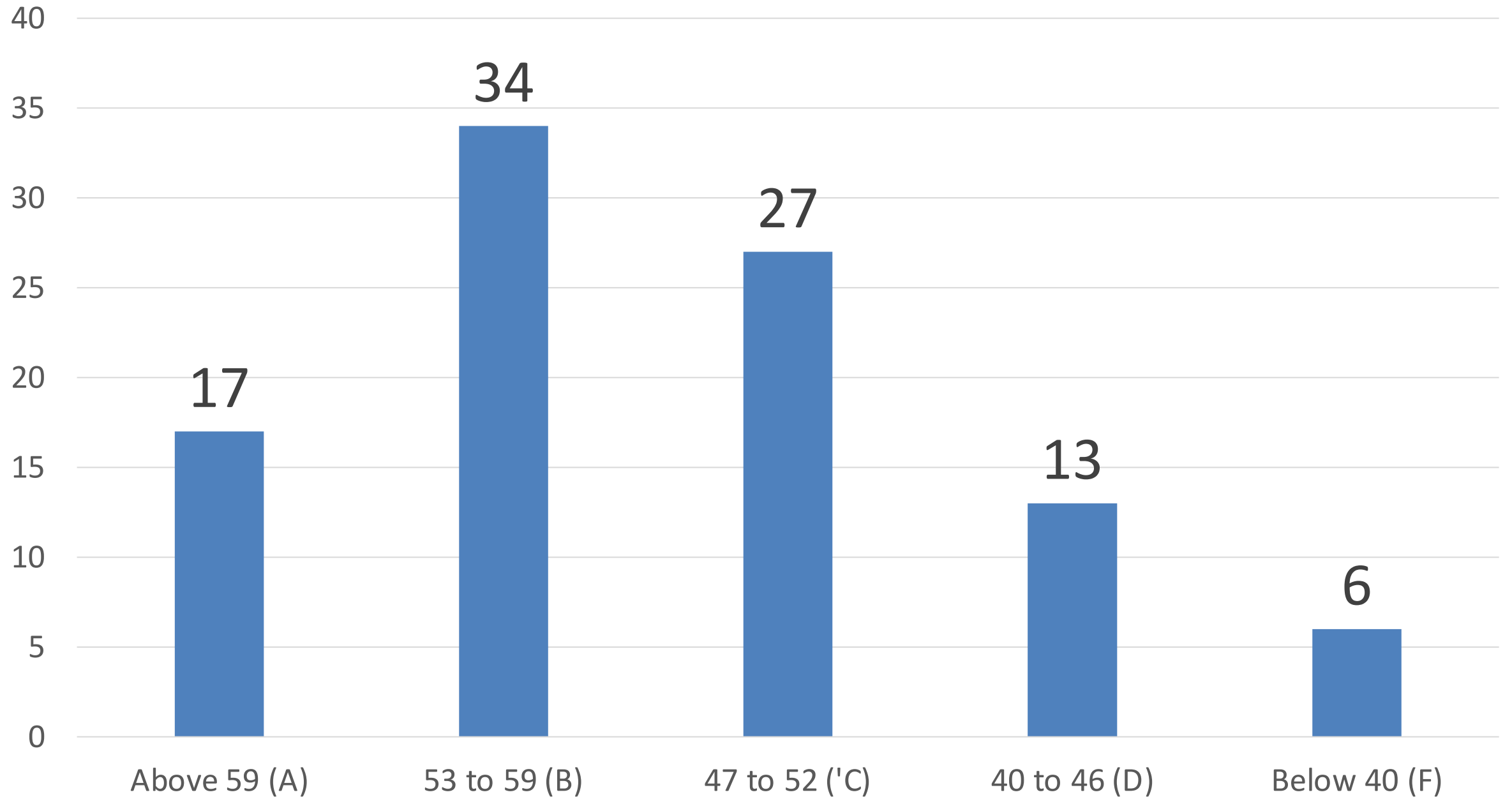
Practical Scores (Out of 66), Fall 2019



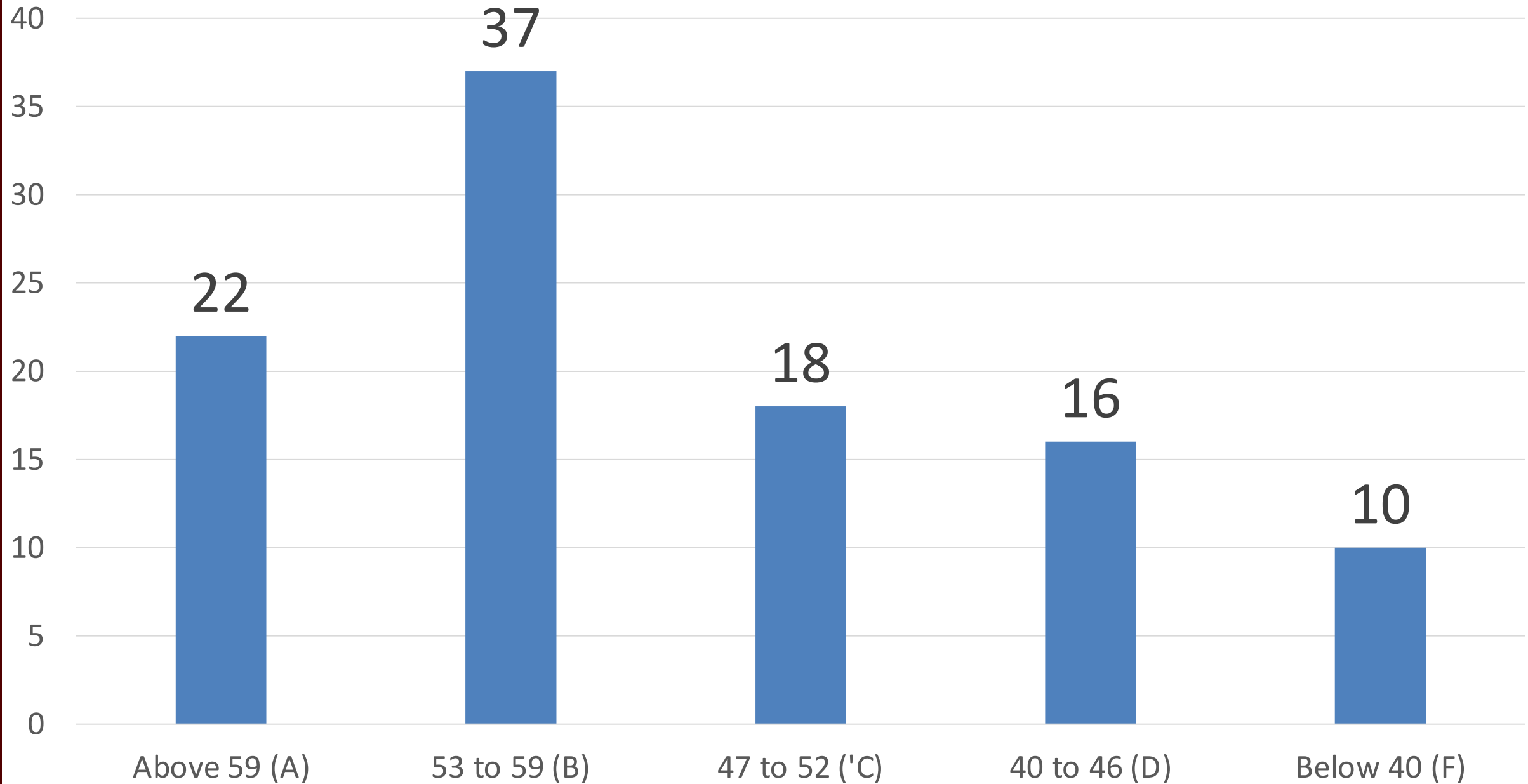
Practical Scores (Out of 66), Fall 2018



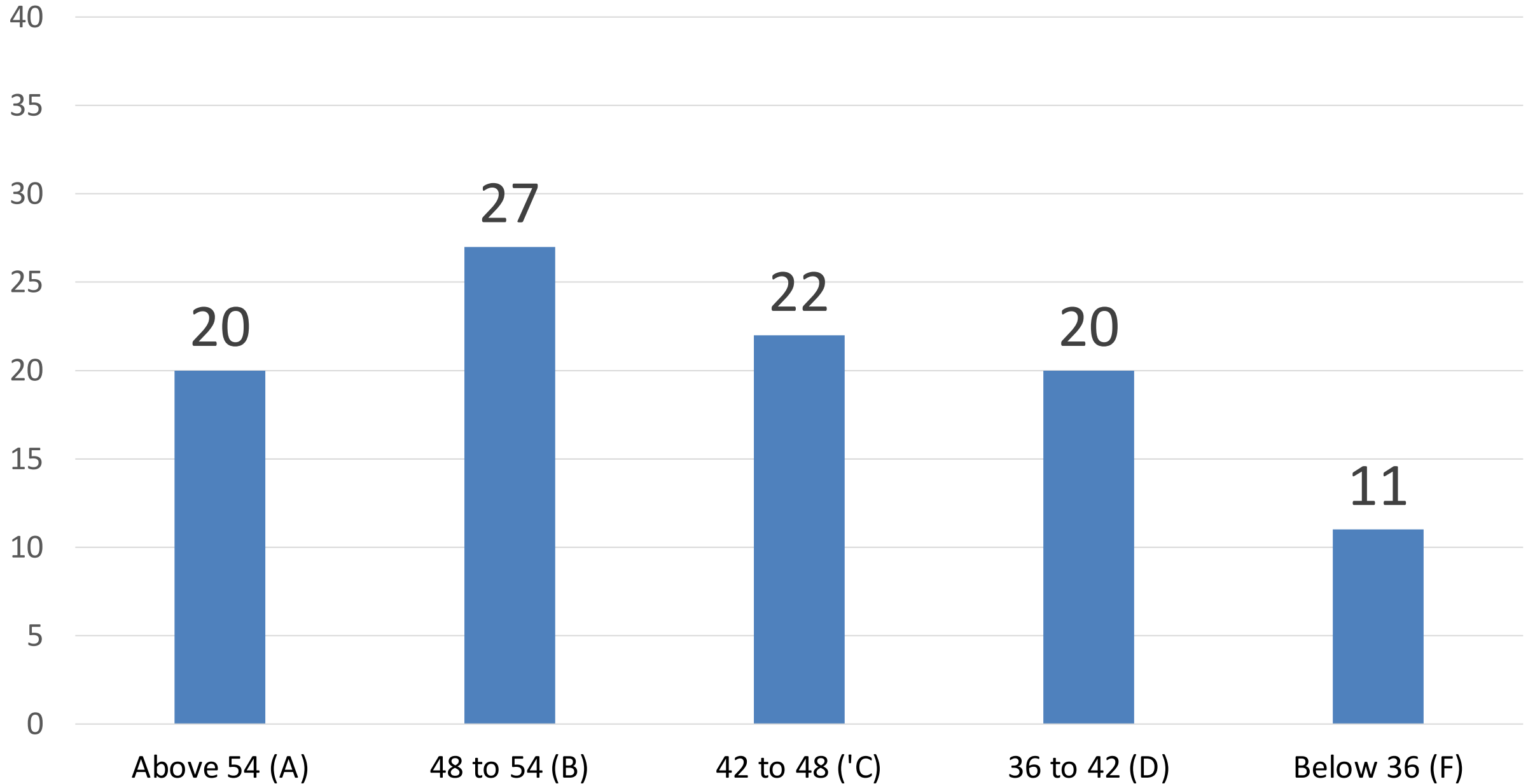
Practical Scores (out of 66), Fall 2017



Practical Scores (out of 66), Spring 2017



Practical Scores (out of 60), Fall 2016



Earn Back

- An earn back activity, focusing on part three, is available on Moodle.
- Everyone is eligible to earn back up to 12 points, without exceeding the 66 cap (no percentages great than 100).

Earn Back II

- This activity is due October 31st, Noon.
- Involves working through questions, assessing right answers, understanding how wrong answers came to be.
- Submit to me via email with the title 'Practical Earn Back'.

Reviewing Practical

- I am happy to sit down with anyone to review your practical to understand your grade.
- Mary and Amanda will have the exams during their office hours next week.
- Schedule a time to come by my office outside of office hours.
- [Meetme.so/UMassGIS](https://meetme.so/UMassGIS)

Data Management

- It's fairly easy to unintentionally lose your data/analysis in Arc
- Part of this we've discussed before (organizing your data)
- Part of it is structural (we'll address now)

Saving, Processing, Defaults

- ArcMap processes things where it has been set to defaultly process them.
- This is often not useful for you.
- In order to remain in control of your data and analysis, you need to ensure your own data and analytical consistencies.

