

GEOL 452/552

-

GIS for Geoscientists I

Lecture 9 - Chapter 4

1

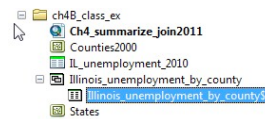
- import table of stand alone tables
- Joining of non-spatial data to existing, spatial data
- ~~Summary statistics of a field, grouped by another field (Summarize)~~
(*didn't get to Sept. 22, will do next time)
- get follow_along_data/Ch4B_class_ex, load mxd file
- Scenario: let's look at per-county unemployment data from a stand alone table (IL only)

2

Importing a stand-alone table

- Excel spread sheet (.xls, .xlsx)
- Excel: workbook contains 1 or more worksheets
- In ArcCatalog: worksheets end with \$ and are "inside" the workbook
- Tab or Comma separated Text files (.txt, .csv)
- Convert to dbf file or export into a Geodatabase
- I've already create a dbf file called IL_uenployment2010.dbf

	A	B	C	D	E	F	G	H	I
1	FIPS	Name	2003	2004	2005	2006	2007	2008	2009
2	17001	Adams	5.4	4.6	3.9	3.6	4.1	4.9	4.9
3	17003	Alexander	10.7	9.5	9	8.6	8.7	9.7	11.8
4	17005	Bond	6.2	6.2	5.6	5.2	5.5	6.8	6.8
5	17007	Boone	8.1	7.6	6.9	5.9	6.9	9.5	15.9
6	17009	Brown	4.4	4.2	3.9	3.2	2.9	3.9	4.4
7	17011	Bureau	7.2	6.2	5.1	4.7	5.1	6.2	11.4

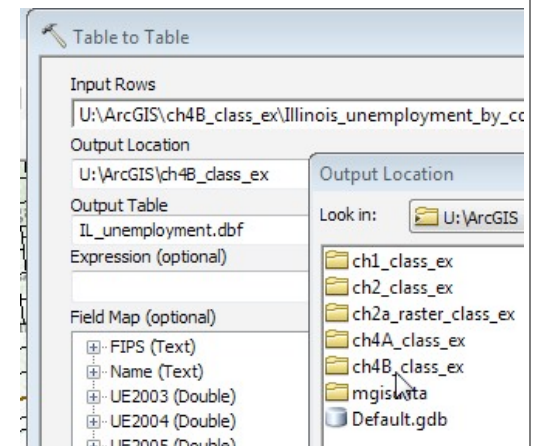
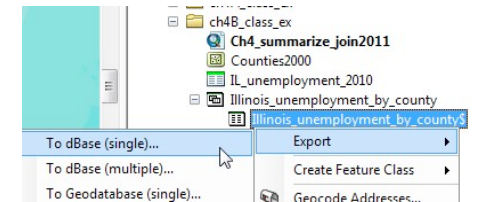


```
"FIPS", "Name", "2003", "2004", "2005", "2006", "2007", "2008", "2009"
17001, Adams, 5.4, 4.6, 3.9, 3.6, 4.1, 4.9, 7.2, 7.4
17003, Alexander, 10.7, 9.5, 9, 8.6, 8.7, 9.7, 12.1, 11.8
17005, Bond, 6.2, 6.2, 5.6, 5.2, 5.5, 6.8, 9.7, 10.1
17007, Boone, 8.1, 7.6, 6.9, 5.9, 6.9, 9.5, 15.2, 15.9
17009, Brown, 4.4, 4.2, 3.9, 3.2, 2.9, 3.9, 4.4, 5.1
17011, Bureau, 7.2, 6.2, 5.1, 4.7, 5.1, 6.2, 10.4, 11.4
17013, Calhoun, 7.2, 6.9, 6.4, 6.4, 7.7, 4.9, 9, 10.9
```

