KEY Week#1 GIS Problems

Alaska Wildfires

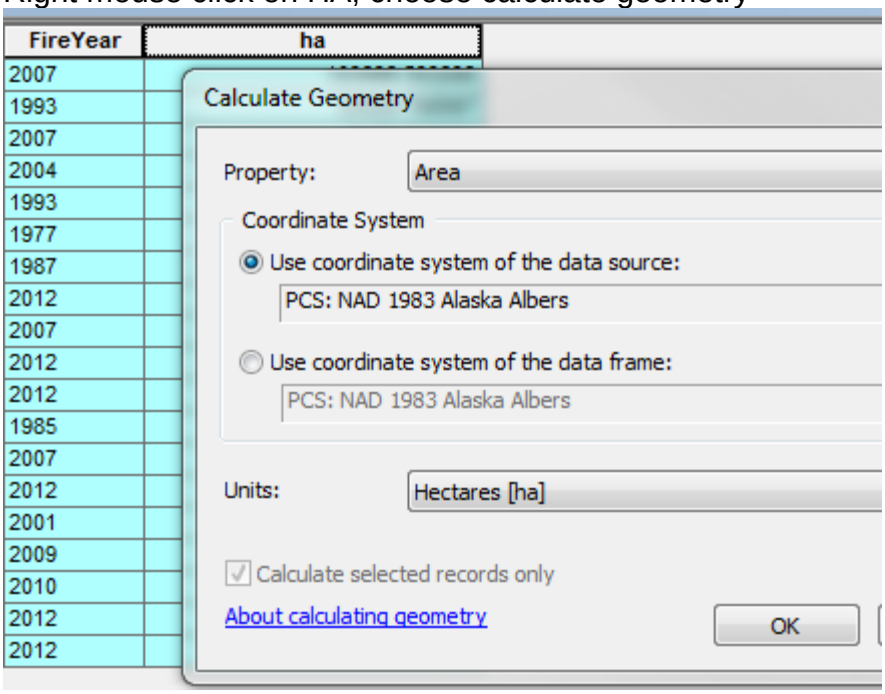
With climate warming, there is an expectation of larger and more severe wildfires. Alaska's climate has been warming since the mid-1970s.

Download and unzip the winzipped executable file ***ak_fires.exe*** from http://dverbyla.net/nrm338/blackboard_data/

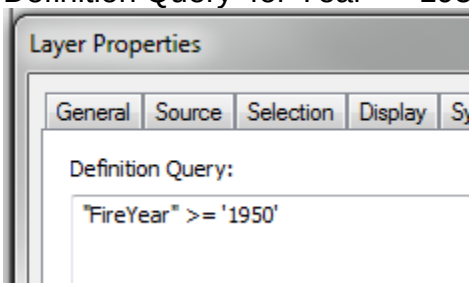
Determine the years of the ten largest wildfires in Alaska since 1950.

We need to know the area of each wildfire in hectares:

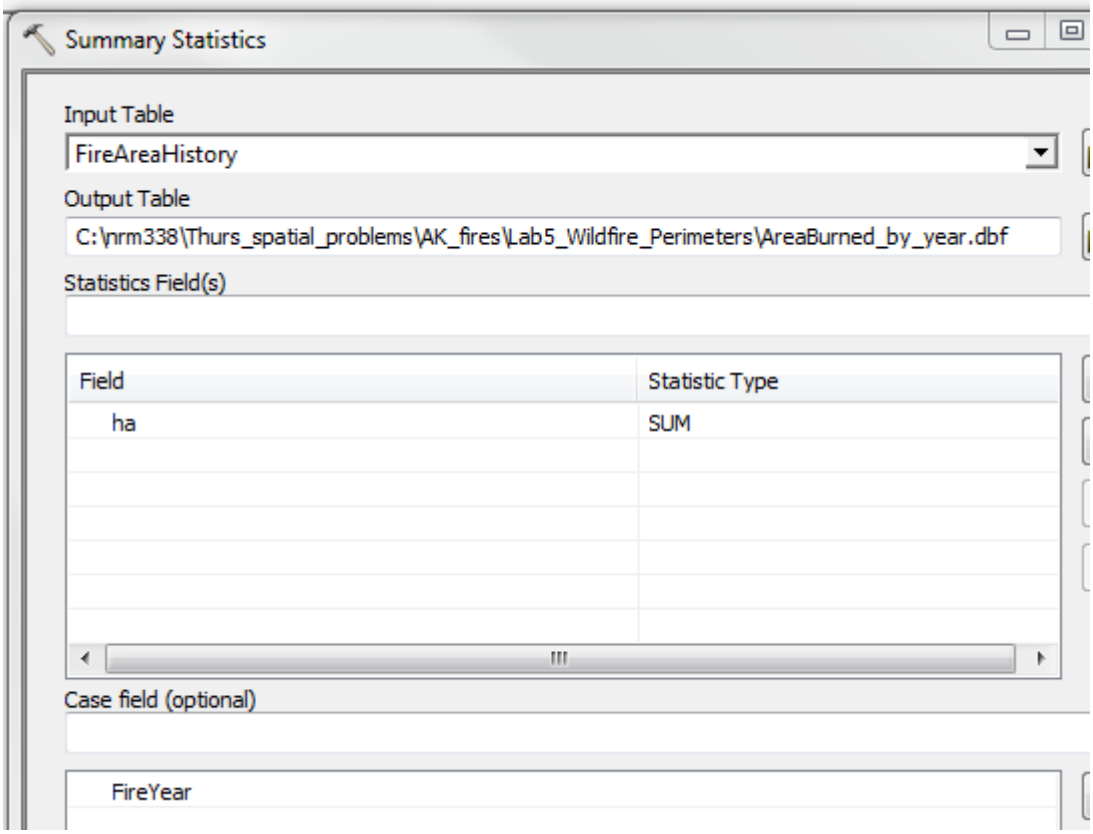
1) Add a double precision field name HA
2) Right mouse click on HA, choose calculate geometry



3) Definition Query for Year >= 1950



4) Summary Statistics to create table of total area burned by year



5) Sort area field descending

FireYear	FREQUENCY	SUM_ha
2004	140	2707171.714
2015	334	2082886.3824
1957	66	1967903.26591
2005	176	1926897.25788
1969	51	1748898.78649
1950	34	1264054.3709
1990	158	1256903.2529
2009	102	1202399.8178
1977	44	940154.032194

6) Determine area of tenth record
7) Summery table definition query area >= value of tenth record

FireYear	FREQUENCY	SUM_ha
2015	334	2082886.3824
2009	102	1202399.8178
2005	176	1926897.25788
2004	140	2707171.714
2002	83	854527.812165
1990	158	1256903.2529
1977	44	940154.032194
1969	51	1748898.78649
1957	66	1967903.26591
1950	34	1264054.3709

So 5 out of 10 of largest fire years sincre 1950 were after 2000…

How many of these fire occurred during the decade 2000-2010?