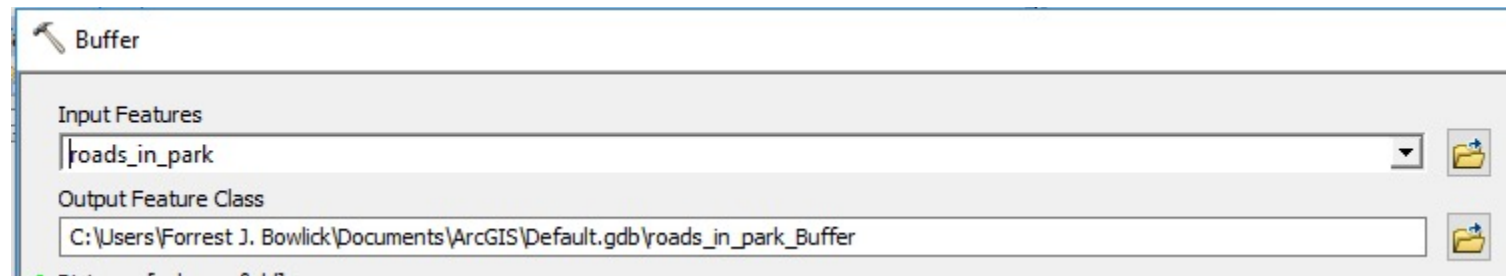


Catalog

Location: landcover.shp

- Home - Documents\ArcGIS
 - AddIns
 - Packages
 - Projects
 - ProjectTemplates
 - Default.gdb
 - Greenland_Lake.gdb
 - Toolbox.tbx
 - Greenland_Lake.lyr
 - WWilliams.shp
- Folder Connections
 - C:\Users\Forrest J. Bowlick\Desktop\Exam_data
 - C:\Users\Forrest J. Bowlick\Desktop\Practice
 - part2_data
 - part3_data
 - landcover.shp
 - landcover_descriptions.xls
 - NY_towns.shp
 - roads_in_park.shp

Beware the Default Geodatabase



Default Geodatabase?

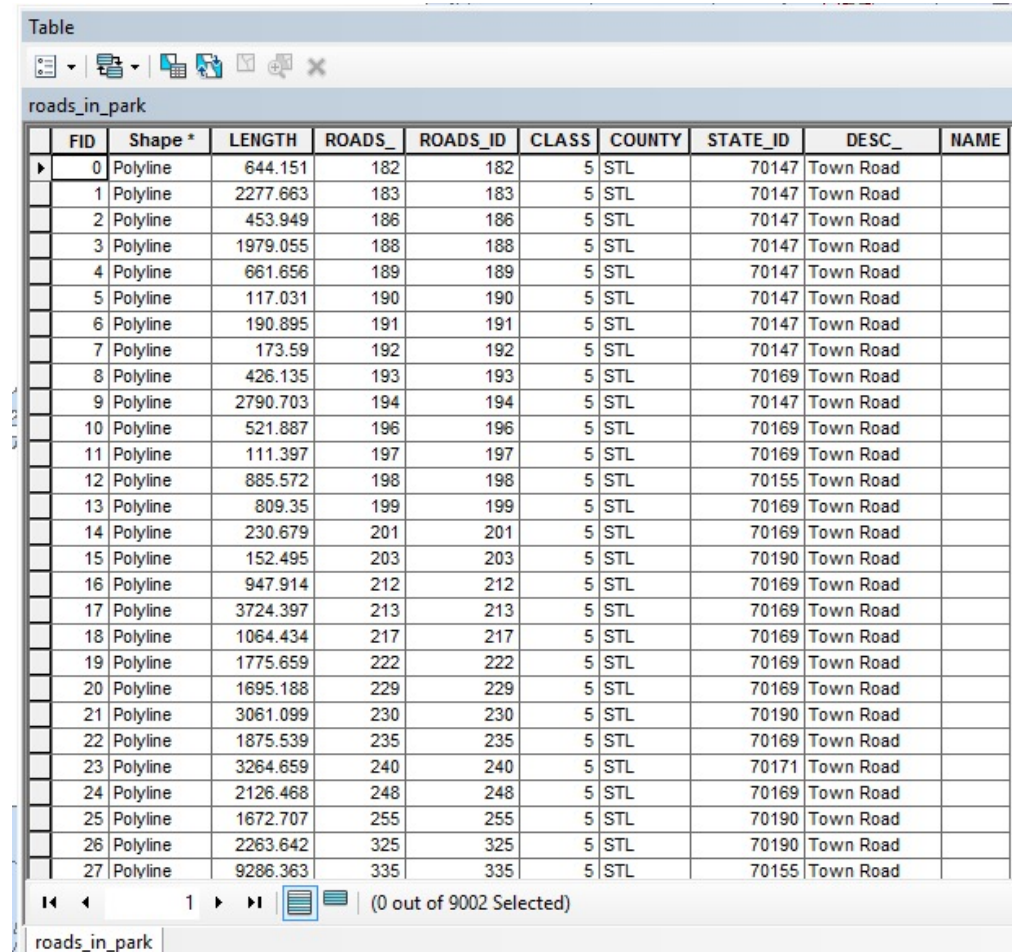
- The preset place where ArcMap puts your stuff.
- Located (unless you change it) at:
C:\Users\ArcGIS\Default.gdb

Geodatabase?

- Via ArcHelp:
 - 'An ArcGIS geodatabase is a collection of geographic datasets of various types held in a common file system folder, or a multiuser relational DBMS (database management system)'.

Database?

- You've been using them already!



Table

roads_in_park

FID	Shape *	LENGTH	ROADS_	ROADS_ID	CLASS	COUNTY	STATE_ID	DESC_	NAME
0	Polyline	644.151	182	182	5	STL	70147	Town Road	
1	Polyline	2277.663	183	183	5	STL	70147	Town Road	
2	Polyline	453.949	186	186	5	STL	70147	Town Road	
3	Polyline	1979.055	188	188	5	STL	70147	Town Road	
4	Polyline	661.656	189	189	5	STL	70147	Town Road	
5	Polyline	117.031	190	190	5	STL	70147	Town Road	
6	Polyline	190.895	191	191	5	STL	70147	Town Road	
7	Polyline	173.59	192	192	5	STL	70147	Town Road	
8	Polyline	426.135	193	193	5	STL	70169	Town Road	
9	Polyline	2790.703	194	194	5	STL	70147	Town Road	
10	Polyline	521.887	196	196	5	STL	70169	Town Road	
11	Polyline	111.397	197	197	5	STL	70169	Town Road	
12	Polyline	885.572	198	198	5	STL	70155	Town Road	
13	Polyline	809.35	199	199	5	STL	70169	Town Road	
14	Polyline	230.679	201	201	5	STL	70169	Town Road	
15	Polyline	152.495	203	203	5	STL	70190	Town Road	
16	Polyline	947.914	212	212	5	STL	70169	Town Road	
17	Polyline	3724.397	213	213	5	STL	70169	Town Road	
18	Polyline	1064.434	217	217	5	STL	70169	Town Road	
19	Polyline	1775.659	222	222	5	STL	70169	Town Road	
20	Polyline	1695.188	229	229	5	STL	70169	Town Road	
21	Polyline	3061.099	230	230	5	STL	70190	Town Road	
22	Polyline	1875.539	235	235	5	STL	70169	Town Road	
23	Polyline	3264.659	240	240	5	STL	70171	Town Road	
24	Polyline	2126.468	248	248	5	STL	70169	Town Road	
25	Polyline	1672.707	255	255	5	STL	70190	Town Road	
26	Polyline	2263.642	325	325	5	STL	70190	Town Road	
27	Polyline	9286.363	335	335	5	STL	70155	Town Road	

roads_in_park

Geo?

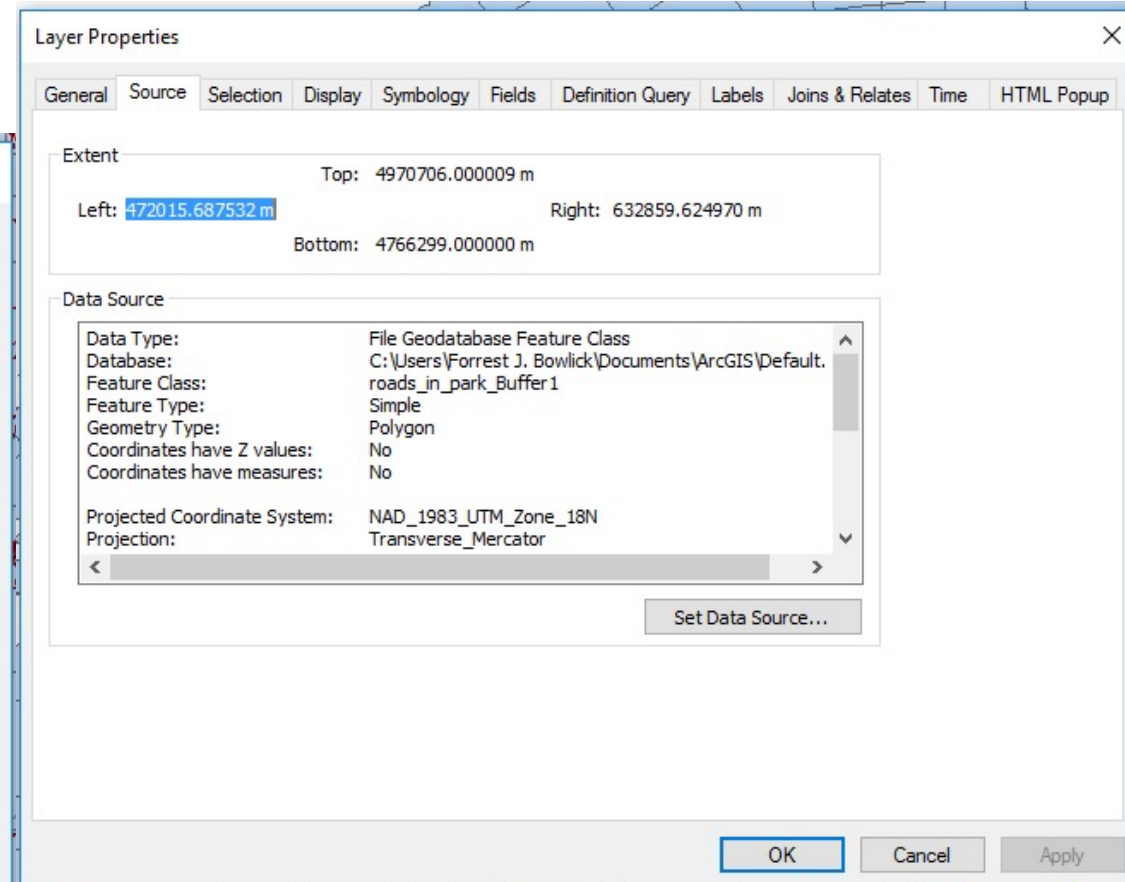
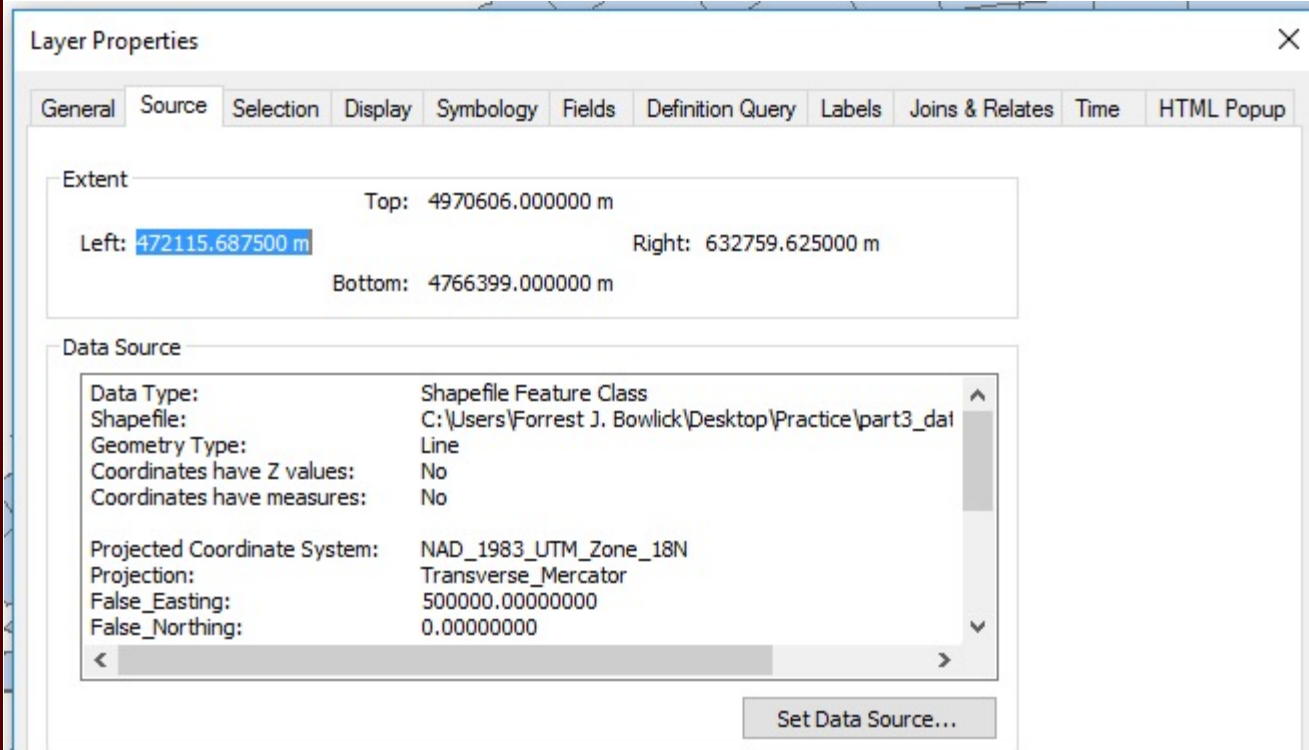
- Stop it.