3

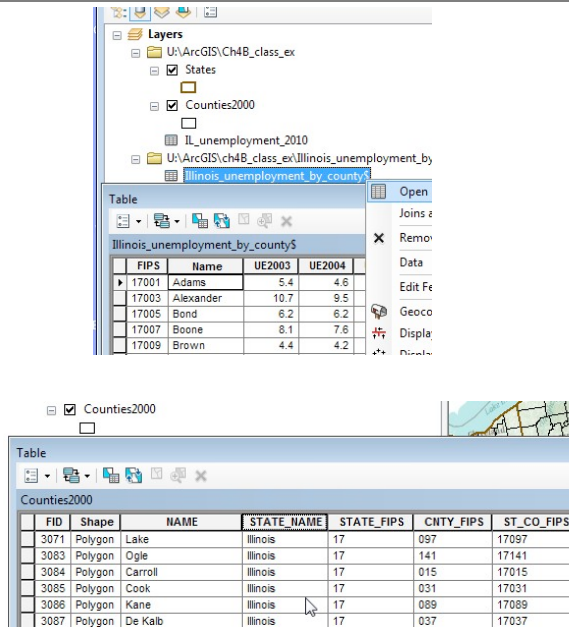
Convert (export) a Excel file

- In ArcCatalog: R-Click on worksheet - Export - To dBase (single)
- Brings up the Table to Table Tool
- let's create a .dbf file (old spread sheet format) called IL_un
- (or: export into you Default.gdb geodatabase)
- Output location: your ch4B_class_ex folder (click Add, do NOT 2 x click on folder)
- Output Table: IL_unemployment.dbf
- click OK



4

- Let's look at the excel table with ArcMap
- ArcMap: Table of content - List by Source!
- Drag stand Excel worksheet table into TOC
- Open -> shows spreadsheet as Table
- Note the FIPS field (think zip code for county)
- However: you cannot draw the unemployment data yet!
- Need to connect it to the Counties2000 layer first
- In Counties2000, the field is called ST_CO_FIPS

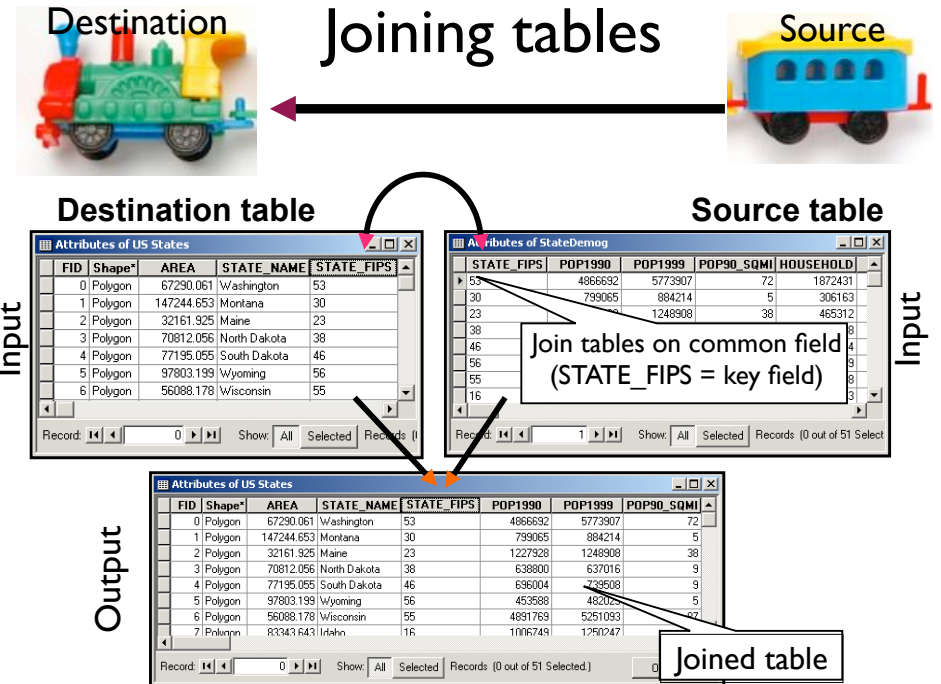


5

Join

- (Initially) a temporary fusing of 2 tables into a single table
- Think join *Source to Destination* (as in "attach (connect) a **car** to a **train engine**", follow the arrow)
- To Join tables must share a **common** field (key field)

7



6

What is the key field here?

Restaurant	Res-ID	Parcel_no
Jake's Pizza	20	45-98764
Momma's Pie Hut	30	64-56790
Big Burger Barn	40	62-98754

Res-ID	Name	SSN
20	Jake Smith	134-56-7689
20	Nancy Gold	229-69-3490
20	Dan Smurt	345-34-8968
30	Karen White	776-67-4578
40	Judy Lewis	670-45-6890
40	Joshua Jones	675-56-4982

Parcel_no	Address	Value	Owner
45-98764	1104 Maple Ave	67,000	Roger Clark
64-56790	1900 Main St	114,510	Roger Clark
62-98754	9207 Sherry Ave	59,000	Judy Lewis

Note: keys do **not** have to have the same name, just the mean the same **concept**

8

Rule of Joining

Each record in the destination table must match (go back to) **one and only one** record in the **source** table.



