



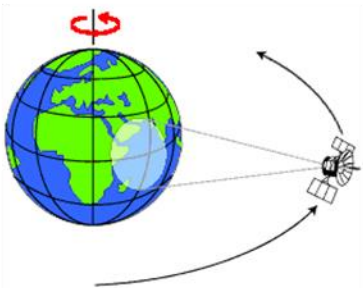
NICHOLAS SCHOOL OF THE
ENVIRONMENT AND EARTH SCIENCES
DUKE UNIVERSITY



Databases/SQL: Tutorial 3

ENV 859 – Advanced GIS

Section 6 – Tutorial 1



Overview

- Schemas
 - What are they?
 - Importing data into a schema
- Database relationships
- Aggregate functions
- Transforming data/Crosstab queries

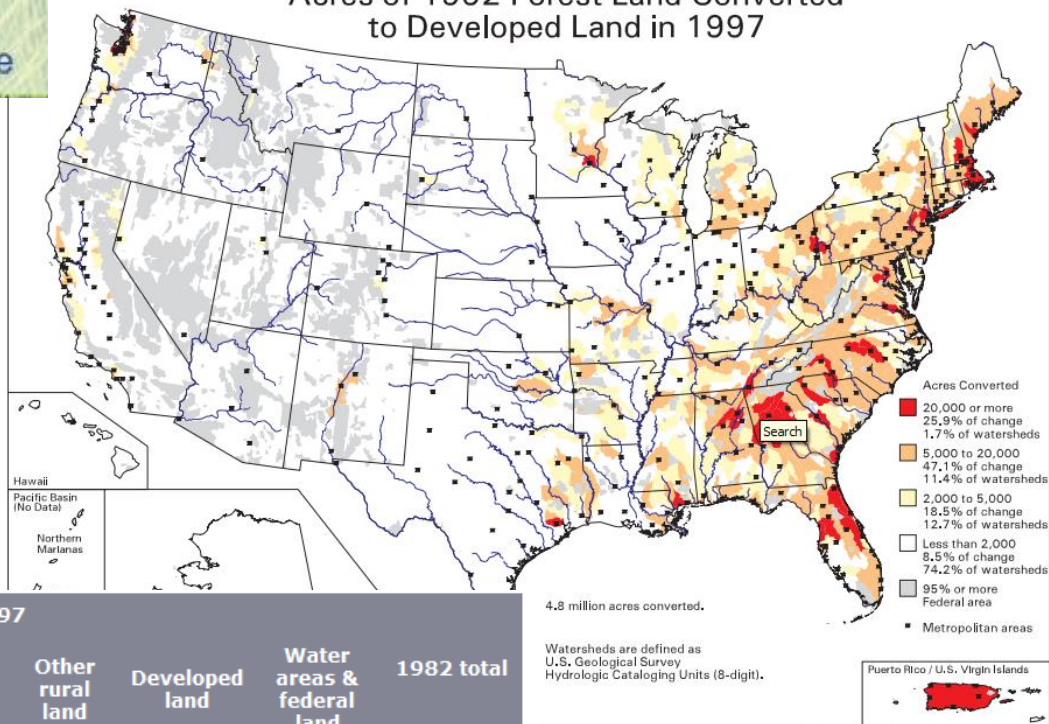
The NRI database

USDA United States Department of Agriculture
Natural Resources Conservation Service



National Resources Inventory

Acres of 1992 Forest Land Converted
to Developed Land in 1997



Land cover/use in 1997

Land cover/use in 1982	Cropland	CRP land	Pasture-land	Rangeland	Forest land	Other rural land	Developed land	Water areas & federal land	1982 total
Cropland	350,265.3	30,412.1	19,269.4	3,659.2	5,606.5	3,158.9	7,097.5	1,485.1	420,954.0
Pastureland	15,347.0	1,329.6	92,088.3	2,567.9	14,091.4	1,619.0	4,230.0	732.8	132,006.0
Rangeland	6,967.5	728.5	3,037.2	394,617.4	3,021.6	1,702.7	3,281.3	3,383.2	416,739.4
Forest land	2,037.1	128.8	4,168.2	2,098.8	380,343.3	1,754.8	10,279.2	2,528.0	403,338.2
Other rural land	1,386.8	93.1	1,013.6	719.1	2,767.7	42,713.3	726.9	227.8	49,648.3
Developed Land	196.7	1.2	78.6	110.8	227.0	12.0	72,618.7	0.8	73,245.8
Water areas federal land	797.5	2.7	336.6	2,204.0	897.7	180.8	18.1	443,760.6	448,198.0
1997 total	376,997.9	32,696.0	119,991.9	405,977.2	406,955.2	51,141.5	98,251.7	452,118.3	1,944,129.7

NRI in RAPCOE

<http://ecoserver.env.duke.edu/RAPCOEV1>



Reforestation Afforestation Project Carbon On-Line Estimator

Baseline estimates: Land use change

Conversions from pasture and cropland into other land uses occur independently of project activity, at rates determined from historical data or set by the user on the previous screen. Multiplying these rates by the areas of cropland and/or pasture planted shows the area of each land use type that would have been expected for the project area, without the project, over time. Any carbon released or sequestered by this background land use change becomes part of the baseline and is credited or debited against the gross carbon offset. These carbon estimates are shown on the next screen.

	<input checked="" type="radio"/> Cropland over time	<input type="radio"/> Pasture over time	<input type="radio"/> Combined over time			
	Starting acres	Acres at year 5	Acres at year 10	Acres at year 15	Acres at year 20	
Cropland	1,000.0	969.8	940.5	912.1	884.6	
Pasture	0.0	17.3	34.1	50.3	66.1	
Forest	0.0	8.4	16.5	24.4	32.1	
Developed	0.0	4.5	8.9	13.1	17.2	

Project Status

Reset

Project location:

State: North Carolina

County: Alamance

MLRA: 136

Baseline afforestation rates:

From cropland: 0.84 %

From pasture: 0.98 %

Leakage rate:

40.60 %

Areas planted:

Cropland: 1000 acres

Pasture: 0 acres

< Land use change rates

Baseline carbon accumulation >

<< Gross carbon calculations

Leakage Calculations >>

Gross Carbon :: Baseline Carbon :: Land Use Rates :: Land Use Change :: Carbon Accumulation :: Leakage Estimates :: Net Project Offset Potential