Default Geodatabase Problems

- Where the default .gdb exists is likely not where your data is mobile.
- Your flash drive might store the original files, but the analysis is staying behind
- ☹️

How do you tell?

- Remember the fantastic source tab.



Those Pesky !

- The ! appear when you load an .mxd into ArcMap but it can't find your data.
- Think back to one of our definitions of GIS:
The container of maps.

What does it mean?

- 'When data has been relocated after the creation of an ArcMap .mxd, relative path names no longer work. A red exclamation point appears next to the feature classes in the ArcMap table of contents.'
- If you have all the data, an easy fix.



Layers

Nevada_agriculture



ne_nass_strata_utm14_wgs84

<all other values>

Legend

15% - 50 % Cultivated

51% - 80 % Cultivated

< 15 % Cultivated

> 80 % Cultivated

Agri-Urban: > 20 Homes per Sq. Mi.

Commercial: > 20 Homes per Sq. Mi.

Non-Agricultural

Water

nd_nass_strata_utm14_wgs84

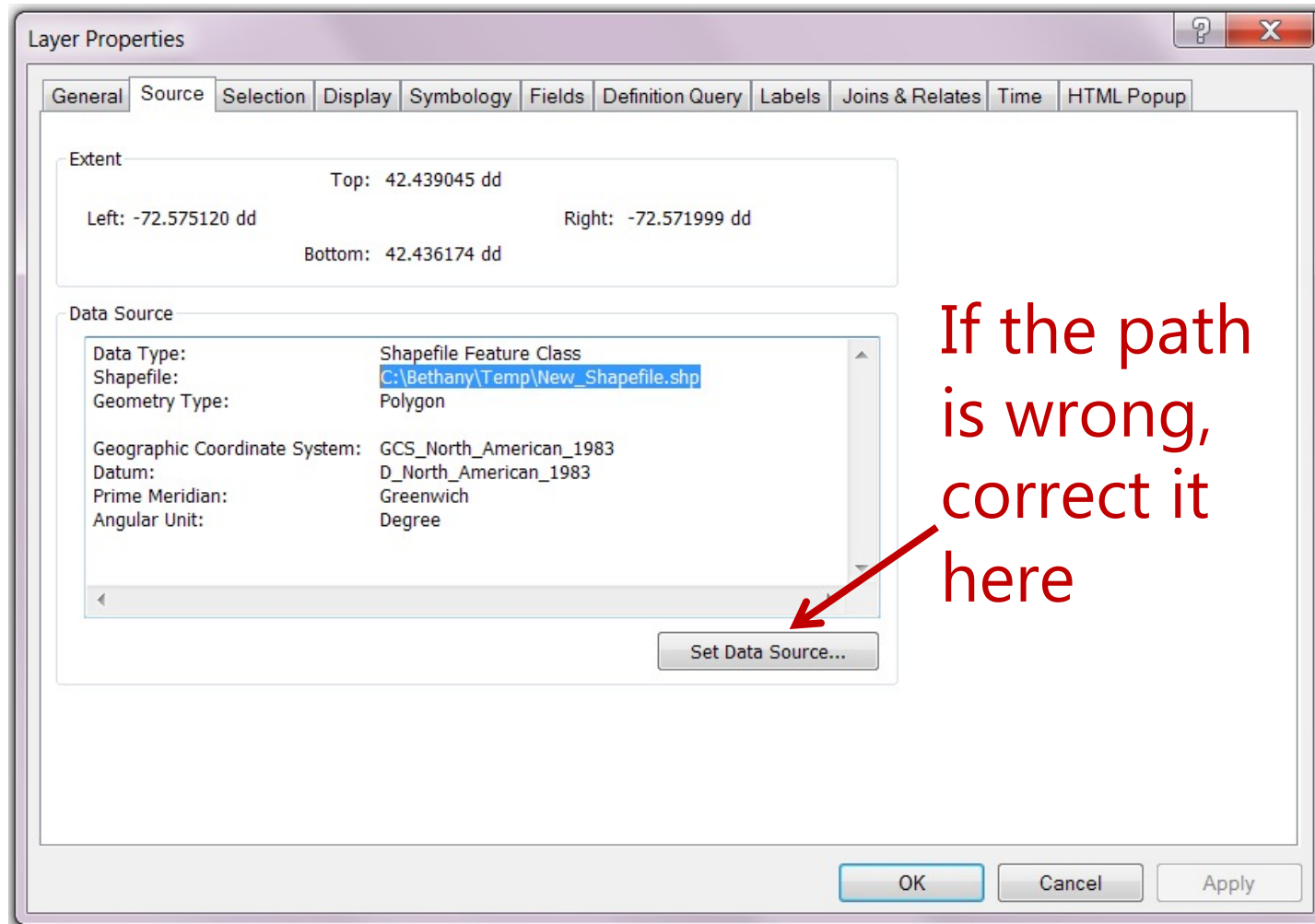
<all other values>

LEGEND

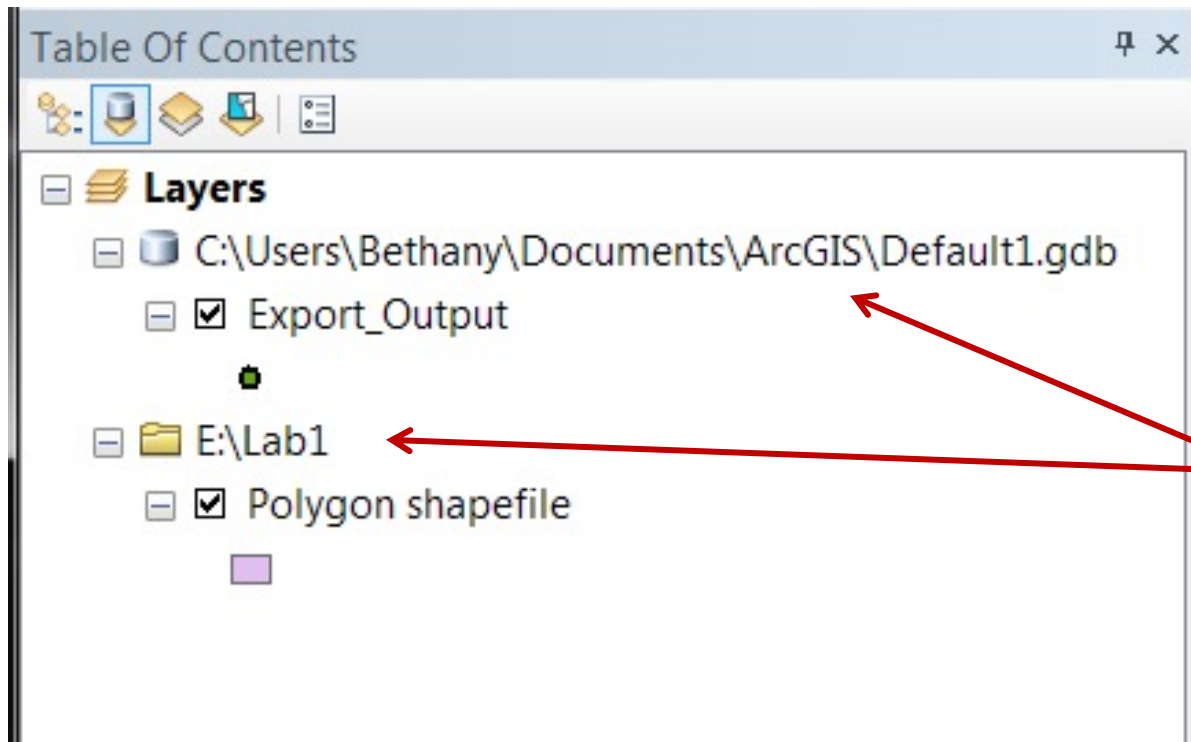
15 - 50 % Cultivated

51 - 75 % Cultivated

But, it's easy to fix incorrect paths *(provided you have the data)*



Use 'list by source' in ArcMap Table of Contents to view paths



Path to your data – anything you want to keep should NOT be in a temporary directory or a directory that may be wiped!

Projects

- Assignments ongoing.
- Still missing about half the class!
- Communication matters.

Tips

- ***You*** are the practitioner!
- Ask questions!
- Protect your Data!!!

Project Anxiety? Me too!

Where do data come from?

How reliable are they?

How can you create your own?

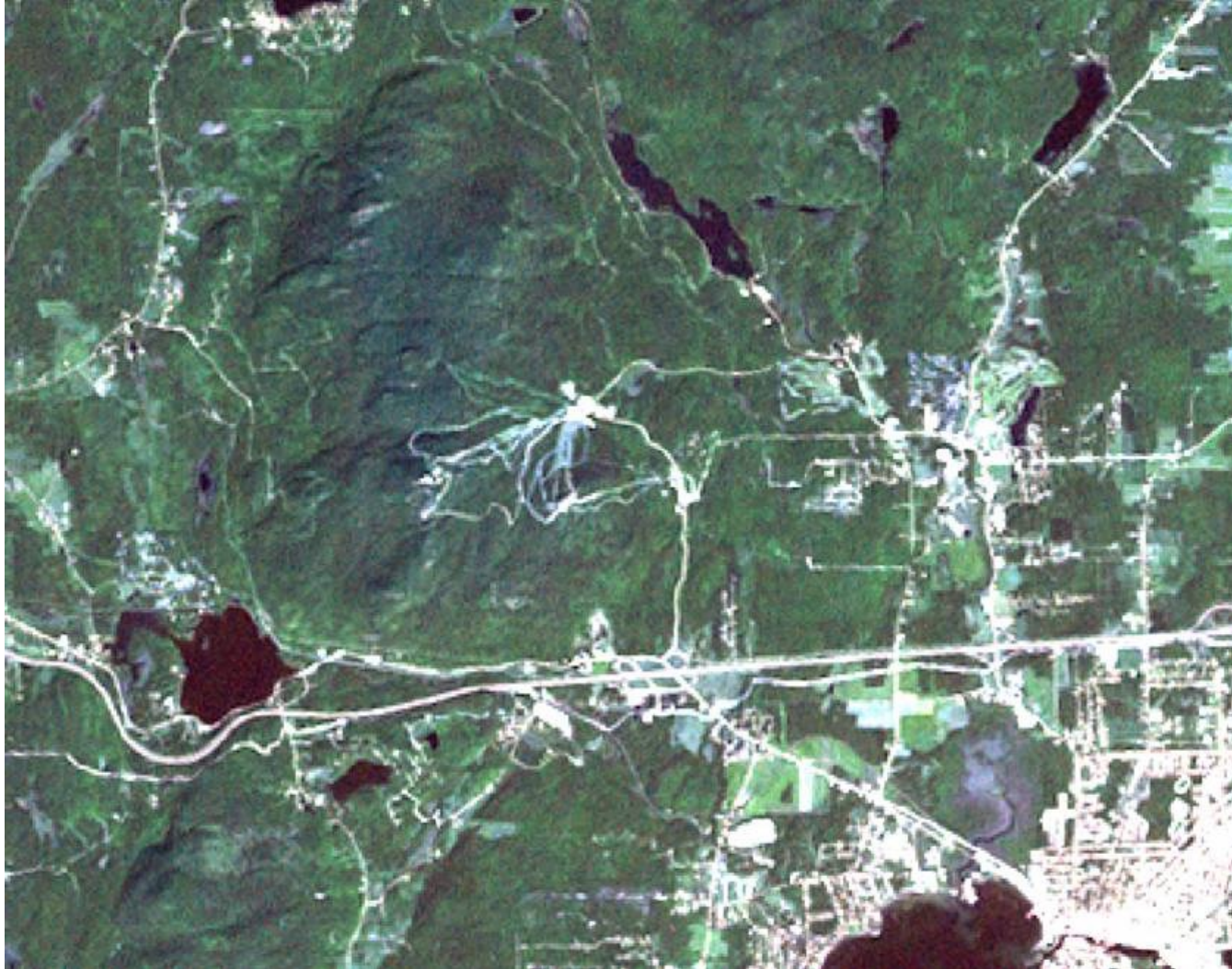


Data from Everywhere

- Anything with spatial attributes can be mapped.
- Even things without explicitly spatial attributes can be mapped!
- If mappable, GIS can use it.