2 Minto Flats South in 2009 and Boundary Fire in 2004

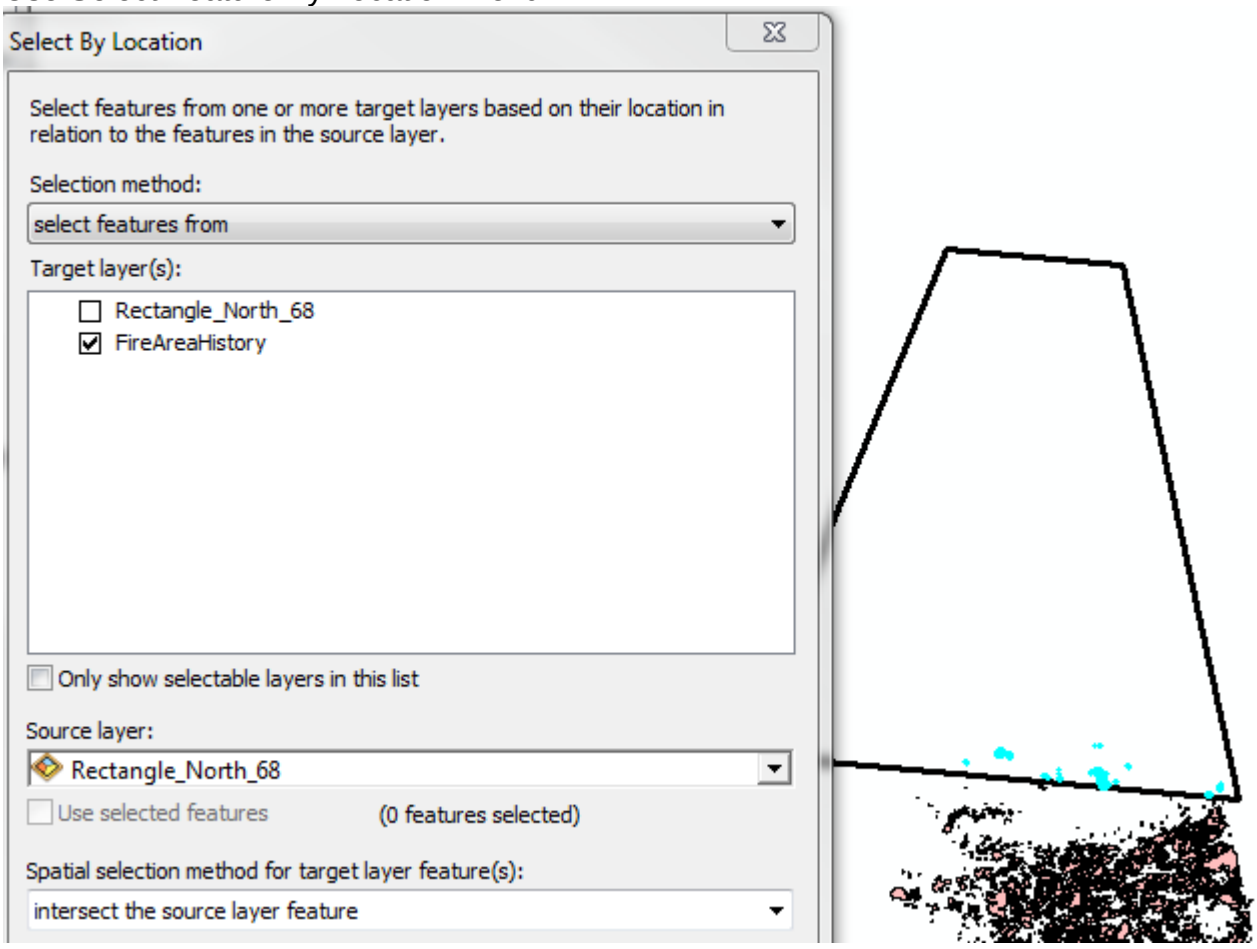
Ten Largest Fires Since 1950

FID	Shape	FireName	FireYear	FIREID	SQ_KM
2538	Polygon	Minto Flats South	2009	32519	2165
350	Polygon	Boundary	2004	1679	2171
1154	Polygon	832015	1988	25174	2262
1633	Polygon	HOLANADA CREEK	1969	25763	2487
1665	Polygon	KATEEL RIVER #5	1957	27590	4573
2011	Polygon	SHAGELUK E	1957	27434	2854
2179	Polygon	TOZITNA	1954	27513	2321
1551	Polygon	Venetie	1950	27656	2432
1552	Polygon	Schuman House - Porcupine	1950	27657	2463
1553	Polygon	Little Black River	1950	27658	5531

What year did the largest fire north of 68 degrees occur in?