RAPCOE v.1.0 © 2007

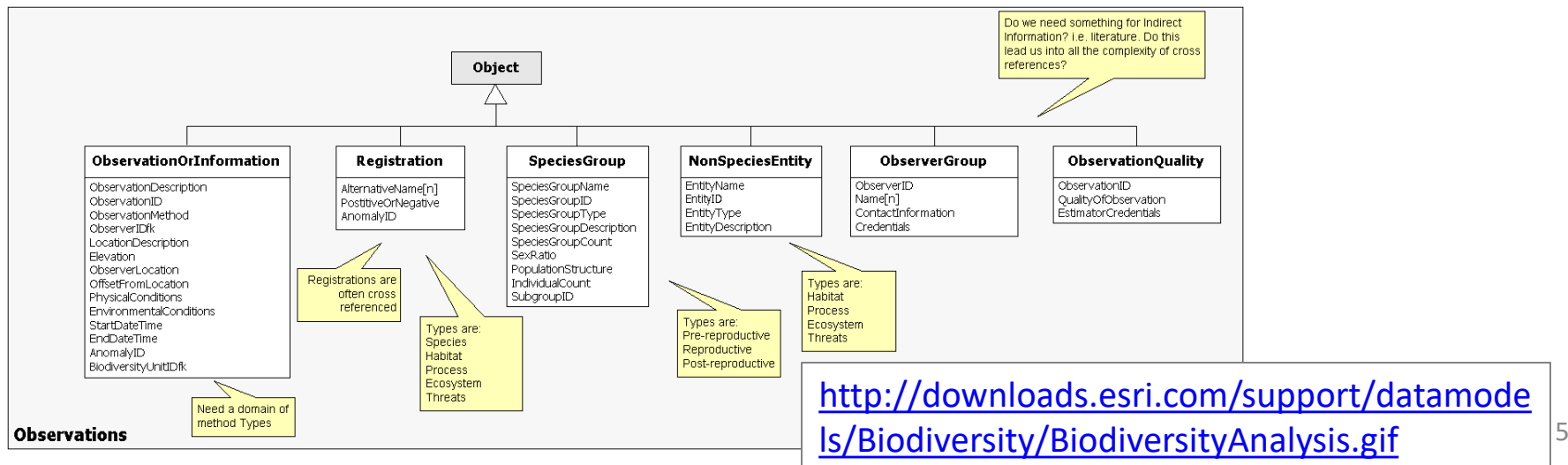
Database schemas/database models

- [Address](#)
- [Agriculture](#)
- [Atmospheric](#)
- [Basemap](#)
- [Biodiversity](#)
- [BroadbandStat](#)
- [Building Interior Space](#)
- [Carbon Footprint](#)
- [Census-Administrative Boundaries](#)
- [Defense-Intel](#)
- [Energy Utilities \(includes ArcGIS MultiSpeak\)](#)
- [Environmental Regulated Facilities](#)
- [Fire Service](#)
- [Forest Service](#)
- [Forestry](#)
- [Geology](#)
- [GIS for the Nation](#)

- [Groundwater](#)
- [Health](#)
- [Historic Preservation and Archaeology](#)
- [Homeland Security](#)
- [Hydro](#)
- [International Hydrographic Organization \(IHO\) S-57 for ENC](#)
- [Irrigation](#)
- [Land Parcels](#)
- [Local Government](#)
- [Marine](#)
- [National Cadastre](#)
- [Petroleum](#)
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- [Telecommunications](#)
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- [Water Utilities](#)

ESRI Database Models

<http://support.esri.com/en/downloads/datamodel/>



The NRI1997 schema

Microsoft Access

File Home Create External Data Database Tools Design

View Primary Key Builder Test Validation Rules Modify Lookups Property Indexes Sheet Show/Hide Create Data Rename/Delete Macros Field, Record & Table Events Relationships Object Dependencies Relationships

All Access Objects

Tables

- 1997only Table
 - Date Created: 11/26/2001 11:27:23 AM
 - Date Modified: 11/27/2001 1:32:57 PM
 - Data for variables that are only available for the 1997 inventory year.
- crophist Table
 - Date Created: 11/27/2001 9:18:17 AM
 - Date Modified: 11/27/2001 9:41:14 AM
 - Data for the land cover/use of a point for the 3 calendar years prio...
- Forest Group Type Table
 - Date Created: 11/27/2001 10:21:12 AM
 - Date Modified: 11/27/2001 1:43:49 PM
 - Codes for Forest Group Type
- habitatindices Table
 - Date Created: 11/27/2001 9:18:17 AM
 - Date Modified: 11/27/2001 9:41:51 AM
 - Data for the habitat indexes.Data exists for 1997 only.
- habitatraw Table
 - Date Created: 11/27/2001 9:18:17 AM
 - Date Modified: 11/2/2002 7:45:26 AM
 - Data for the transect segments of the "Habitat X". There are at leas...
- overlandraw Table
 - Date Created: 11/27/2001 9:18:17 AM
 - Date Modified: 1/2/2002 7:45:41 AM
 - Data for the segments of the overland flow. There usually are mult...
- point Table
 - Date Created: 11/26/2001 1:33:40 PM
 - Date Modified: 1/2/2002 7:41:04 AM
 - Data for every point that is not year-specific.
- SpecificLandUse Table
 - Date Created: 11/27/2001 9:27:34 AM
 - Date Modified: 11/27/2001 10:07:14 AM
 - Codes for Specific Land Cover/Use
- trend Table
 - Date Created: 11/26/2001 3:07:09 PM
 - Date Modified: 11/27/2001 1:33:33 PM
 - Trending data for the points. At least 2 inventory years of data are...

point

Field Name	Data Type	Description
recordid	Text	Concatenated stratum, cluster, and unique number within stratum and cl
nriptr	Number	Link to Soils database
stratum	Number	Variance estimation stratum
cluster	Number	Variance estimation cluster
xfact	Number	Number of acres the sample point represents (in 100s)
fips	Text	Federal Information Processing Standard (FIPS) (see Appendix I for excep
hydro	Text	Hydrologic Unit Code (8 digit)
mhydro	Text	Modified HUC (4 digit) used in estimation process
mlra	Text	Major Land Resource Area (MLRA)
bailey	Text	Bailey's Ecoregion
split	Text	Identifies points split for purposes of cluster weight equalization (for fed
impute	Text	Imputed Points Code
impute87	Number	Imputation 1987 Code
wifact	Number	Wind Erosion Equation (WEQ) soil erodibility index
wcfact	Number	Wind Erosion Equation (WEQ) climatic factor

Field Properties

General	Lookup
Field Size	11
Format	
Input Mask	
Caption	Record ID
Default Value	
Validation Rule	
Validation Text	
Required	No
Allow Zero Length	No
Indexed	Yes (No Duplicates)
Unicode Compression	No
IME Mode	No Control
IME Sentence Mode	None
Smart Tags	

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.