FID	Shape*	STATE_NAME	STATE_ABBR
0	Polygon	Hawaii	HI
1	Polygon	Washington	WA
2	Polygon	Montana	MT
3	Polygon	Maine	ME
4	Polygon	North Dakota	ND
5	Polygon	South Dakota	SD
6	Polygon	Wyoming	WY
7	Polygon	Wisconsin	WI

Destination table

STATE	Count	Sum DAMAGE	Sum DEATHS
CA	218	3705234000	
AK	106	32600000	
MT	62	4220000	
WA	67	3775000	
ID	41	1350000	
HI	63	1100000	
OR	24	760000	

Source table

One to one

Shape*	NAME	STATE_NAME	STATE_ABBR
Polygon	Lake of the Woods	Minnesota	27
Polygon	Ferry	Washington	53
Polygon	Stevens	Washington	53
Polygon	Okanogan	Washington	53
Polygon	Pend Oreille	Washington	53
Polygon	Boundary	Idaho	1E
Polygon	Lincoln	Montana	3C
Polygon	Flathead	Montana	3C

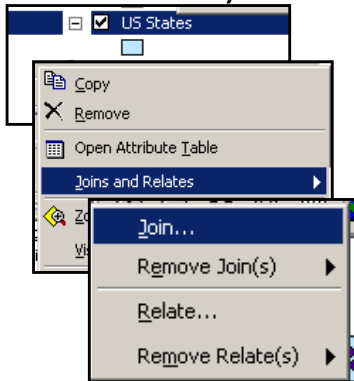
FID	Shape*	STATE_NAME	STATE_ABBR
0	Polygon	Hawaii	HI
1	Polygon	Washington	WA
2	Polygon	Montana	MT
3	Polygon	Maine	ME
4	Polygon	North Dakota	ND
5	Polygon	South Dakota	SD
6	Polygon	Wyoming	WY
7	Polygon	Wisconsin	WI

Many (arrow heads) to one (tail)

- Joins: easy way upgrade a standalone table into geospatial, if it shares a key field with a shapefile
- Joining is initiated from the shapfile
- Joins are temporary (ad hoc) and can be removed again
- To make permanent: export the joined shapefile (Data - Export)

How to join or relate tables

R-Click Destination layer



Join Data

Join lets you append additional data to this layer's attribute table so you can, for example, symbolize the layer's features using this data.

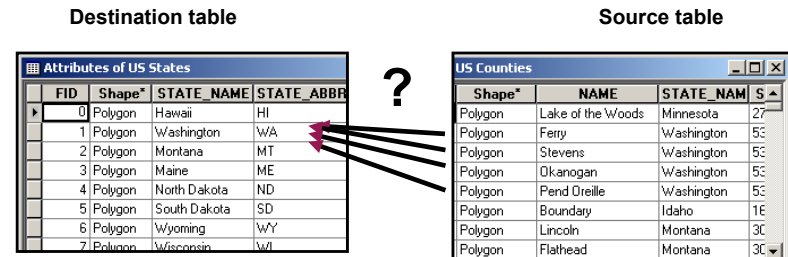
What do you want to join to this layer?

Join attributes from a table

1. **Key field in destination layer:** STATE_ABBR
2. **Source table/layer:** the table from disk: quakesum2
 Show the attribute tables of layers in this list
3. **Key field in source layer:** STATABBR

Relate :

Connecting many source records to one destination record

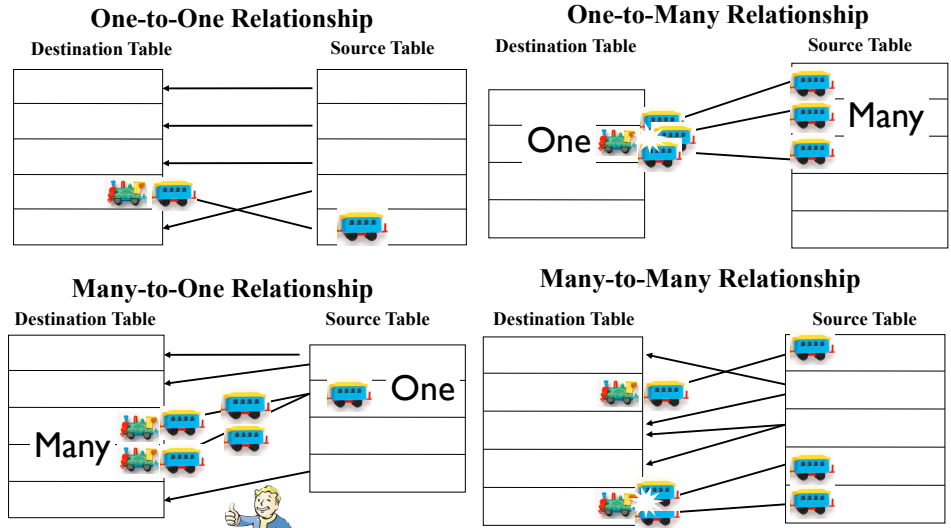


- Record to join to destination is ambiguous
- Violates the Rule of Joining: (“arrow head collisions”)
- Must create a **relate** instead
- Useful when selecting records “across tables” (see later)

When can we Join vs. Relate?