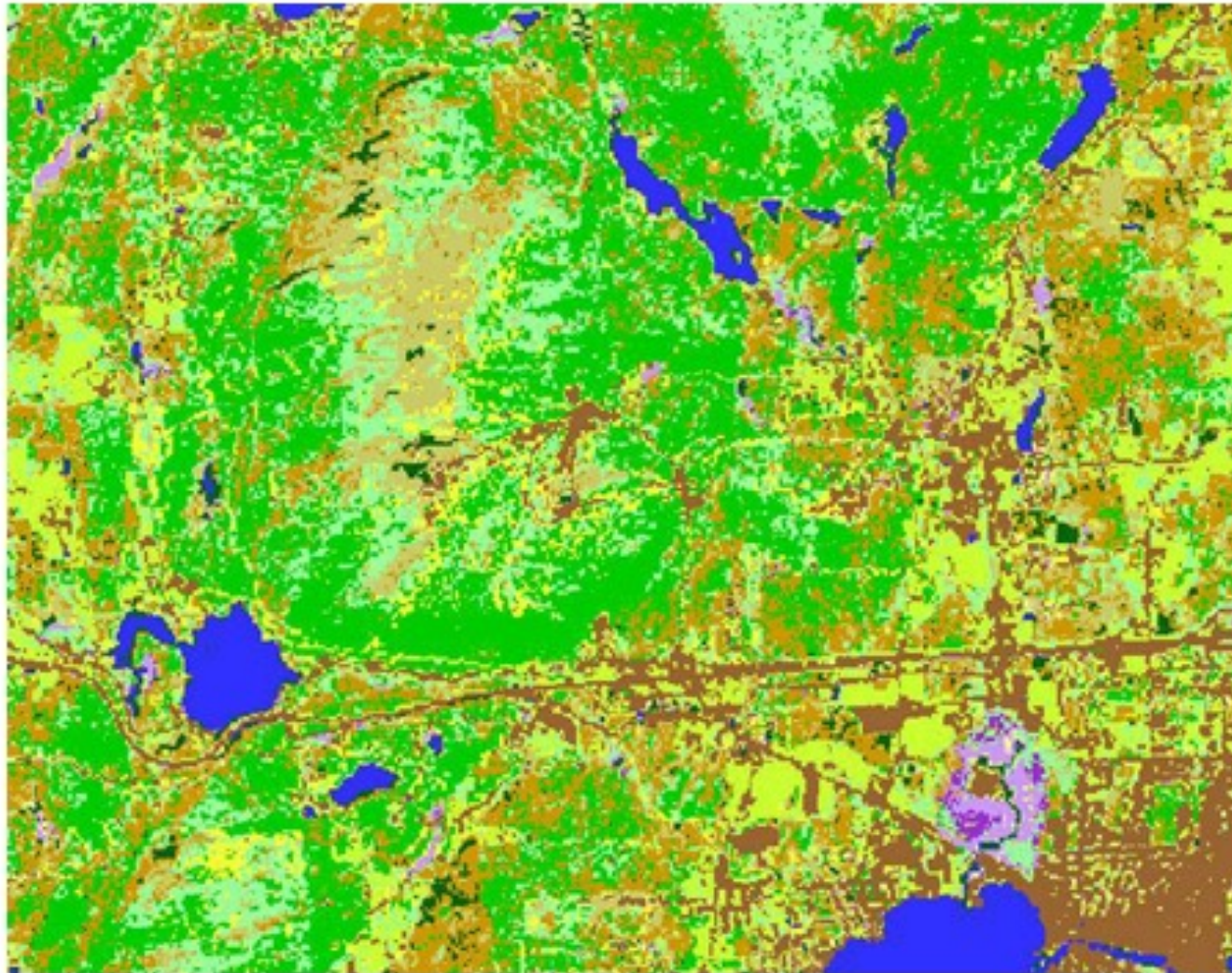
Data example	Source
Land cover map	Satellite image classification, aerial photo interpretation

Land Cover Classification



Landsat 7
Satellite imagery

Land Cover Classification II



(Partial extract of the EOSD legend)

- 20 Water
- 30 Non-Vegetated Land
- 32 Rock/Rubble
- 33 Barren Land
- 34 Developed
- 50 Shrubland
- 51 Shrub Tall
- 52 Shrub Low
- 80 Wetland
- 81 Wetland-Treed
- 82 Wetland-Shrub
- 83 Wetland-Herb
- 100 Herb
- 110 Grassland
- 120 Agriculture
- 200 Forest/Trees
- 210 Coniferous
- 220 Broadleaf
- 230 Mixedwood

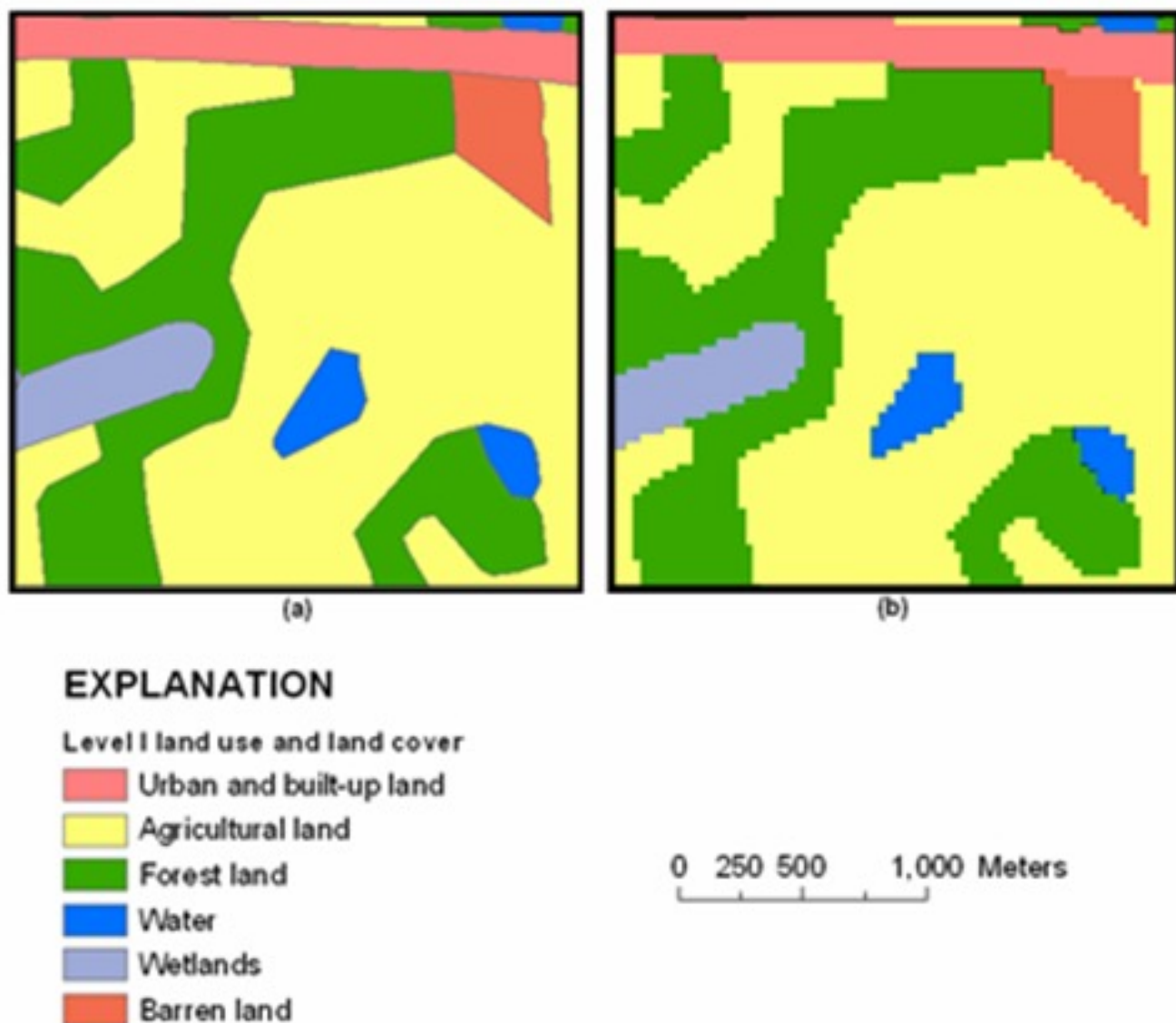


Figure 6. Comparison of land-use and land-cover data represented in (A) polygon and (B) 30-meter-resolution raster formats.

Data example	Source
Land cover map	Satellite image classification, aerial photo interpretation
Census map	Mailed surveys

Use a blue or black pen.

Start here

The Census must count every person living in the United States on April 1, 2010.

Before you answer Question 1, count the people living in this house, apartment, or mobile home using our guidelines.

- Count all people, including babies, who live and sleep here most of the time.

The Census Bureau also conducts counts in institutions and other places, so:

- Do not count anyone living away either at college or in the Armed Forces.
- Do not count anyone in a nursing home, jail, prison, detention facility, etc., on April 1, 2010.
- Leave these people off your form, even if they will return to live here after they leave college, the nursing home, the military, jail, etc. Otherwise, they may be counted twice.

The Census must also include people without a permanent place to stay, so:

- If someone who has no permanent place to stay is staying here on April 1, 2010, count that person. Otherwise, he or she may be missed in the census.

1. How many people were living or staying in this house, apartment, or mobile home on April 1, 2010?

Number of people =

2. Were there any additional people staying here April 1, 2010 that you did not include in Question 1? Mark if that apply.

- Children, such as newborn babies or foster children
- Relatives, such as adult children, cousins, or in-laws
- Nonrelatives, such as roommates or live-in baby sitters
- People staying here temporarily
- No additional people

3. Is this house, apartment, or mobile home — Mark ONE box.

- Owned by you or someone in this household with a mortgage or loan? Include home equity loans.
- Owned by you or someone in this household free and clear (without a mortgage or loan)?
- Rented?
- Occupied without payment of rent?

4. What is your telephone number? We may call if we don't understand an answer.

Area Code + Number

- -

CMB No. 0807-0019-C: Approval Expires 12/31/2011.

Form **D-61** (7-18-2009)

5. Please provide information for each person living here. Start with a person living here who owns or rents this house, apartment, or mobile home. If the owner or renter lives somewhere else, start with any adult living here. This will be Person 1.

What is Person 1's name? Print name below.

Last Name

First Name MI

6. What is Person 1's sex? Mark ONE box.

- Male Female

7. What is Person 1's age and what is Person 1's date of birth? Please report babies as age 0 when the child is less than 1 year old. Print numbers in boxes.

Age on April 1, 2010
Month Day Year of birth

→ NOTE: Please answer BOTH Question 8 about Hispanic origin and Question 9 about race. For this census, Hispanic origins are not races.

8. Is Person 1 of Hispanic, Latino, or Spanish origin?

- No, not of Hispanic, Latino, or Spanish origin
- Yes, Mexican, Mexican Am., Chicano
- Yes, Puerto Rican
- Yes, Cuban
- Yes, another Hispanic, Latino, or Spanish origin — Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spanish, and so on.

9. What is Person 1's race? Mark one or more boxes.

- White
- Black, African Am., or Negro
- American Indian or Alaska Native — Print name of enrolled or principal tribe.

- Asian Indian Japanese Native Hawaiian
- Chinese Korean Guamanian or Chamorro
- Filipino Vietnamese Samoan
- Other Asian — Print race, for example, Hong, Laotian, Thai, Pakistani, Cambodian, and so on.
- Other Pacific Islander — Print race, for example, Fijian, Tongan, and so on.

Some other race — Print race.