Num Lock

Using the NRI schema

Get External Data - Text File

Select the source and destination of the data

Specify the source of the data.

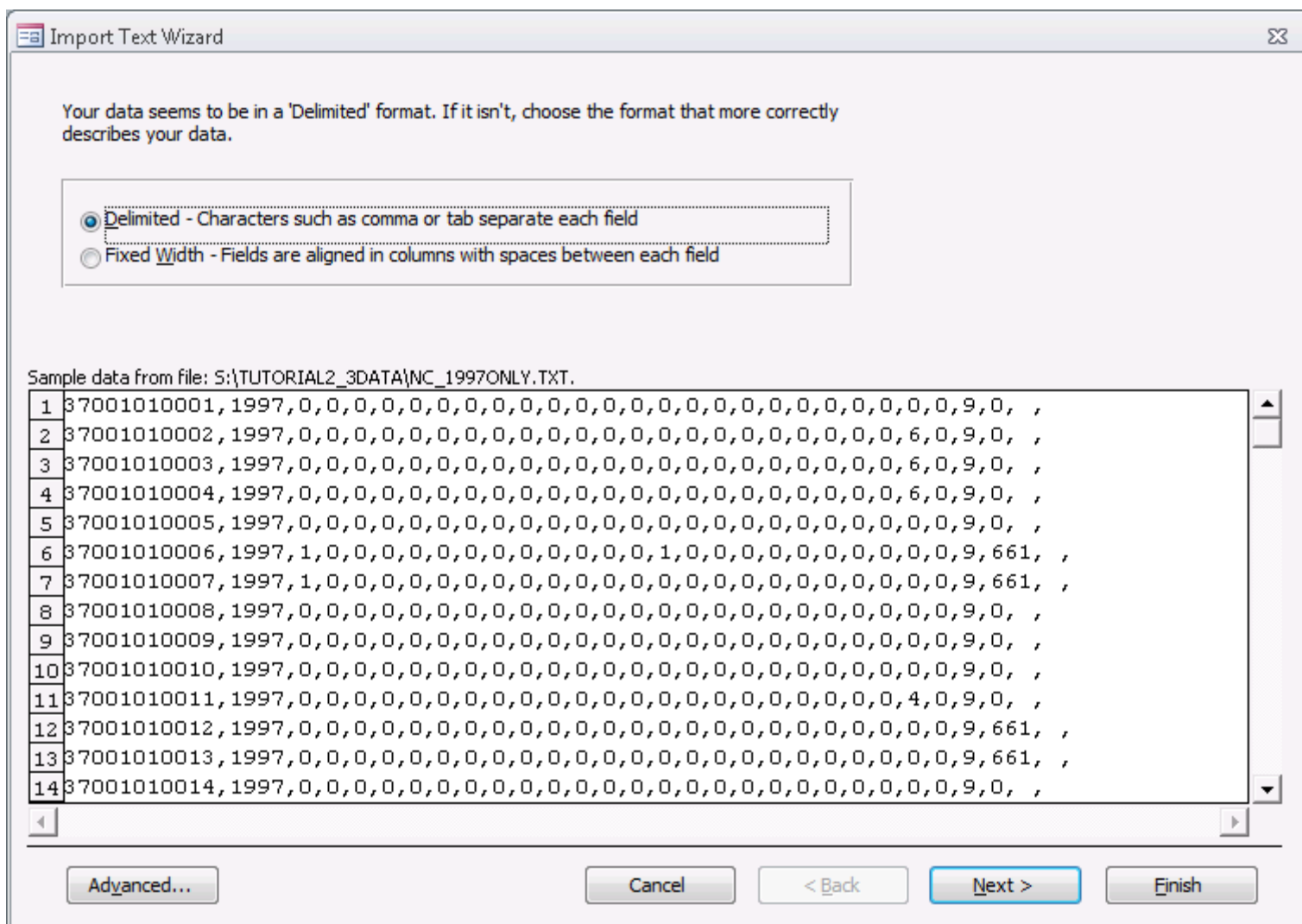
File name:

Specify how and where you want to store the data in the current database.

☐ **Import the source data into a new table in the current database.**
If the specified table does not exist, Access will create it. If the specified table already exists, Access might overwrite its contents with the imported data. Changes made to the source data will not be reflected in the database.

☒ **Append a copy of the records to the table:**
If the specified table exists, Access will add the records to the table. If the table does not exist, Access will create it. Changes made to the source data will not be reflected in the database.

☐ **Link to the data source by creating a linked table.**
Access will create a table that will maintain a link to the source data. You cannot change or delete data that is linked to a text file. However, you can add new records.



Using the NRI schema

Import Text Wizard

What delimiter separates your fields? Select the appropriate delimiter and see how your text is affected in the preview below.

Choose the delimiter that separates your fields:








☐ Tab ☐ Semicolon ☒ Comma ☐ Space ☐ Other:

☐ First Row Contains Field Names Text Qualifier: {none} ▼

37001010001	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	
37001010002	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	9	0
37001010003	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	9	0
37001010004	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	9	0
37001010005	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0
37001010006	1997	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	661
37001010007	1997	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	661
37001010008	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0
37001010009	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0
37001010010	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0
37001010011	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	9	0
37001010012	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	661
37001010013	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	661
37001010014	1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0

Advanced... Cancel < Back Next > Finish

Using the NRI schema

-  nc_1997only
-  nc_crophist
-  nc_habitatindices
-  nc_habitatraw
-  nc_overlandraw
-  nc_point
-  nc_trend



Database relationships

point

Record ID
37001010001
37001010002
37001010003
37001010004
37001010005
37001010006
37001010007
37001010008
37001010009
37001010010
37001010011
37001010012
37001010013
37001010014
37001010015
37001010016
37001010017