- Depends on the cardinality of the pair!
- Four possible types of cardinalities:
- Language: We say:
This is a Destination-to-Source cardinality, in a Many-to-1 cardinality, 1 source goes to many destinations!

CARDINALITY: Types of Relationships (follow arrows back from tip!)



An engine gets only 1 car: can use **Join** operation (no arrow head collisions) An engine gets 2+ cars: can only use **Relate** operation (arrow head collisions)

Source/Destination? Key? Cardinality? Join?

Restaurant	Res-ID	Parcel_no	Parcel_no	Address	Value	Owner
Jake's Pizza	20	45-98764	45-98764	1104 Maple Ave	67,000	Roger Clark
Momma's Pie Hut	30	64-56790	64-56790	1900 Main St	114,510	Roger Clark
Big Burger Barn	40	62-98754	62-98754	9207 Sherry Ave	59,000	Judy Lewis

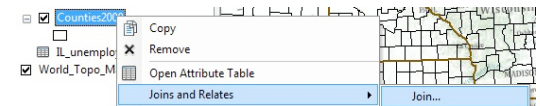
Res-ID	Name	SSN	Restaurant	Res-ID	Parcel_no
20	Jake Smith	134-56-7689	Jake's Pizza	20	45-98764
20	Nancy Gold	229-69-3490	Momma's Pie Hut	30	64-56790
20	Dan Smurt	345-34-8968	Big Burger Barn	40	62-98754
30	Roger Clark	776-67-4578			
40	Judy Lewis	670-45-6890			
40	Joshua Jones	675-56-4982			

Restaurant	Res-ID	Parcel_no
Jake's Pizza	20	45-98764
Momma's Pie Hut	30	64-56790
Big Burger Barn	40	62-98754

Res-ID	Name	SSN
20	Jake Smith	134-56-7689
20	Nancy Gold	229-69-3490
20	Dan Smurt	345-34-8968
30	Roger Clark	776-67-4578
40	Judy Lewis	670-45-6890
40	Joshua Jones	675-56-4982

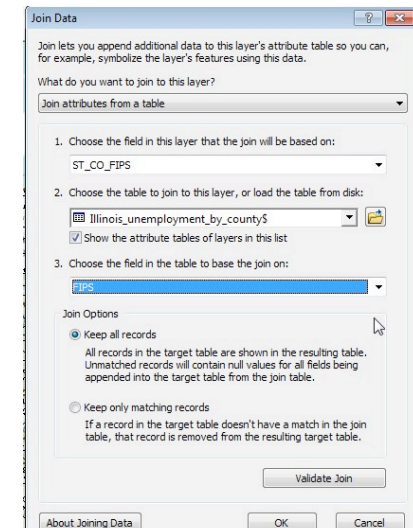
Joining class exercise

R-click on Counties2000



Counties2000: field is called ST_CO_FIPS

Stand-alone table: field is called FIPS



Table

Counties2000

FID	Shape	NAME	STATE_NAME	STAT	CNT	ST_CO_FIPS	AREA	OID	NAME	Unempl2010	ST_CO_FIPS
923	Polygon	Mason	Illinois	17	125	17125	570.8455	62	Mason	12.5	17125
924	Polygon	Clinton	Indiana	18	023	18023	408.1857	<Null>	<Null>	<Null>	<Null>
925	Polygon	Yuma	Colorado	08	125	08125	2361.9133	<Null>	<Null>	<Null>	<Null>
926	Polygon	Washington	Colorado	08	121	08121	2496.7995	<Null>	<Null>	<Null>	<Null>
927	Polygon	Harrison	Ohio	39	067	39067	415.8077	<Null>	<Null>	<Null>	<Null>
928	Polygon	Mercer	New Jersey	34	021	34021	226.9378	<Null>	<Null>	<Null>	<Null>
929	Polygon	Tipton	Indiana	18	159	18159	249.4065	<Null>	<Null>	<Null>	<Null>
930	Polygon	Champaign	Illinois	17	019	17019	992.3362	9	Champaign	9	17019

- Result: Counties2000 now has a NEW attributes (OID and right)
- But: Only Illinois counties have data, other counties are still empty (<Null>)

17

Lab

- Finish chapter 4 Tutorial
- HW 4: 1,2,4,5,6 extra: 9/10
- (due Oct. 6)

18