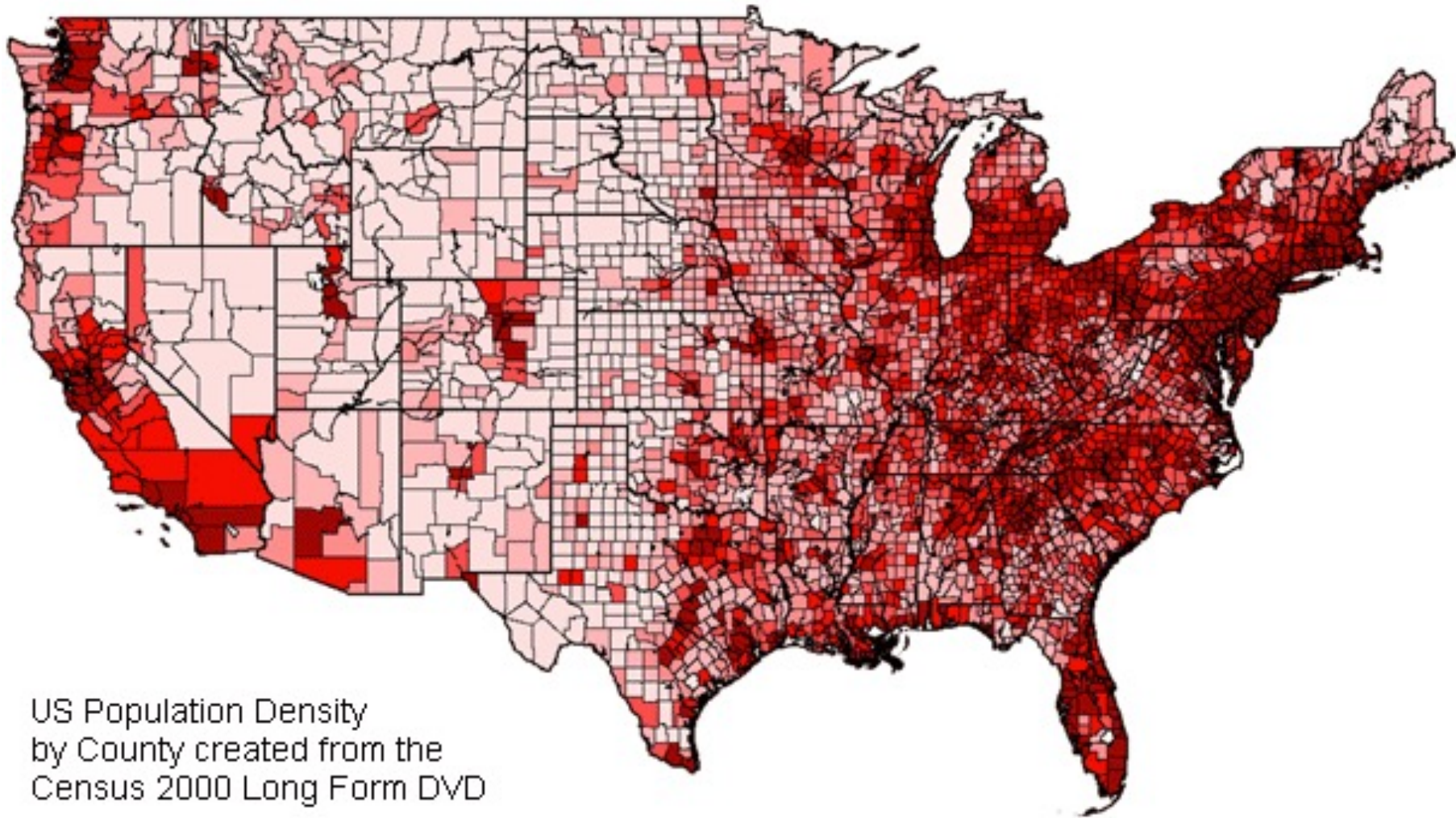
10. Does Person 1 sometimes live or stay somewhere else?

- No Yes — Mark all that apply.
- In college housing
- In the military
- At a seasonal or second residence
- For child custody
- In jail or prison
- In a nursing home
- For another reason

→ If more people were counted in Question 1, continue with Person 2.

- Number of people
- Age
- Sex
- Race
- Income
- Education

Population density by county



County-level census information

NAME	STATE_NAME	POP1999	MALES	FEMALES	WHITE	BLACK	AMERI_E	ASIAN_PI	HISPANIC	AGE_5_17	AGE_18_29	AGE_30_49	AGE_50_64
Phillips	Montana	4744	2537	2626	4741	2	390	14	44	1176	690	1399	716
Valley	Montana	8136	4110	4129	7423	9	770	19	62	1703	981	2309	1313
Daniels	Montana	1959	1115	1151	2242	0	6	18	12	475	189	608	389
Whatcom	Washington	159393	62848	64932	119229	650	4014	2363	3718	23201	26341	38357	14998
Bonner	Idaho	35901	13231	13391	26210	37	220	71	352	5721	2972	8332	3913
Ward	North Dakota	58560	28824	29097	54545	1411	962	594	857	11241	13497	15402	6259
Koochiching	Minnesota	15420	8440	7859	15633	45	451	50	185	3117	2513	4757	2443
Skagit	Washington	101320	39205	40350	74133	280	1712	782	4335	15167	11947	23329	11020
Williams	North Dakota	20025	10386	10743	20025	18	1010	43	110	4733	2883	6184	2728
McHenry	North Dakota	6024	3309	3219	6498	4	13	11	13	1377	676	1658	1064
St. Louis	Minnesota	192958	96435	101778	192053	1106	3682	1076	952	36136	33054	56233	27138
San Juan	Washington	12738	4967	5068	9811	23	79	86	121	1480	803	3316	1706
Roosevelt	Montana	10936	5374	5625	5569	17	5355	40	103	2684	1664	2982	1272
Mountrial	North Dakota	6590	3469	3552	5606	4	1395	14	25	1603	812	1861	951
Marshall	Minnesota	10190	5566	5427	10889	2	50	14	113	2474	1293	2866	1651
Ramsey	North Dakota	11973	6221	6460	12022	21	591	30	49	2462	1935	3350	1736
Walsh	North Dakota	13422	6890	6950	13453	17	97	59	441	2844	1826	3640	1952
Beltrami	Minnesota	39000	17011	17373	28409	100	5641	194	146	7356	7343	8949	3868
Pierce	North Dakota	4597	2498	2554	5011	2	23	15	1	1015	598	1142	802
Chelan	Washington	60730	25780	26470	48333	80	487	378	4786	9939	7760	15293	7026
Pondera	Montana	6424	3198	3235	5691	5	704	20	31	1448	792	1728	897
Clallam	Washington	64786	28084	28380	52509	321	2695	614	1150	10096	7312	15661	8274
Benson	North Dakota	6904	3631	3567	4417	0	2772	3	24	1787	996	1669	911
Chouteau	Montana	5125	2782	2670	5221	4	212	10	25	1153	622	1518	822
Snohomish	Washington	604856	232194	233448	434536	4767	6422	16467	10656	89762	83391	155542	53413
Island	Washington	71454	31340	28855	55034	1454	480	2553	2006	10554	12434	16696	7323
Sanders	Montana	10200	4377	4292	8135	12	471	37	104	1882	956	2509	1322
Lake	Minnesota	10536	5182	5222	10222	2	61	16	22	1010	1202	2862	1005

Beware Human Error

- The nature of the classifications and groups you allocate data to might not be scientifically valid.
- Always collect data with the structure of your organization in mind.

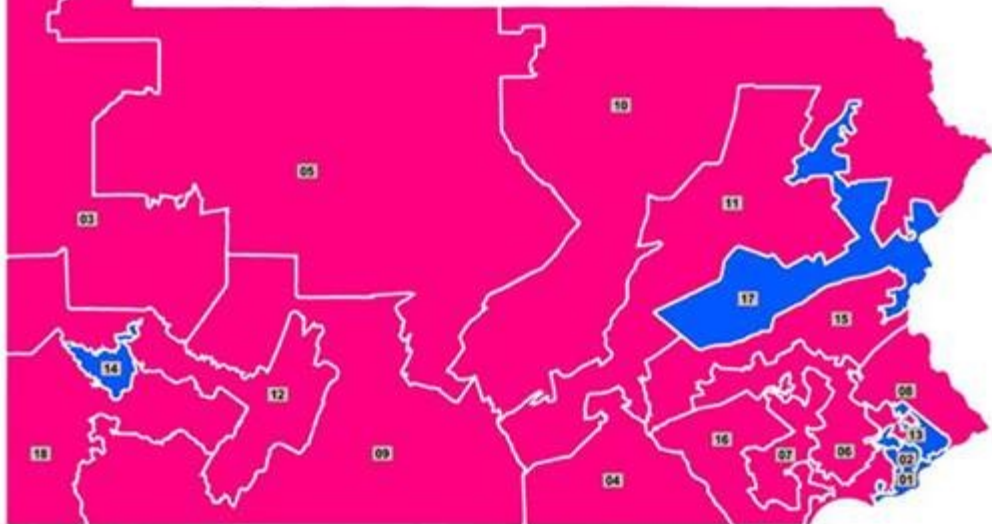
Timely Example

<https://www.youtube.com/watch?v=QZZwoObFMhU>

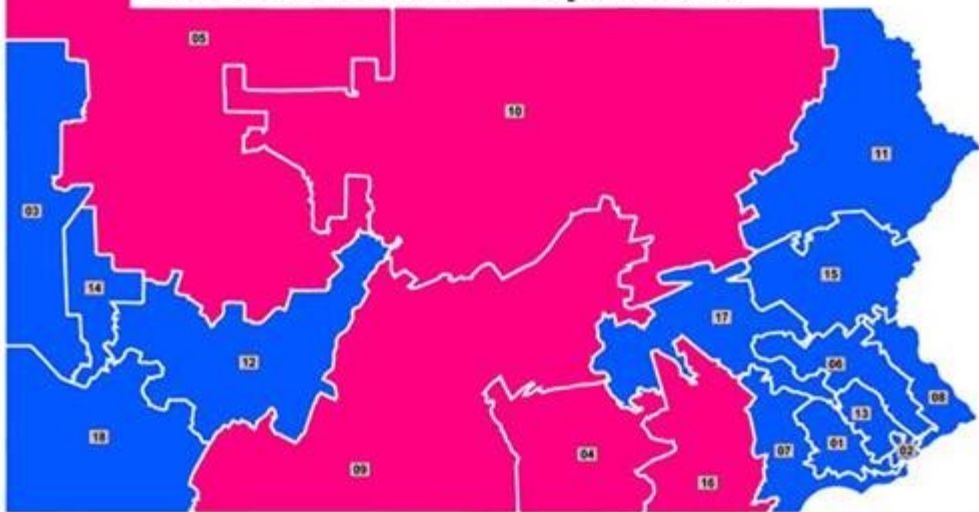
<https://www.youtube.com/watch?v=YcUDBgYodIE>

tx.ag/GIS7B

The 2011 Pennsylvania redistricting plan resulted in a Congressional delegation made up of **13 Republicans and 5 Democrats.**

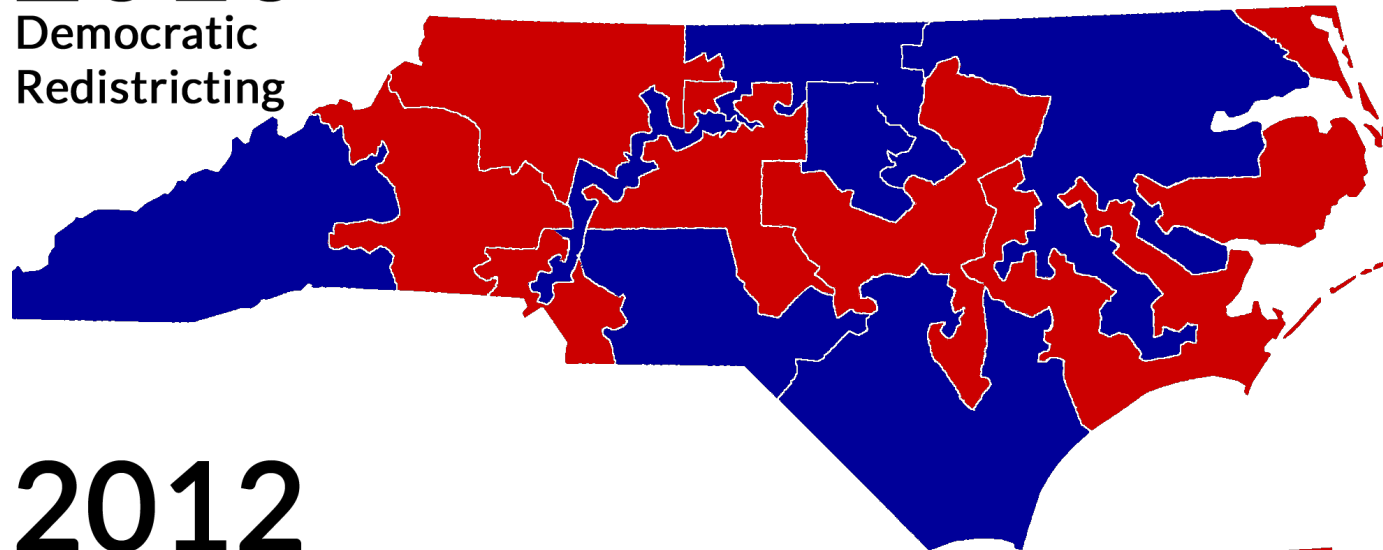


But using the exact same data, we re-drew the lines to predict the exact opposite result: **13 Democrats and 5 Republicans.**