Insert Subdatasheet

Tables Queries Both

1997only
crophist
Forest Group Type
habitatindices
habitatraw
overlandraw
point
SpecificLandUse
trend
weq
wetland

Link Child Fields: recordid

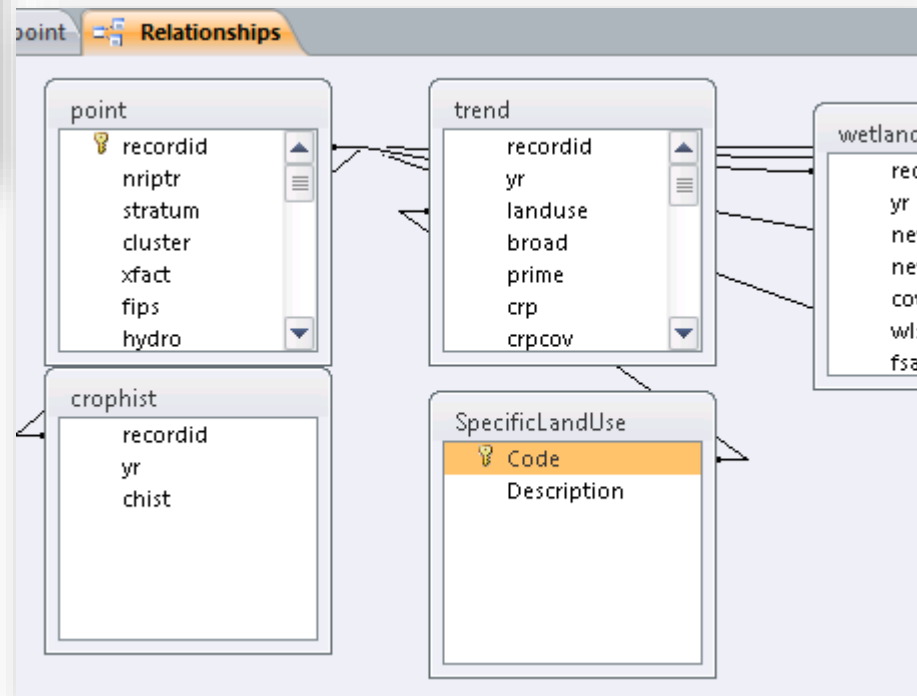
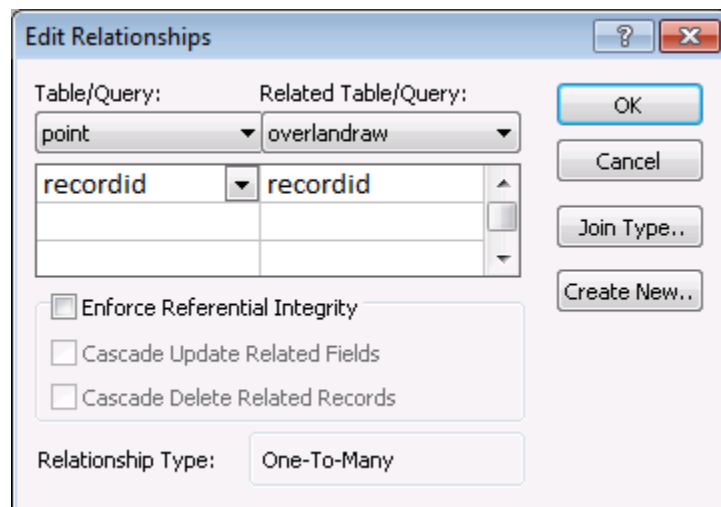
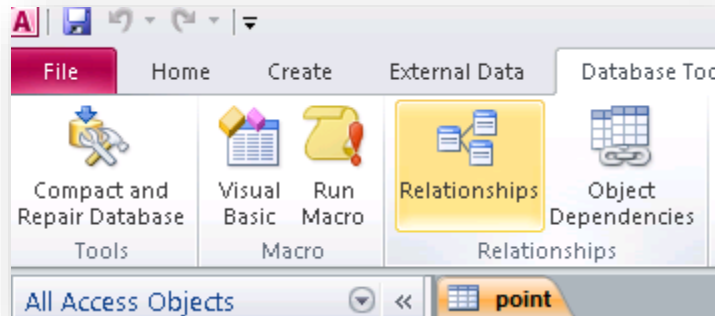
Link Master Fields: recordid

OK Cancel

point

Record ID	Soils Pointer	Stratum	Cl
37001010001	249587	37001	
Year	Landuse for	Broaduse fo	P
1982	342	5	1
1987	342	5	1
1992	800	8	0
1997	800	8	0
*	0	0	0

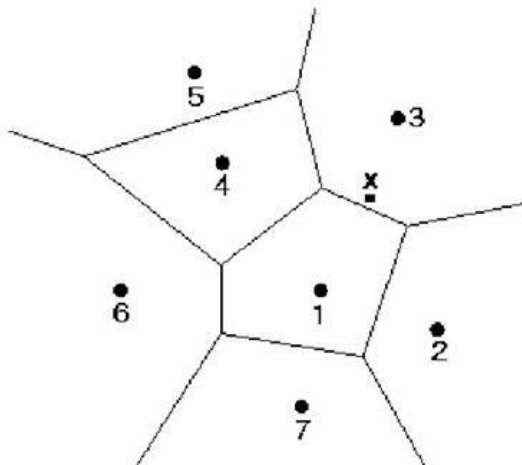
Database relationships



Aggregating functions

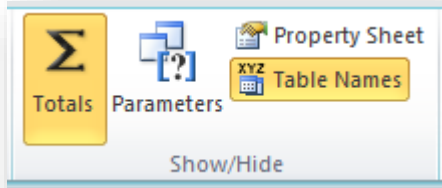
Record ID	Soils Pointer	Stratum	Cluster	Expansion Facto	FIPS code
37001010001	249587	37001	1	1	37001
37001010002	288554	37001	1	17	37001
37001010003	274351	37001	1	17	37001
37001010004	274167	37001	1	17	37001
37001010005	288554	37001	1	1	37001
37001010006	249587	37001	1	25	37001
37001010007	274175	37001	1	26	37001
37001010008	249587	37001	1	1	37001
37001010009	215428	37001	1	1	37001
37001010010	250974	37001	1	1	37001
37001010011	249110	37001	1	15	37001
37001010012	216529	37001	1	16	37001
37001010013	250968	37001	1	15	37001