1) Create rectangle with southern edge at 68 degrees north (see lab 1)

2) Use Select Feature By Location menu



3) Open attribute table, sort descending on area field to find largest fire

FID	Shape	FireName	FireYear	ha
1229	Polygon	Anaktuvuk River	2007	103896.593896
1122	Polygon	DCKN190	1993	33520.780567
2371	Polygon	Coleen	2007	8472.923821
1772	Polygon	Ammerman Mountain	2004	8018.656017
2662	Polygon	DCKN178	1993	6793.238565
1516	Polygon	AIN SSE 38	1977	4675.63468
2382	Polygon	FYU NE 47	1987	3022.54707
338	Polygon	Knifeblade Ridge	2012	1464.473503
633	Polygon	Sagavanirktok	2007	1279.016133
901	Polygon	Itkillik River	2012	935.177498
459	Polygon	Kigalik River	2012	829.62045
2010	Polygon	WAY UP N #2	1985	760.947397
562	Polygon	Kuparuk	2007	684.966953
319	Polygon	Kigalik River 2	2012	356.012454
1646	Polygon	Kuparuk River	2001	341.865402
2516	Polygon	Baby Creek	2009	210.31076
1084	Polygon	Kutchik River	2010	173.214239
900	Polygon	West Colville River	2012	87.530336
462	Polygon	Alice Creek	2012	2.017443

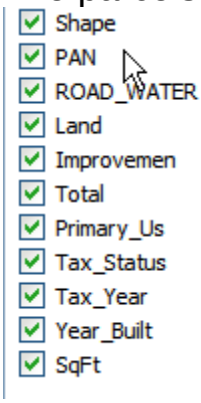
So largest fire north of 68 degrees was the Anaktuvuk River fire of 2007 which burned about 1039 square kilometers.

Chena River Parcels

Download the geodatabase container ***parcels.mdb*** from
http://nrm.salrm.uaf.edu/~dverbyla/nrm338/thurs_GIS_problems

These data were originally downloaded from the Fairbanks North Star Borough GIS website.