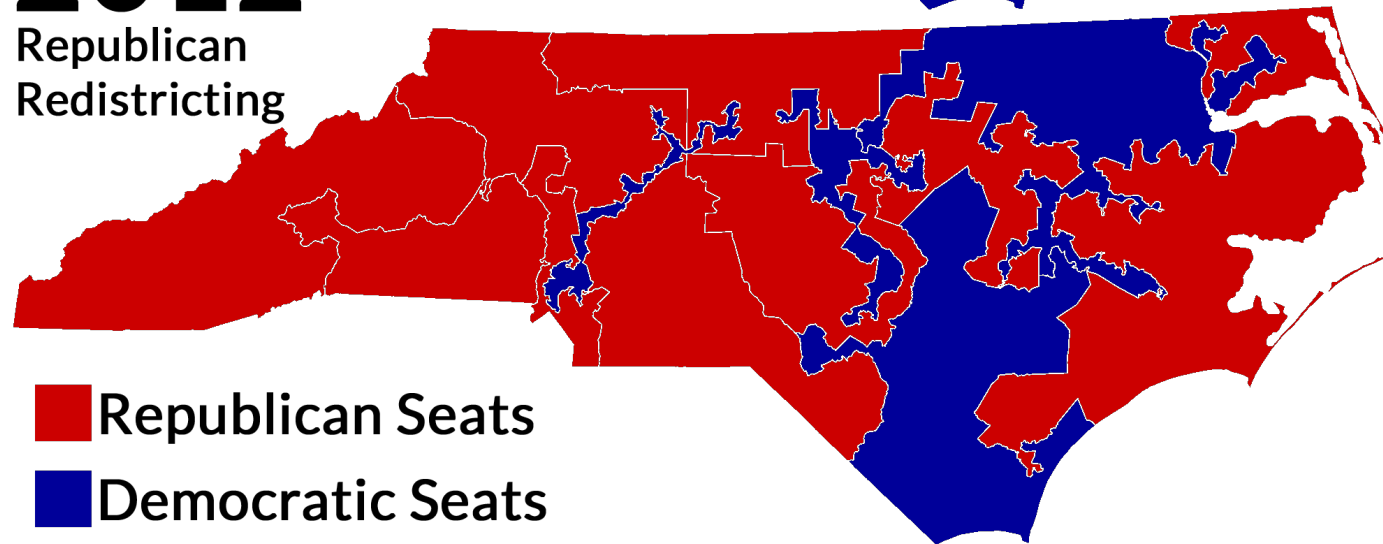
2010

Democratic
Redistricting



2012

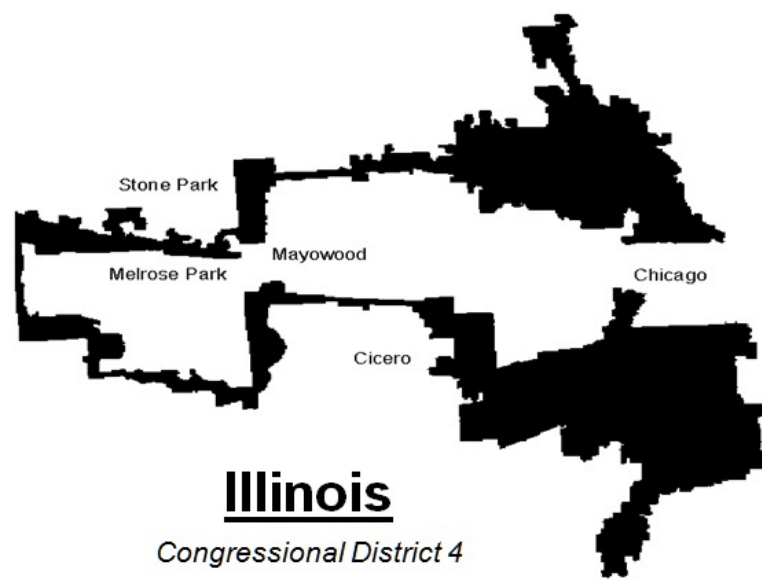
Republican
Redistricting



- Republican Seats
- Democratic Seats

**Which makes us wonder: who really matters?
The People, or the person with the pen?**

www.senatorleach.com/redistricting



Illinois

Congressional District 4



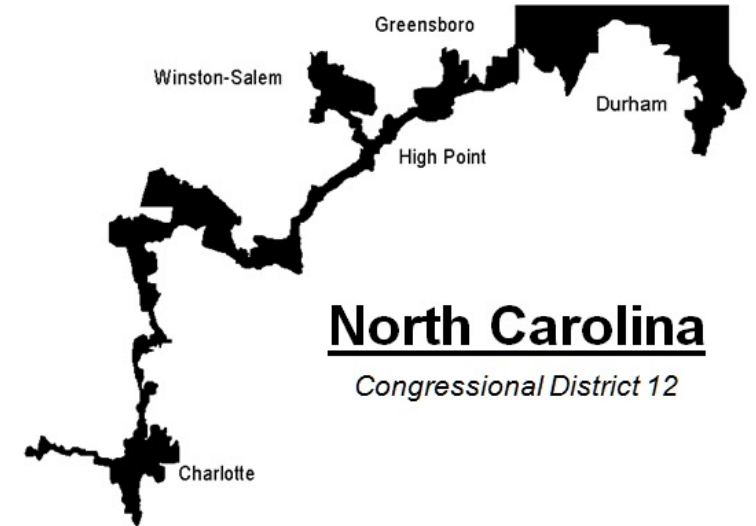
Georgia

Congressional District 11



Louisiana

Congressional District 4



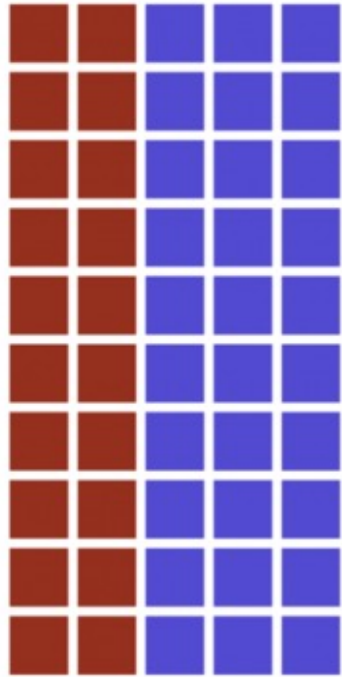
North Carolina

Congressional District 12

Gerrymandering, explained

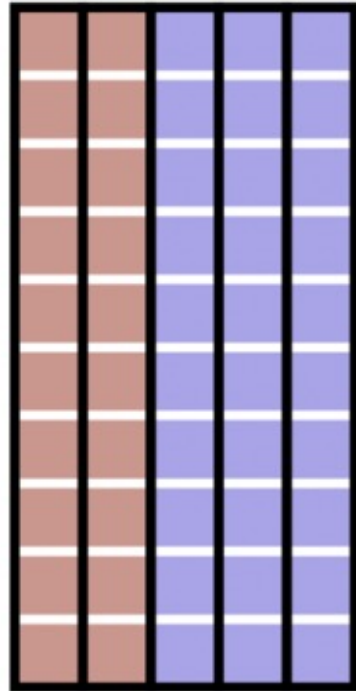
Three different ways to divide 50 people into five districts

50
people



**60% blue,
40% red**

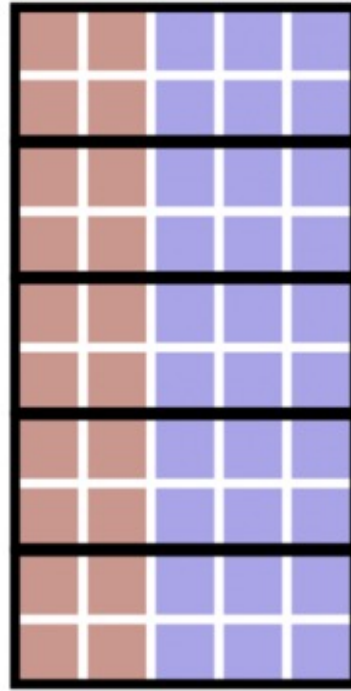
1. Perfect
representation



**3 blue districts,
2 red districts**

BLUE WINS

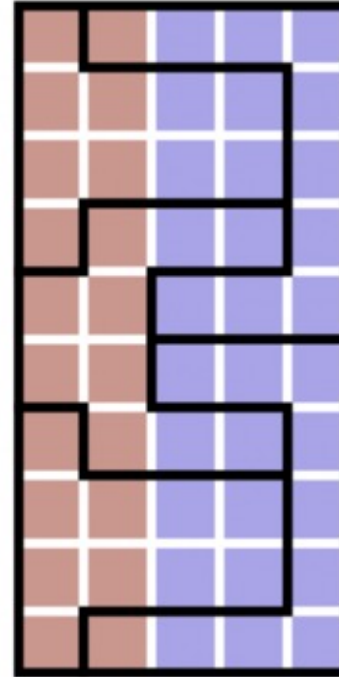
2. Compact,
but unfair



**5 blue districts,
0 red districts**

BLUE WINS

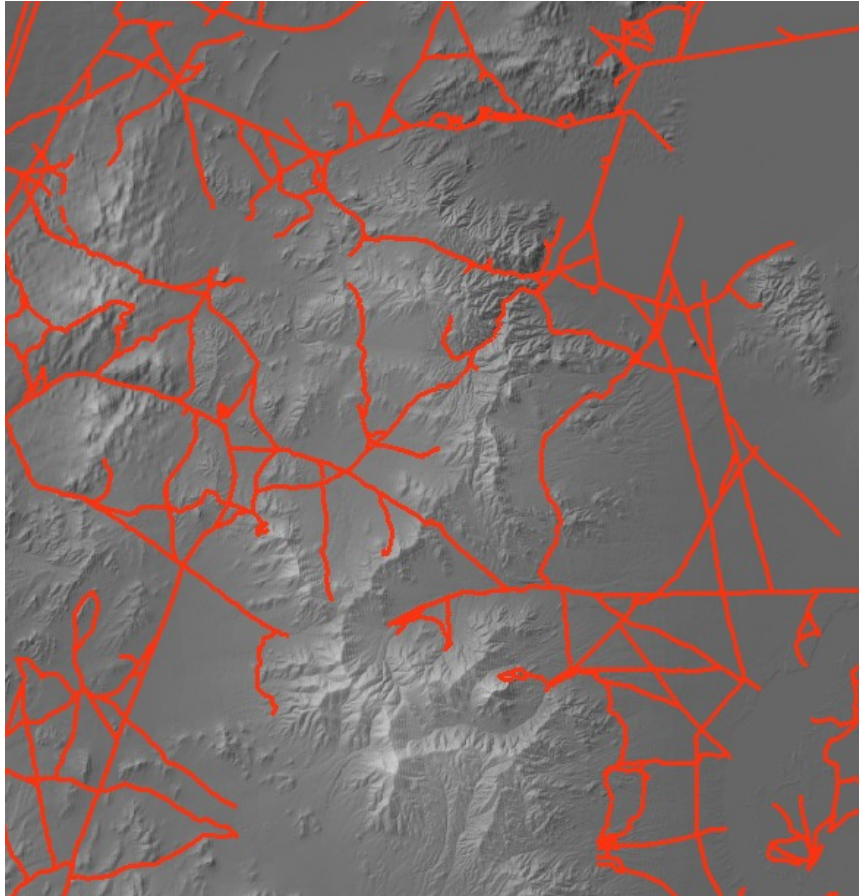
3. Neither compact
nor fair



**2 blue districts,
3 red districts**

RED WINS

Roads



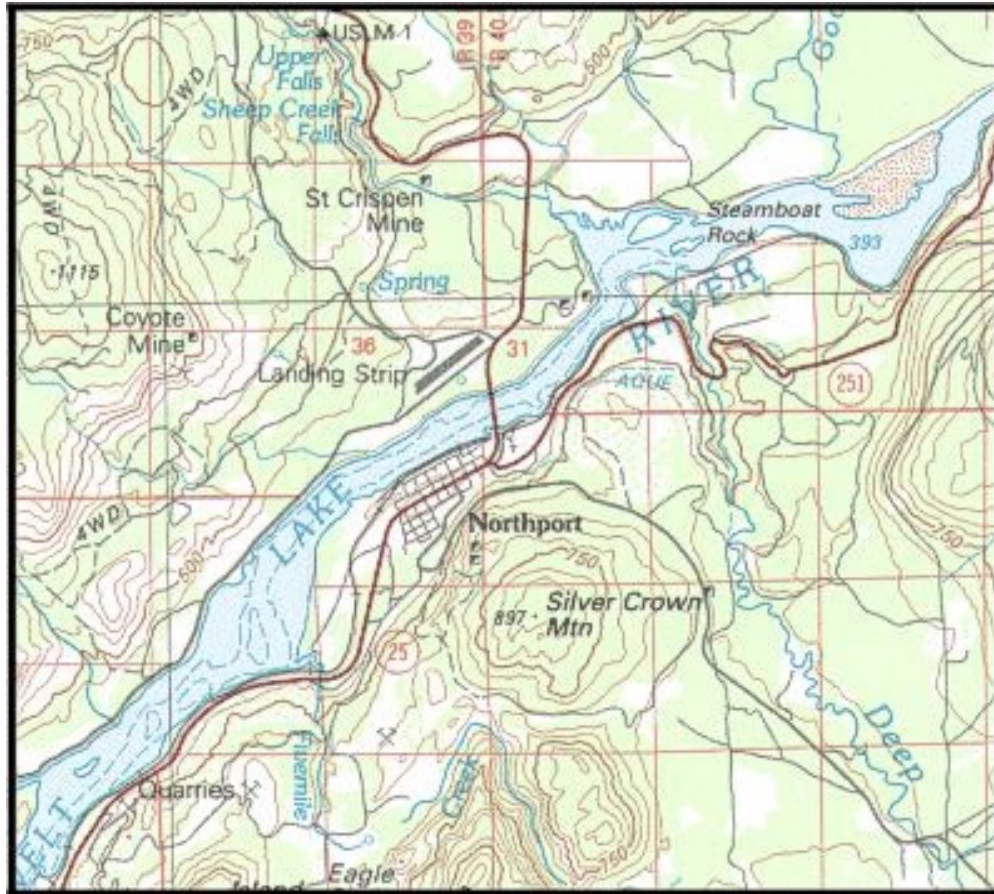
TIGER Navigation
2010 CENSUS <u>TIGER/LINE</u> SHAPEFILES MAIN
DOWNLOAD SHAPEFILES
RELEASE SCHEDULE
TECHNICAL DOCUMENTATION
USER NOTES
PREVIOUS VERSIONS
2009 <u>TIGER/LINE</u> SHAPEFILES
2008 <u>TIGER/LINE</u> SHAPEFILES
2007 <u>TIGER/LINE</u> SHAPEFILES
TIGER/LINE FILES
OTHER 2010 CENSUS GEOGRAPHIC PRODUCTS
GEOGRAPHY MAIN PAGE