point table



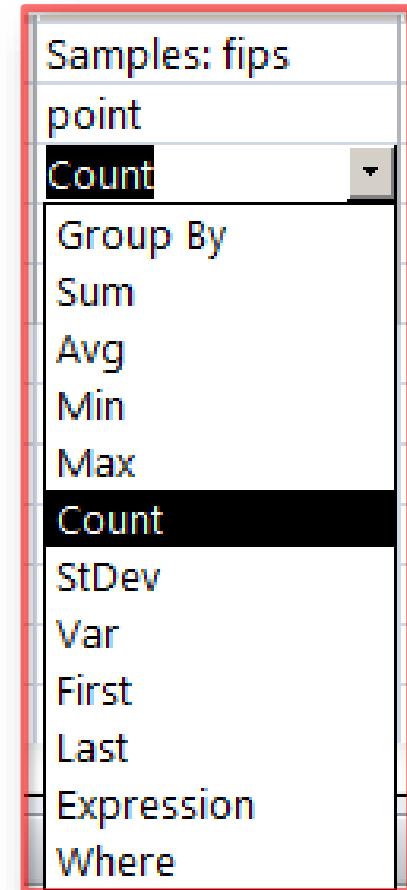
FIPS code	Samples	Acres
37001	369	278300
37003	191	168500
37005	314	150700
37007	336	343800
37009	445	273200
37011	188	158200
37013	386	613600
37015	279	474400

Aggregate functions



Field:	fips	fips	xfact
Table:	point	point	point
Total:	Group By	Count	Sum
Sort:			
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:			
or:			

Field:	fips	Samples: fips	Acres: [xfact]*100
Table:	point	point	
Total:	Group By	Count	Sum
Sort:			



Aggregating functions

```
SELECT point.fips, Count(point.fips) AS Samples,  
Sum([xfact]*100) AS Acres  
FROM point  
GROUP BY point.fips;
```

FIPS code	Samples	Acres
37001	369	278300
37003	191	168500
37005	314	150700
37007	336	343800
37009	445	273200
37011	188	158200
37013	386	613600
37015	279	474400
37017	350	567800

```
SELECT point.fips, Count(point.fips) AS Samples,  
Sum([xfact]*100) AS Acres  
FROM point  
WHERE flood = 'FREQ'  
GROUP BY point.fips;
```

FIPS code	Samples	Acres
37003	13	8100
37005	3	1700
37007	51	24900
37009	10	10100
37011	3	2300
37013	15	36600
37015	62	139600
37017	19	43700

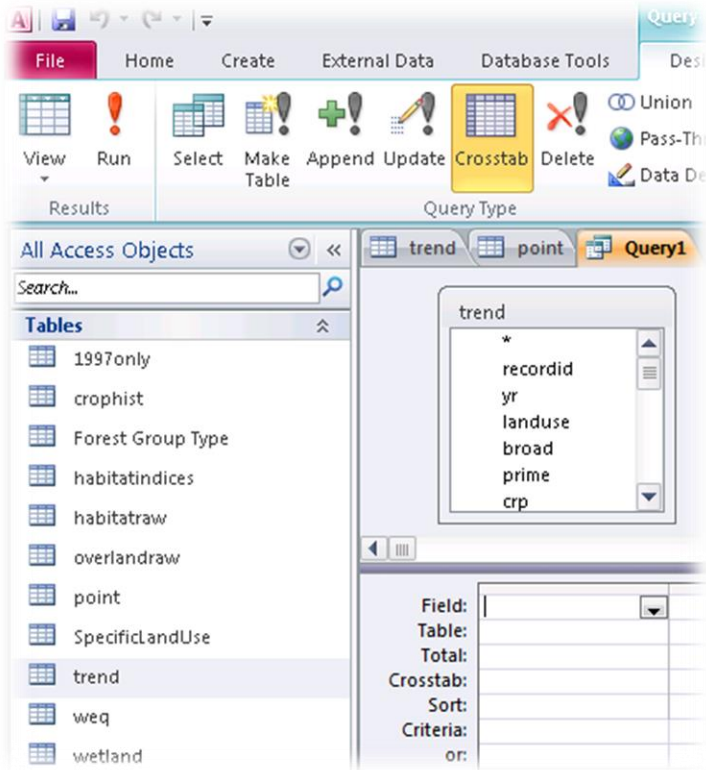
Transforming Data: Crosstab Queries

Record ID	Year	Landuse for 1982, 1987, 1992, 1997	Broaduse for 1982, 1987, 1992, 1997
37001010001	1982	342	5
37001010001	1987	342	5
37001010001	1992	800	8
37001010001	1997	800	8
37001010002	1982	342	5
37001010002	1987	342	5
37001010002	1992	342	5
37001010002	1997	342	5

Record ID	1982	1987	1992	1997
37001010001	5	5	8	8
37001010002	5	5	5	5
37001010003	5	5	5	5
37001010004	5	5	5	5
37001010005	5	5	5	8

Record ID	1982	1987	1992	1997
37001010001	Forest land	Forest land	Rural transport	Rural transport
37001010002	Forest land	Forest land	Forest land	Forest land
37001010003	Forest land	Forest land	Forest land	Forest land
37001010004	Forest land	Forest land	Forest land	Forest land
37001010005	Forest land	Forest land	Forest land	Rural transport

Transforming Data: Crosstab Queries



Field:	recordid	yr	broad
Table:	trend	trend	trend
Total:	Group By	Group By	First
Crosstab:	Row Heading	Column Heading	Value
Sort:			
Criteria:			
or:			

Values → TRANSFORM First(trend.broad) AS FirstOfbroad
Row headings → SELECT trend.recordid
 FROM trend
 GROUP BY trend.recordid
Column headings → PIVOT trend.yr;

Transforming Data: Crosstab Queries

Adding the Broad
Land Use
categories

Record ID	1982	1987
37001010001	5	5
37001010002	5	5
37001010003	5	5
37001010004	5	5
37001010005	5	5



Record ID	1982	1987
37001010001	Forest land	Forest land
37001010002	Forest land	Forest land
37001010003	Forest land	Forest land
37001010004	Forest land	Forest land
37001010005	Forest land	Forest land

SA\\Tutorial2_3Data\\codes\\variable_codes.txt - Notepad++

File Edit Search View Encoding Language Settings Macro Run Plugins Window ?