The parcels fields are

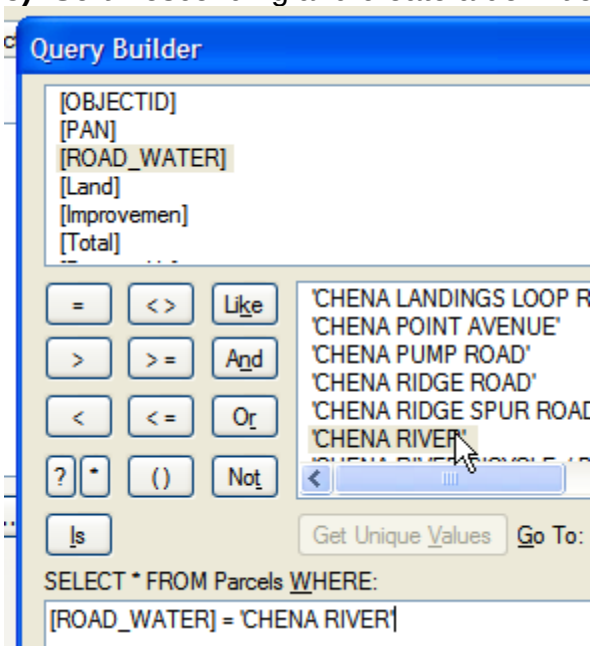


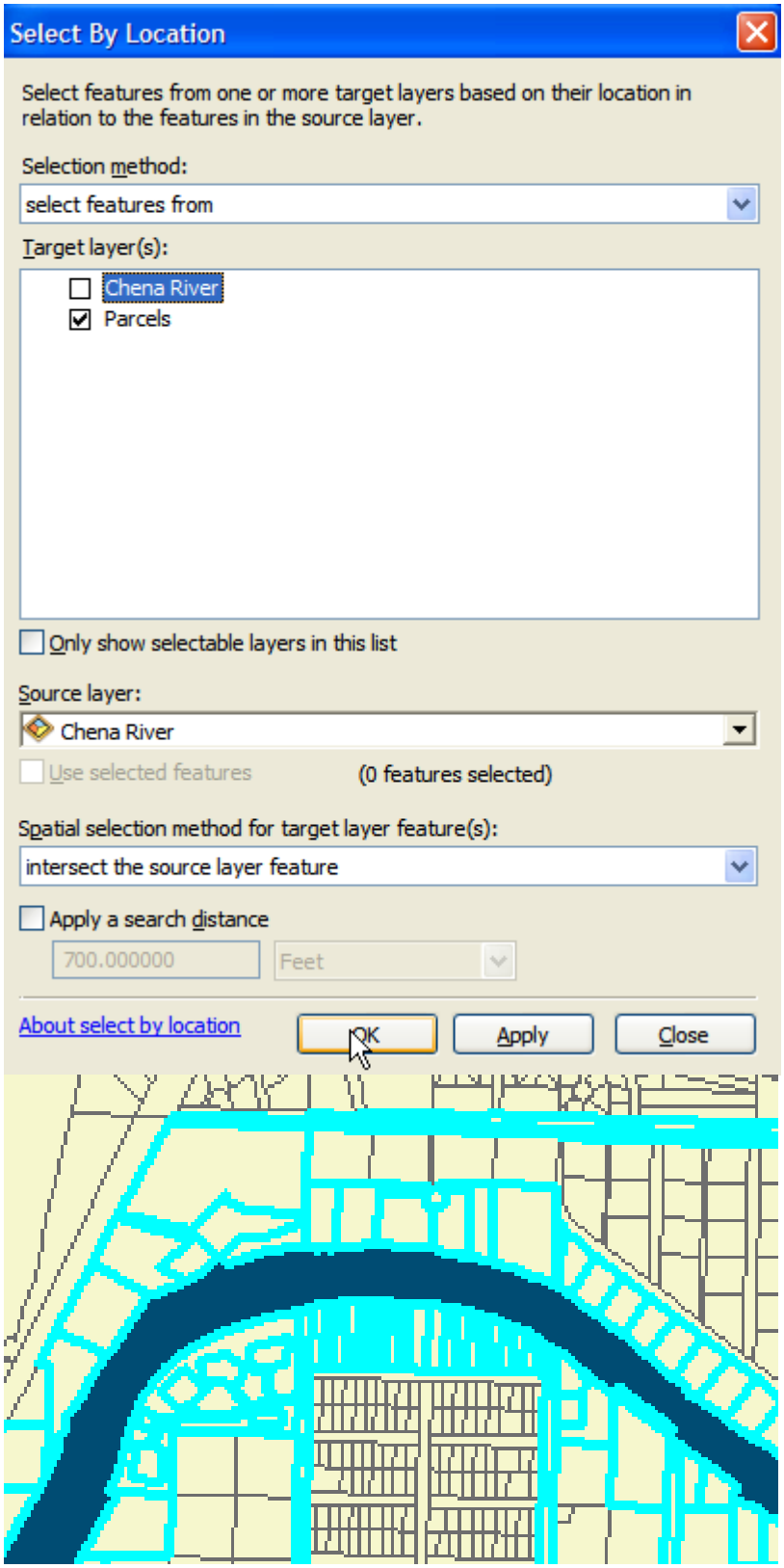
Where PAN is the parcel ID,
Road_Water is blank if the parcel is not a road or water body:

Create an arcmap layer representing the Chena River.

Locate all parcels on the Chena River. For these parcels, compute the parcel appraised land value per square foot of total parcel area. ***Create a table listing the ten highest land values***.