Other Geocoded road information



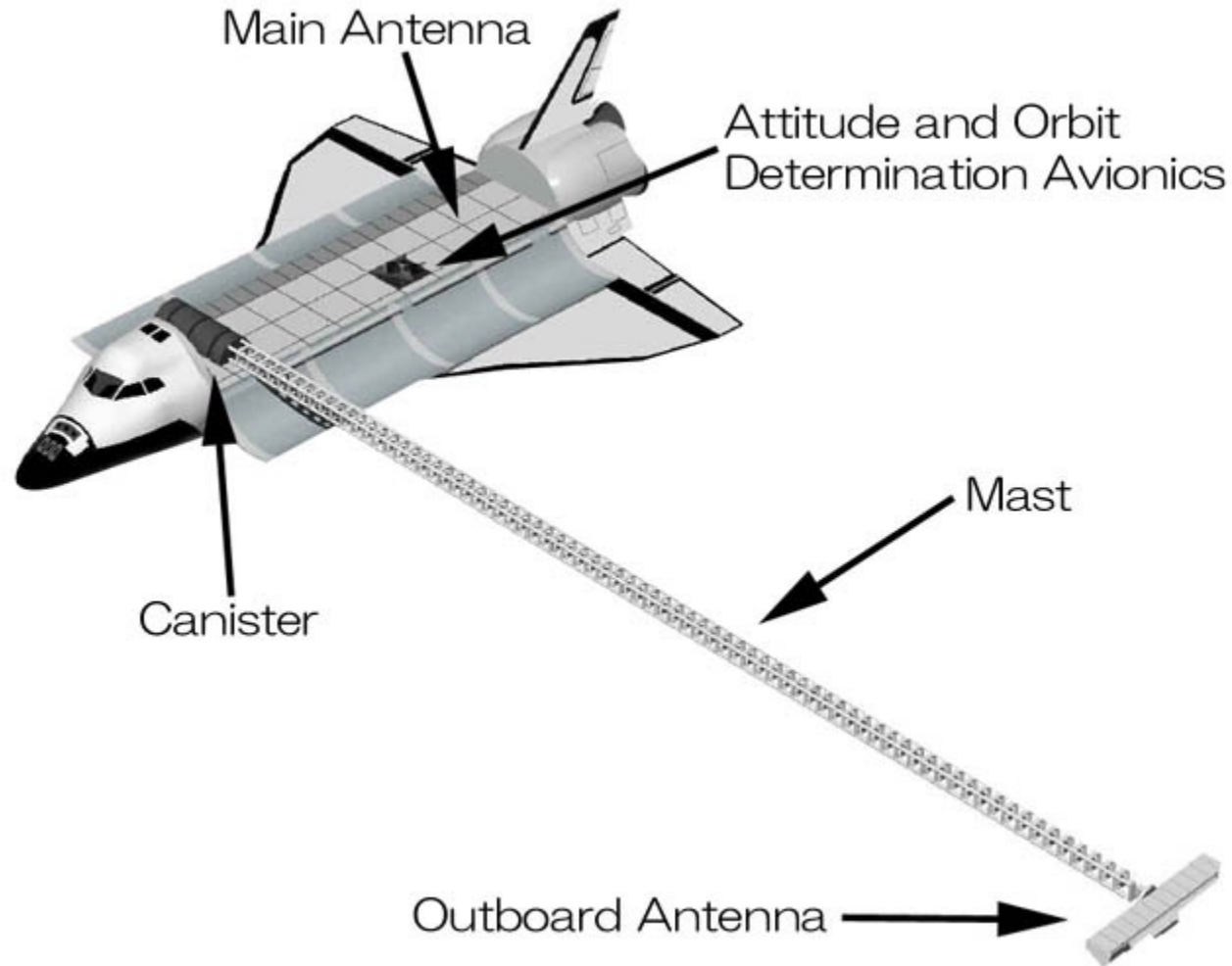
Data example	Source
Land cover map	Satellite image classification, aerial photo interpretation
Census map	Mailed surveys
Topographic maps	Surveys, RADAR, LiDAR

Topographic Maps from Surveys

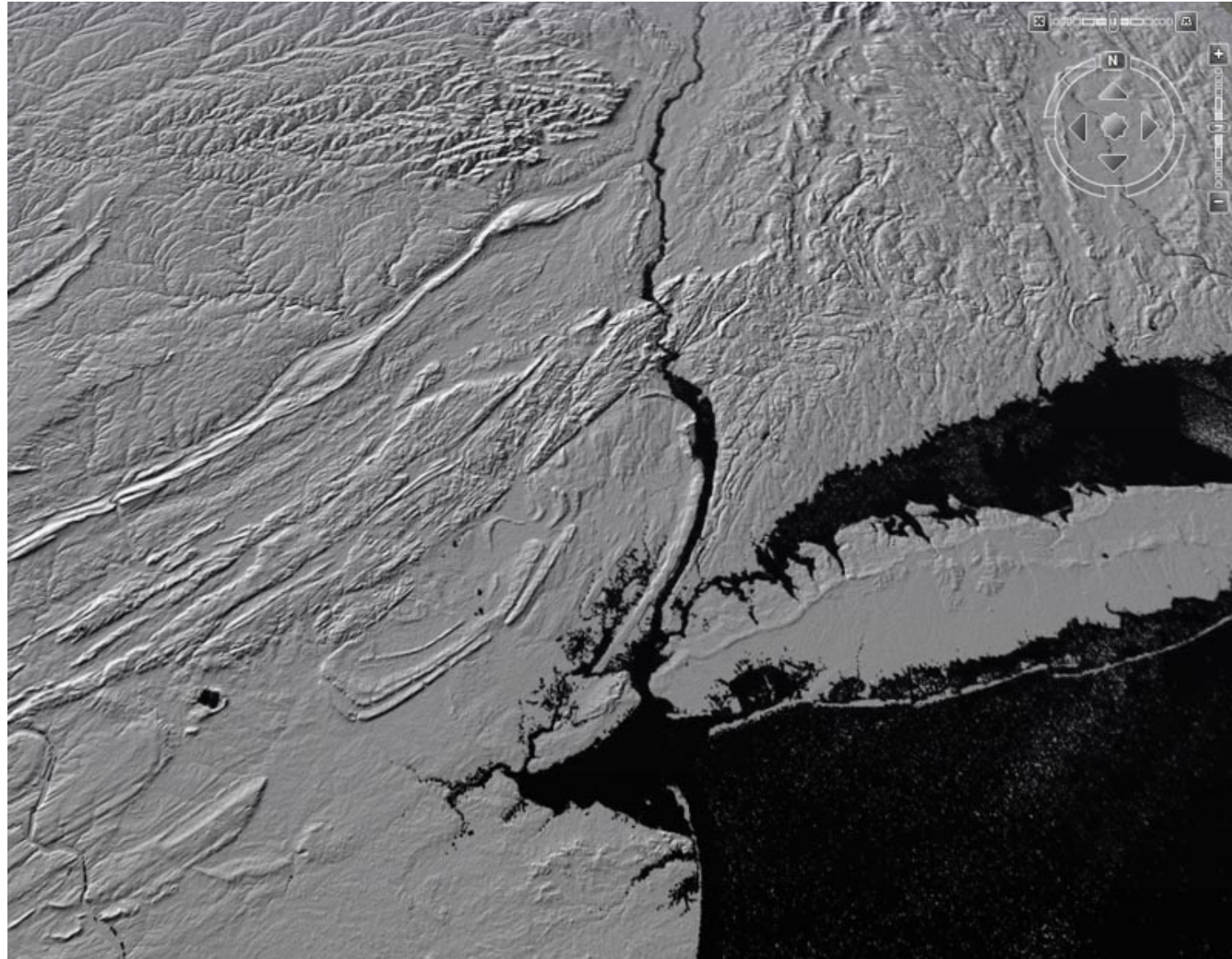


Example: USGS quadrangle topo lines defined based on widespread surveys

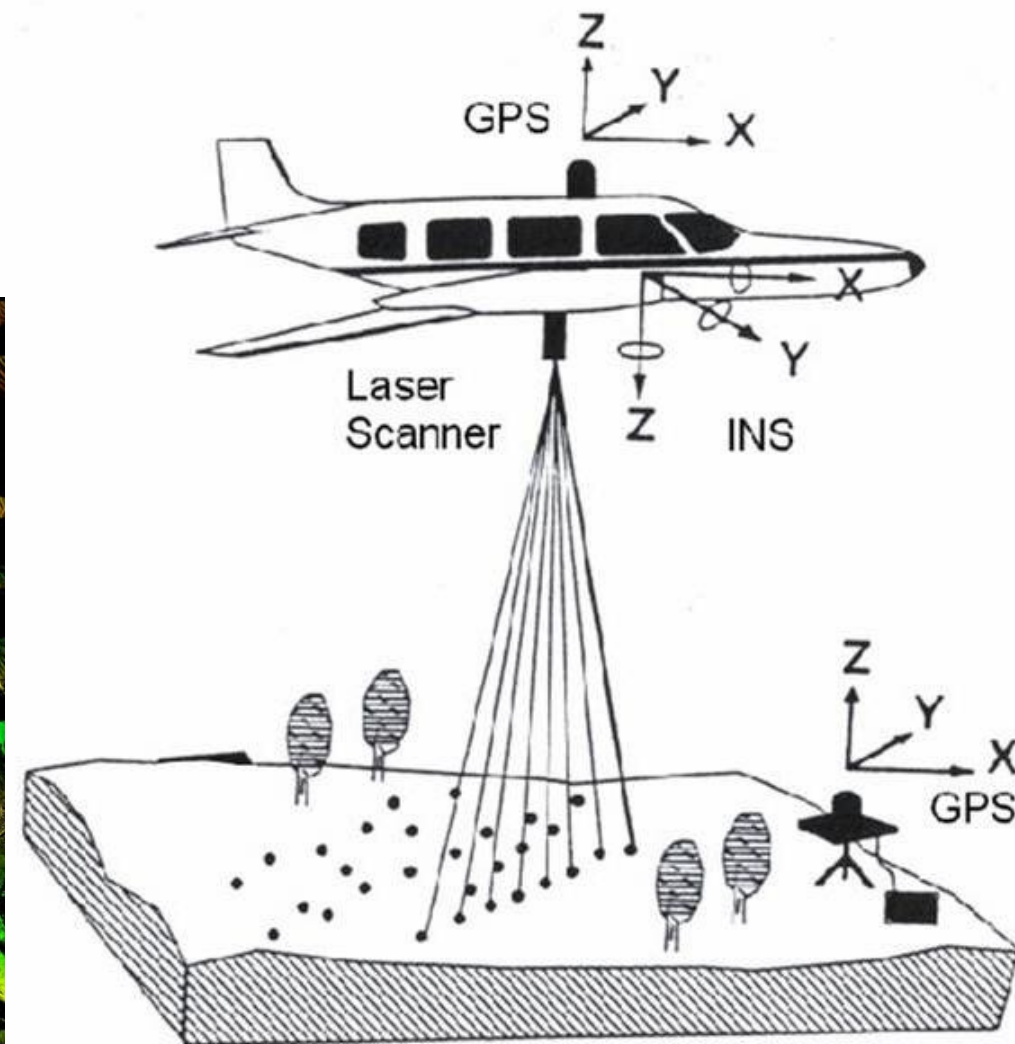
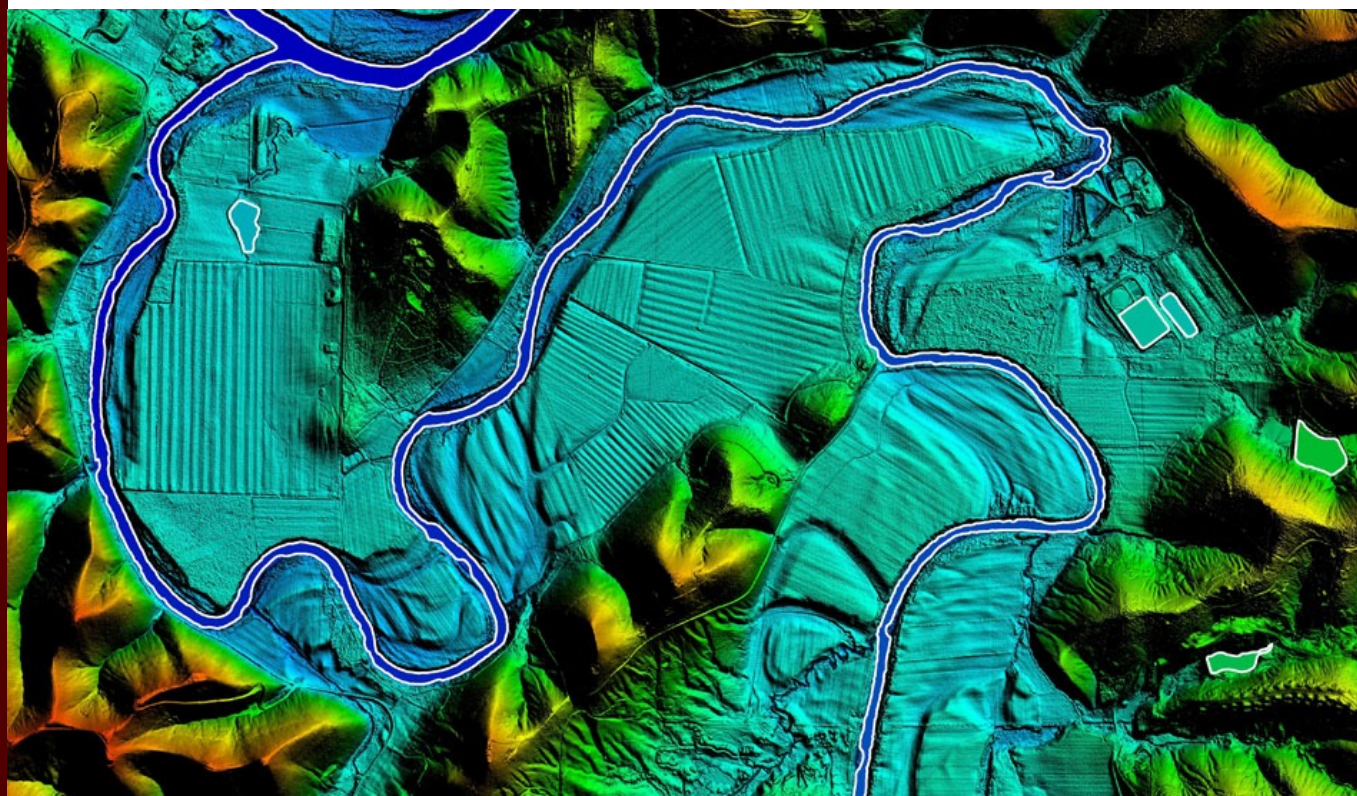
Topographic Maps from SPACE