variable_codes.txt

```
228  
229 Appendix XV - Broad Land Cover/Use  
230 broad code, description  
231 1,Cropland_cultivated  
232 2,Cropland_noncultivated  
233 3,Pastureland  
234 4,Rangeland  
235 5,Forest land  
236 6,Other rural land  
237 7,Urban and built-up land  
238 8,Rural transportation  
239 9,Small water areas  
240 10,Census water  
241 11,Federal land  
242 12,Conservation Reserve Program (CRP) land  
243  
244
```

length: 8005 lines: 3 Ln: 245 Col: 31 Sel: 0 UNIX ANSI INS

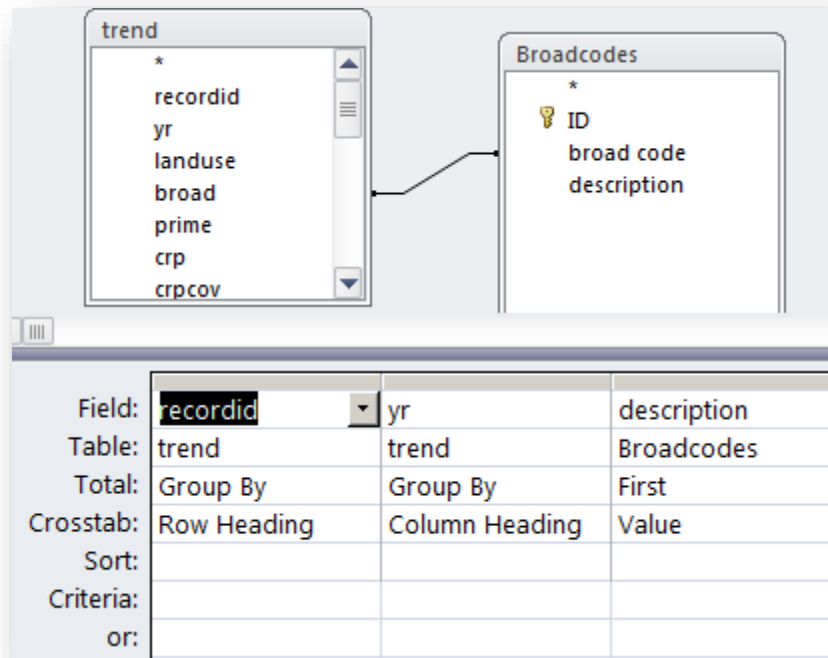
File Home Create External Data Databases

Saved Imports Linked Table Manager Excel Access ODBC Database XML File More

Import & Link

Transforming Data: Crosstab Queries

Joining the Broad Land Use categories



Field:	recordid	yr	description
Table:	trend	trend	Broadcodes
Total:	Group By	Group By	First
Crosstab:	Row Heading	Column Heading	Value
Sort:			
Criteria:			
or:			

Record ID	1982	1987	1992	1997
37001010001	5	5	8	8
37001010002	5	5	5	5
37001010003	5	5	5	5
37001010004	5	5	5	5
37001010005	5	5	5	8



Record ID	1982	1987	1992	1997
37001010001	Forest land	Forest land	Rural transport	Rural transport
37001010002	Forest land	Forest land	Forest land	Forest land
37001010003	Forest land	Forest land	Forest land	Forest land
37001010004	Forest land	Forest land	Forest land	Forest land
37001010005	Forest land	Forest land	Forest land	Rural transport

```

TRANSFORM First(Broadcodes.description) AS FirstOfdescription
SELECT trend.recordid
FROM trend INNER JOIN Broadcodes ON trend.broad = Broadcodes.[broad code]
GROUP BY trend.recordid
PIVOT trend.yr;
    
```

Task 1: *NC Land cover – 1982 to 1997*

1982

FIPS code	Acres	Census water	Cropland_cultivated	Cropland_noncultivated	Federal land	Forest land	Othe
37001	278300	1000	44900	2100		139000	
37003	168500	1800	24400	7100		83800	
37005	150700		2900	7900	7900	77100	
37007	343800	2900	82400	1500	8000	207300	
37009	273200		8400	13900	300	163800	
37011	158200			8000	19200	104400	
37013	613600	84400	126200		2800	322800	
37015	474400	23700	107300		100	319500	
37017	567800	5100	124700	2700		411400	
37019	571000	23400	44500	800	7500	428100	

1997

FIPS code	Acres	Census water	Conservation Re	Cropland_cultivated	Cropland_noncultivated	Federal land	Forest land	Oth
37001	278300	1000		37800	1900		126000	
37003	168500	1800		10700	3600		83900	
37005	150700			2100	1200	7800	78400	
37007	343800	2900	37300	29900	8500	8000	206200	
37009	273200			3200	7000	300	166300	
37011	158200				4300	29600	91900	
37013	613600	84400		117900		2800	324100	
37015	474400	23700		110000		6200	310100	
37017	567800	5100	5700	135700	5400		384800	
37019	571000	23400		31600		7500	416200	

Task 1: *NC Land cover – 1982 to 1997*

Field:	fips	description	Expr1: Sum([xfact]*100)	Acres: Sum([xfact]*100)	yr
Table:	point	Broadcodes			trend
Total:	Group By	Group By	Expression	Expression	Where
Crosstab:	Row Heading	Column Heading	Value	Row Heading	
Sort:					
Criteria:					1982
or:					