1) Definition query to create layer representing Chena River
2) Select by Location all Parcels intersecting with Chena River layer
3) Add a field for land value
4) Calculate land value in $ per square foot of property land value
5) Sort Descending and create a definition query based on tenth highest land value




Select By Location
Select features from one or more target layers based on their location in relation to the features in the source layer.
Selection method:
select features from
Target layer(s):
Chena River
Parcels
Only show selectable layers in this list
Source layer:
Chena River
Use selected features
(0 features selected)
Spatial selection method for target layer feature(s):
intersect the source layer feature
Apply a search distance
700.000000
Feet
About select by location
OK
Apply
Close

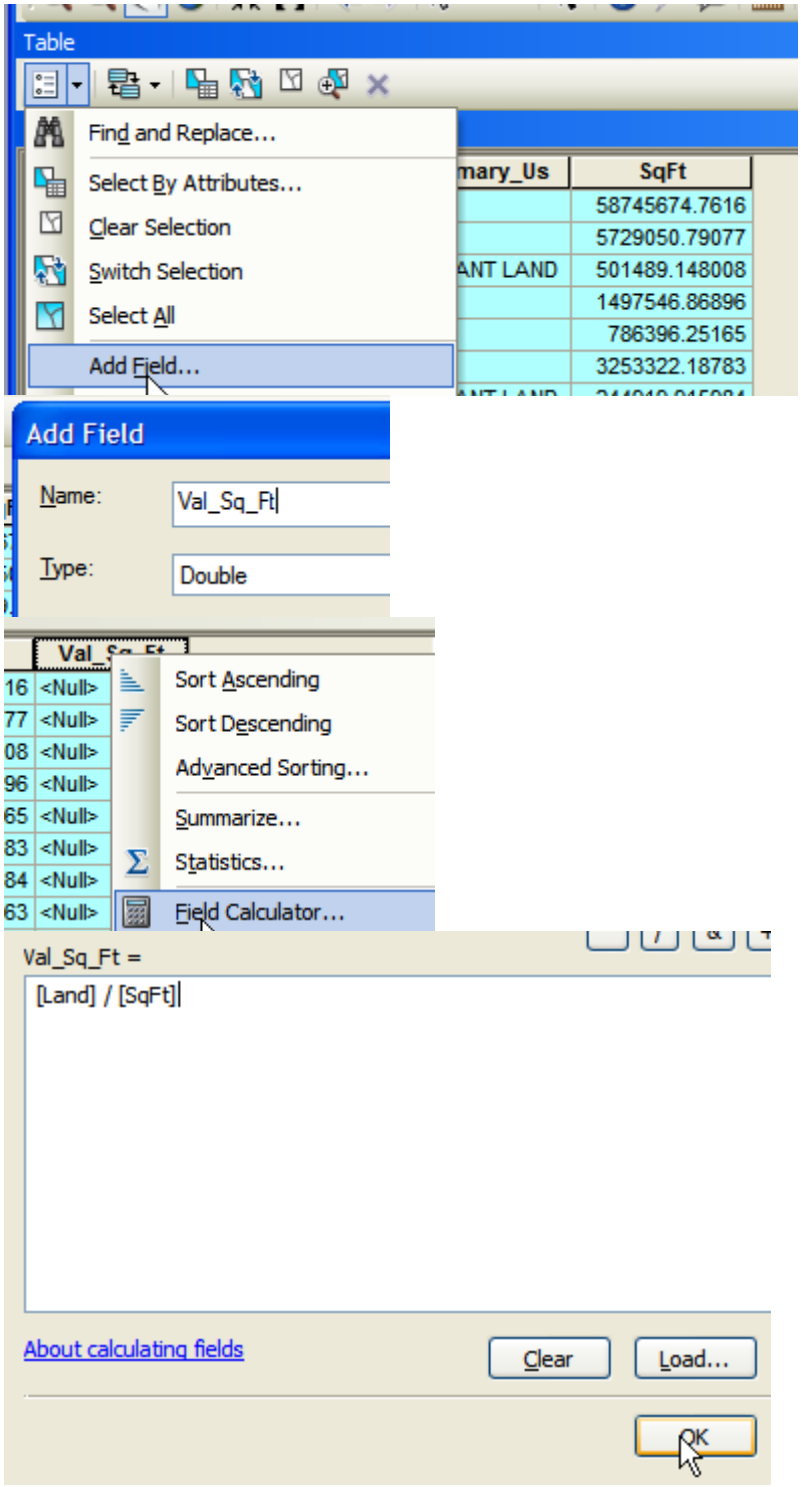
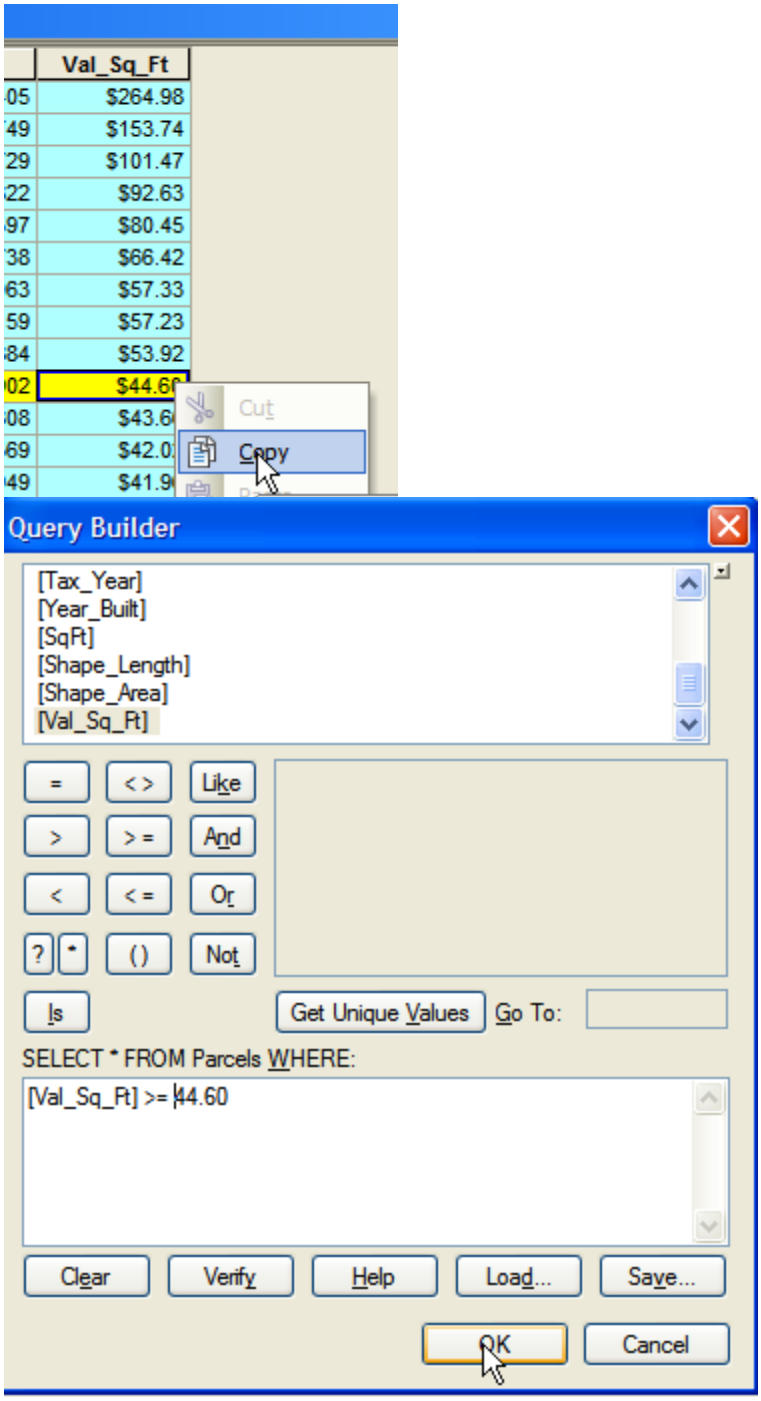
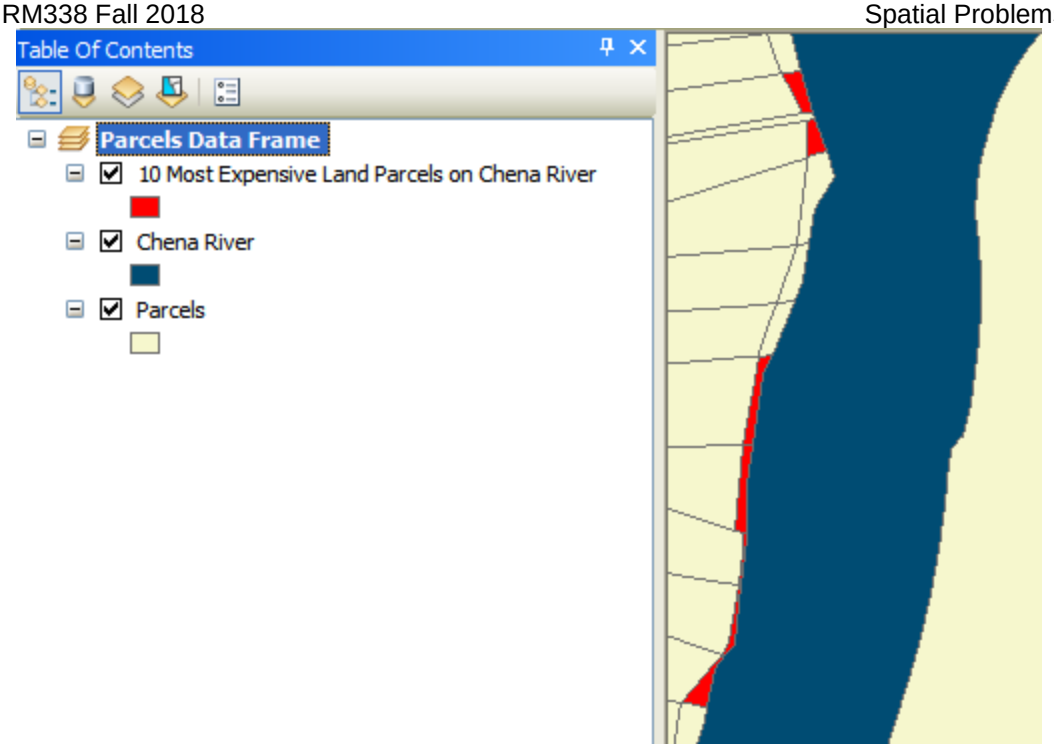