New-school topographic maps: SRTM



Topographic Maps from LASERS



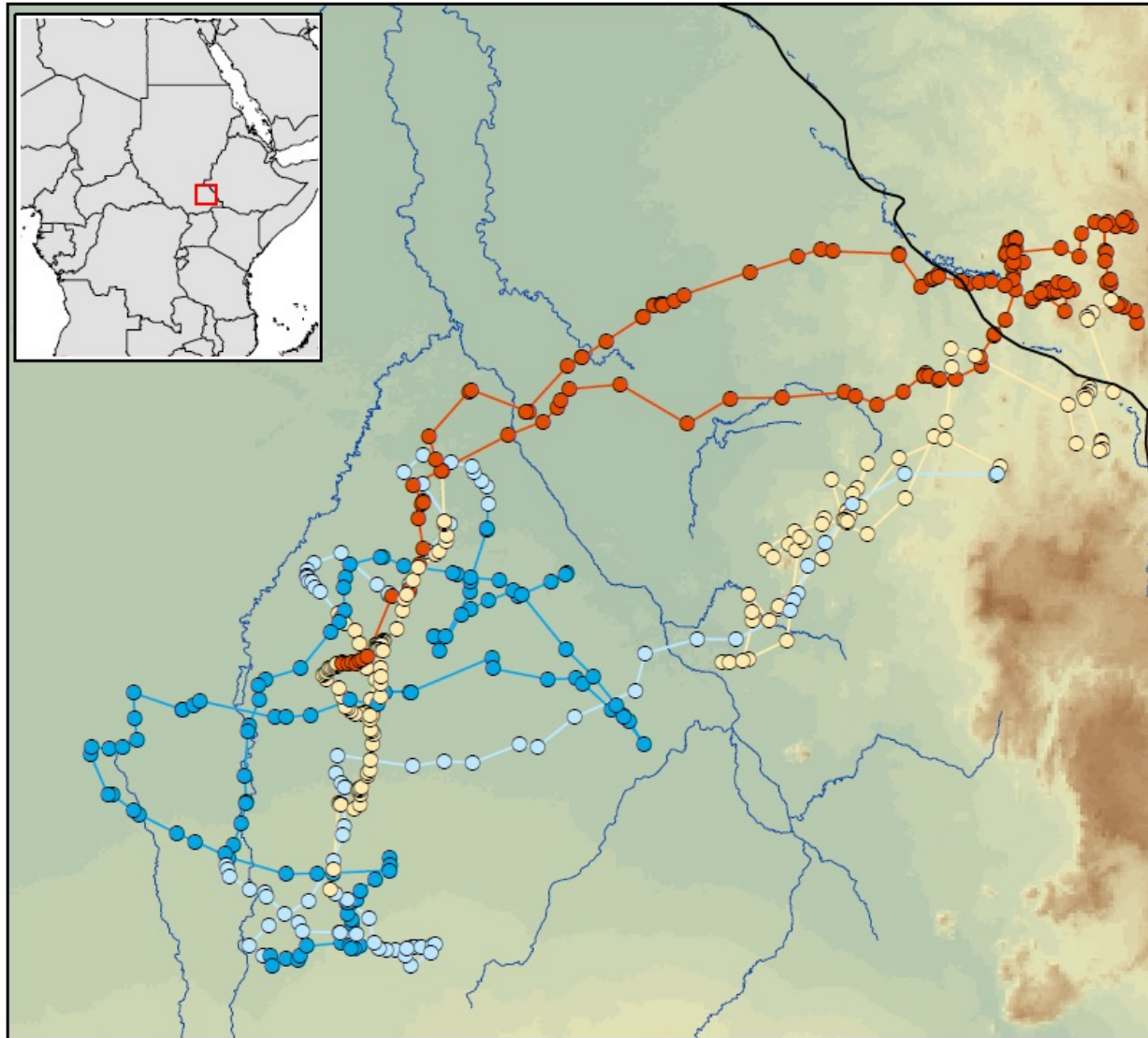
Data example	Source
Land cover map	Satellite image classification, aerial photo interpretation
Census map	Mailed surveys
Topographic maps	Surveys, RADAR, LiDAR
Change maps	Digitized paper maps, aerial photo interpretation

Scanning and interpreting historic aerial photos



Data example	Source
Land cover map	Satellite image classification, aerial photo interpretation
Census map	Mailed surveys
Topographic maps	Surveys, RADAR, LiDAR
Change maps	Digitized paper maps, aerial photo interpretation
Point locations	GPS collars, Field collection

GPS collar data – migration routes



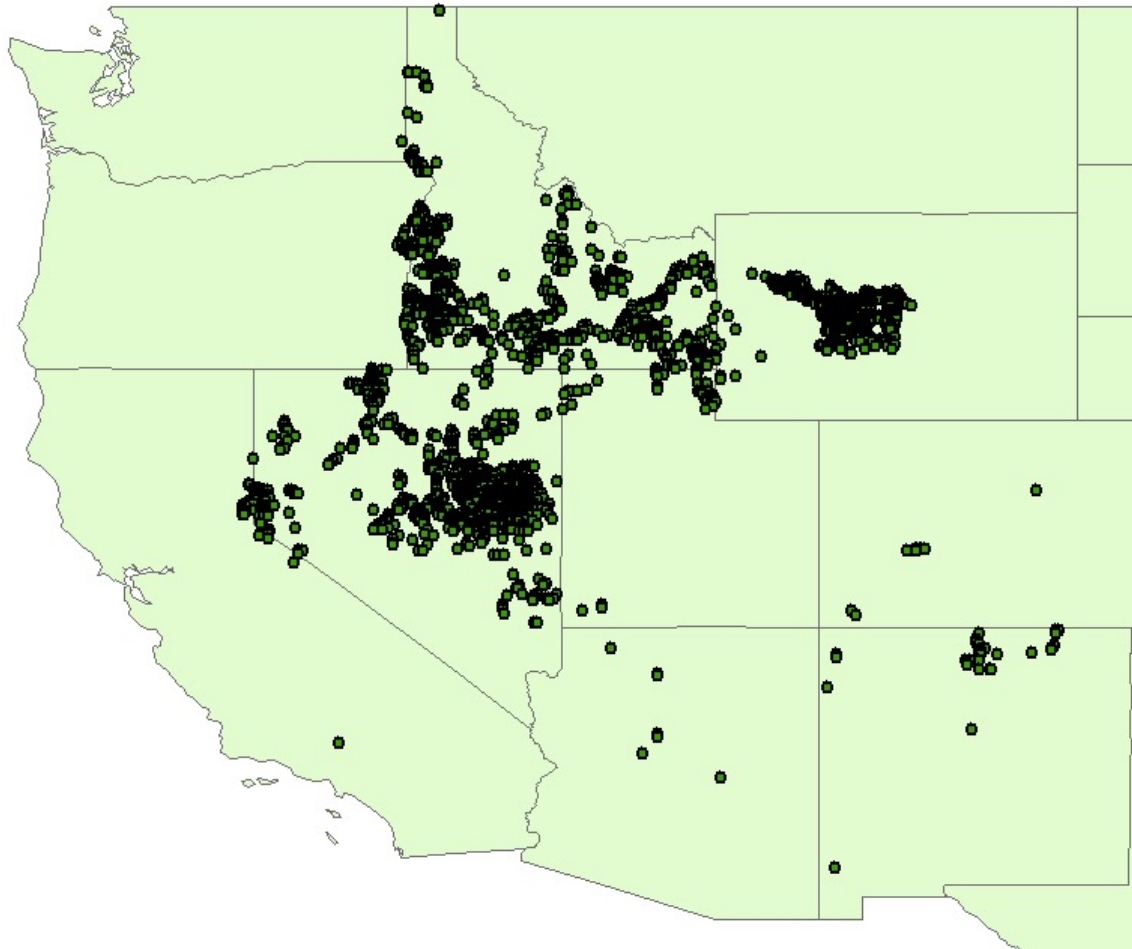
0 25 50 100
Kilometers



402.0000001 - 423
423.0000001 - 446
446.0000001 - 471
471.0000001 - 497
497.0000001 - 526
526.0000001 - 558
558.0000001 - 592
592.0000001 - 628

Spatial display of XY Coordinates

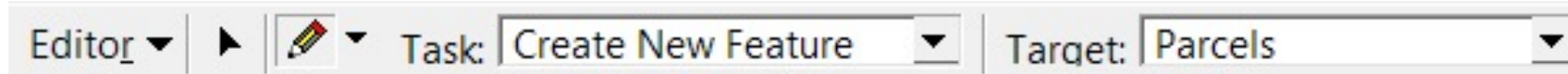
	A	B	C
1	ID	Latitude	Longitude
2	ciar_gbif	48.7502	-122.875
3	ciar_gbif	48.5835	-123.042
4	ciar_gbif	48.5835	-123
5	ciar_gbif	48.5835	-122.958
6	ciar_gbif	48.5419	-122.958
7	ciar_gbif	48.5419	-122.833
8	ciar_gbif	48.4585	-122.958
9	ciar_gbif	48.8335	-121.917
10	ciar_gbif	48.7918	-116.458
11	ciar_gbif	48.7918	-105.542
12	ciar_gbif	48.7918	-103.5
13	ciar_gbif	48.7918	-102.5
14	ciar_gbif	48.7918	-100.833
15	ciar_gbif	48.7502	-98.4583
16	ciar_gbif	48.7502	-97.5416
17	ciar_gbif	48.7085	-116.292
18	ciar_gbif	48.7085	-113
19	ciar_gbif	48.7085	-104.5



Recap:

- Data come from *many* different sources
 - Can't find what you need? Create your own!
- All data are subject to error
 - Never assume that your data are perfect
- Manipulating and storing data are well within the GIS wheelhouse

ArcGIS Editor Toolbar



The editor toolbar only works for vector data (shapefiles)

Create and edit new shapefiles