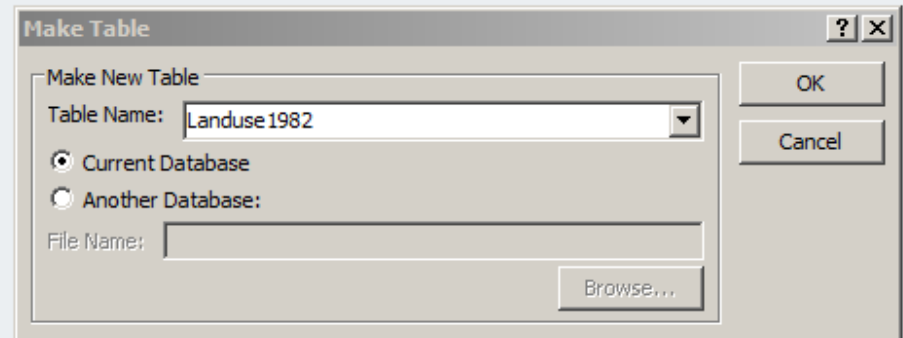
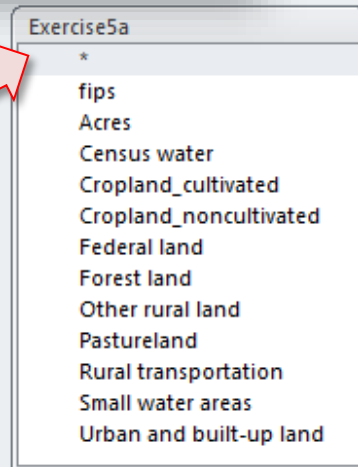
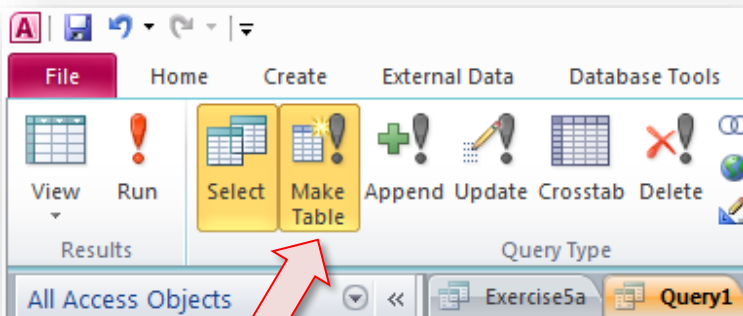
FIPS code	Acres	Census water	Cropland_cultivated	Cropland_noncultivated	Federal land	Forest land	Othe
37001	278300	1000	44900	2100		139000	
37003	168500	1800	24400	7100		83800	
37005	150700		2900	7900	7900	77100	
37007	343800	2900	82400	1500	8000	207300	
37009	273200		8400	13900	300	163800	
37011	158200			8000	19200	104400	
37013	613600	84400	126200		2800	322800	
37015	474400	23700	107300		100	319500	
37017	567800	5100	124700	2700		411400	
37019	571000	22400	44500	800	7500	428100	

```

TRANSFORM Sum([xfact]*100) AS Expr1
SELECT point.fips, Sum([xfact]*100) AS Acres
FROM point INNER JOIN (trend INNER JOIN Broadcodes ON trend.broad = Broadcodes.[broad code]) ON point.recordid
= trend.recordid
WHERE (((trend.yr)=1982))
GROUP BY point.fips
PIVOT Broadcodes.description;
    
```

Task 1: *NC Land cover – 1982 to 1997*

Saving outputs of a crosstab query to a new table

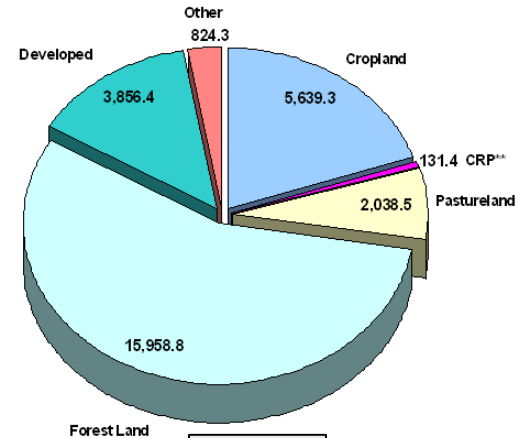


Field:	Exercise5a.*					
Table:	Exercise5a					
Sort:						
Show:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Criteria:						
or:						

Task 2: Fate of cropland from '82-'97

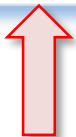


1982



1997

fips	TotalAcres	Census water	Conservation Reserv	Cropland_cultiv	Cropland_noncu	Federal land	Forest land	Other rural land	Pastureland	Rura
37001	47000			24000	1000			100	8500	
37003	31500			8300	3600		4100	700	10700	
37005	10800			1900	1200		1200	2200	4800	
37007	83900		37300	29700	6500		5300	100	4400	
37009	22300			3100	7000		2000	300	9000	



Of the **31,500** acres of **cropland** in Alexander Co. (FIPS 37003) seen in 1982, **4100** acres was classified as **forest land** in 1997...

Task 2: Fate of cropland from '82-'97

- Select records that were cropland in 1982...
- Cross-tabulate selected records on land use in 1997...

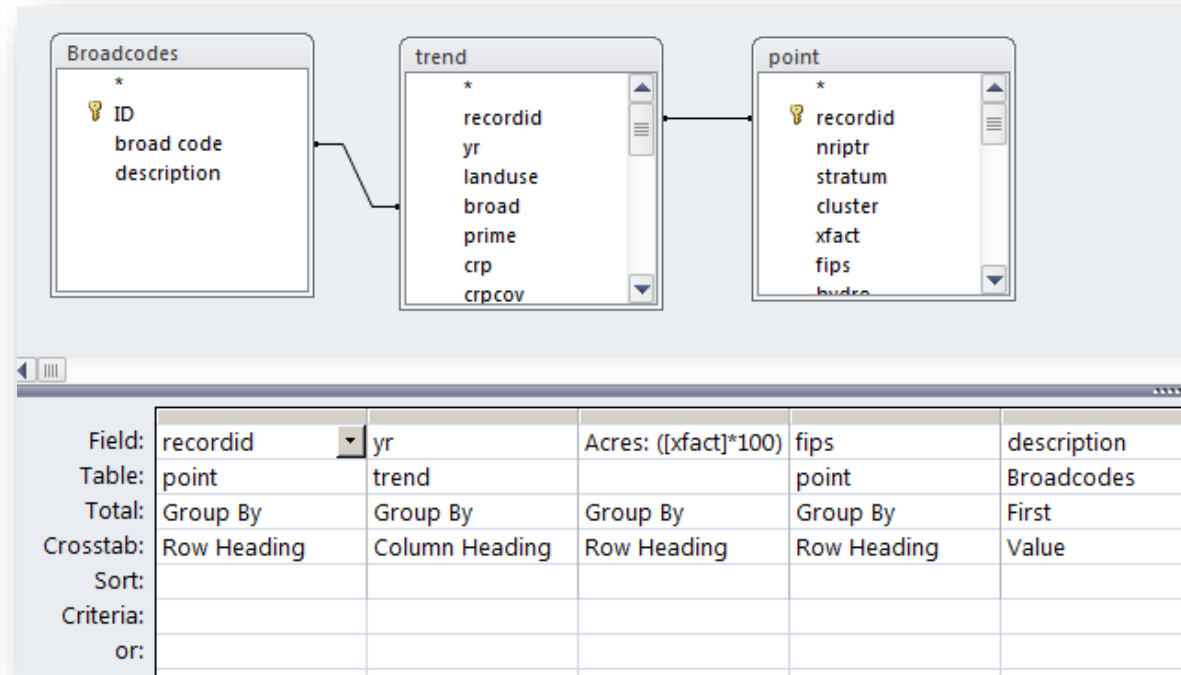
trend				
Record ID	Year	Landuse for 1982, 1987, 1992, 1997	Broaduse for 1982, 1987, 1992, 1997	
37001010001	1982	342	5	
37001010001	1987	342	5	
37001010001	1992	800	8	
37001010001	1997	800	8	

point						
	Record ID	Soils Pointer	Stratum	Cluster	Expansion Factor	FIPS code
+	37001010001	249587	37001	1	1	37001
+	37001010002	288554	37001	1	17	37001
+	37001010003	274351	37001	1	17	37001
+	37001010004	274167	37001	1	17	37001
+	37001010005	288554	37001	1	1	37001
+	37001010006	249587	37001	1	25	37001
+	37001010007	274175	37001	1	26	37001
+	37001010008	249587	37001	1	1	37001
+	37001010009	215428	37001	1	1	37001
+	37001010010	250974	37001	1	1	37001
+	37001010011	249110	37001	1	15	37001
+	37001010012	249587	37001	1	15	37001

Broadcodes		
ID	broad code	description
1	1	Cropland_cultivated
2	2	Cropland_noncultivated
3	3	Pastureland
4	4	Rangeland
5	5	Forest land
6	6	Other rural land

Task 2: Fate of cropland from '82-'97

Step 1.



Record ID	Acres	FIPS code	1982	1987	1992	1997
37001010001	100	37001	Forest land	Forest land	Rural transportatio	Rural transportatio
37001010002	1700	37001	Forest land	Forest land	Forest land	Forest land
37001010003	1700	37001	Forest land	Forest land	Forest land	Forest land
37001010004	1700	37001	Forest land	Forest land	Forest land	Forest land
37001010005	100	37001	Forest land	Forest land	Forest land	Rural transportatio
37001010006	2500	37001	Cropland_cultivate	Cropland_cultivate	Cropland_cultivate	Cropland_cultivate
37001010007	2600	37001	Forest land	Forest land	Forest land	Cropland_cultivate
37001010008	100	37001	Other rural land	Other rural land	Other rural land	Other rural land

Task 2: Fate of cropland from '82-'97

Step 2.

From step 1

Exercise6a

*

recordid

Acres

fips

1982

1987

1992

1997

Field:	fips	1997	Acres	TotalAcres: Acres	1982
Table:	Exercise6a	Exercise6a	Exercise6a	Exercise6a	Exercise6a
Total:	Group By	Group By	Sum	Sum	Where
Crosstab:	Row Heading	Column Heading	Value	Row Heading	
Sort:					
Criteria:					Like "crop*"

fips	TotalAcres	Census water	Conservation Reserv	Cropland_cultiv	Cropland_noncl	Federal land	Forest land	Other rural land	Pastureland	Rural
37001	47000			34900	1900			100	8500	
37003	31500			8300	3600		4100	700	10700	
37005	10800			1500	1200		1200	2200	4600	
37007	83900		37300	29700	6500		5300	100	4400	
37009	22300			3100	7000		2000	300	9000	

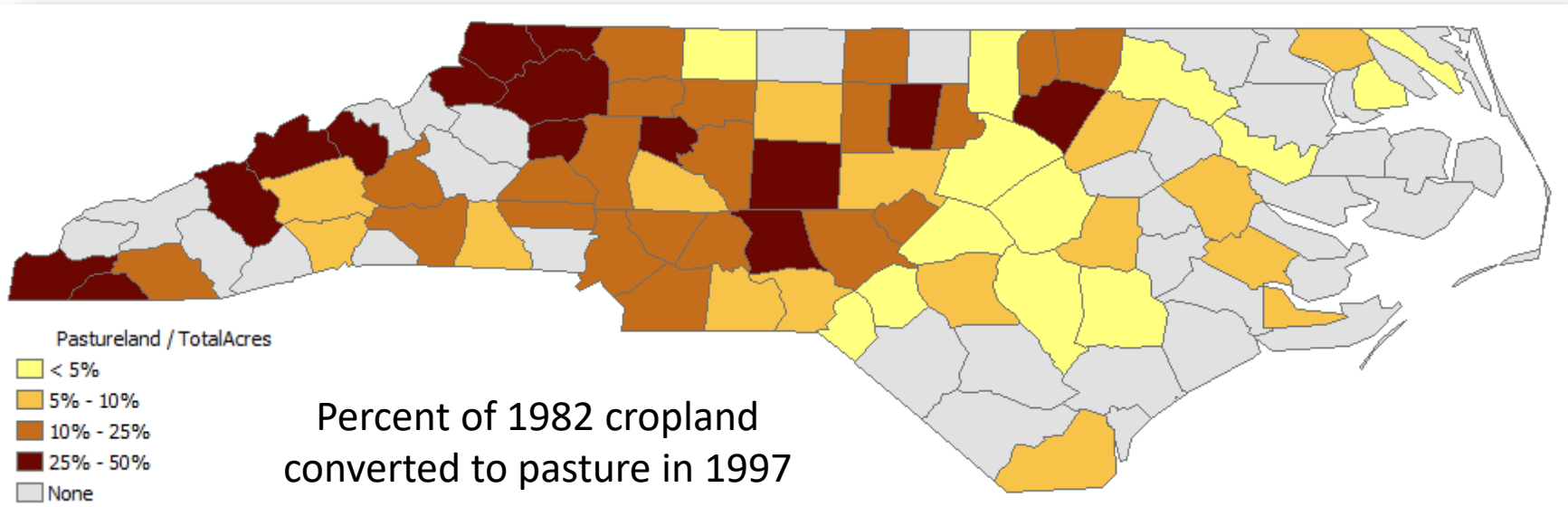
Viewing results in ArcMap

MS Access

Crosstab query → Make table query → Table

ArcMap

Open → Join to county features (FIPS) → Symbolize



QUESTIONS?