Table
Find and Replace...
Select By Attributes...
Clear Selection
Switch Selection
Select All
Add Field...
mary_Us
SqFt
58745674.7616
5729050.79077
ANT LAND
501489.148008
1497546.86896
786396.25165
3253322.18783
Add Field
Name:
Val_Sq_Ft
Type:
Double
Sort Ascending
Sort Descending
Advanced Sorting...
Summarize...
Statistics...
Field Calculator...
Val_Sq_Ft =
[Land] / [SqFt]
About calculating fields
Clear
Load...
OK


Val_Sq_Ft
05 $264.98
49 $153.74
29 $101.47
22 $92.63
97 $80.45
38 $66.42
63 $57.33
59 $57.23
84 $53.92
02 $44.60
08 $43.6
69 $42.0
49 $41.9
Cut
Copy
Query Builder
[Tax_Year]
[Year_Built]
[SqFt]
[Shape_Length]
[Shape_Area]
[Val_Sq_Ft]
=
< >
Like
>
> =
And
<
< =
Or
?
*
( )
Not
Is
Get Unique Values
Go To:
SELECT * FROM Parcels WHERE:
[Val_Sq_Ft] >= 44.60
Clear
Verify
Help
Load...
Save...
OK
Cancel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Parcels Data Frame
10 Most Expensive Land Parcels on Chena River
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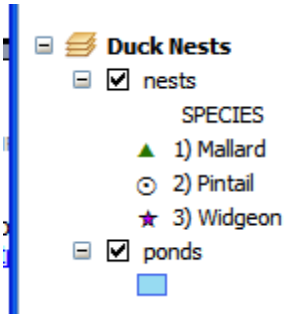
Parcels

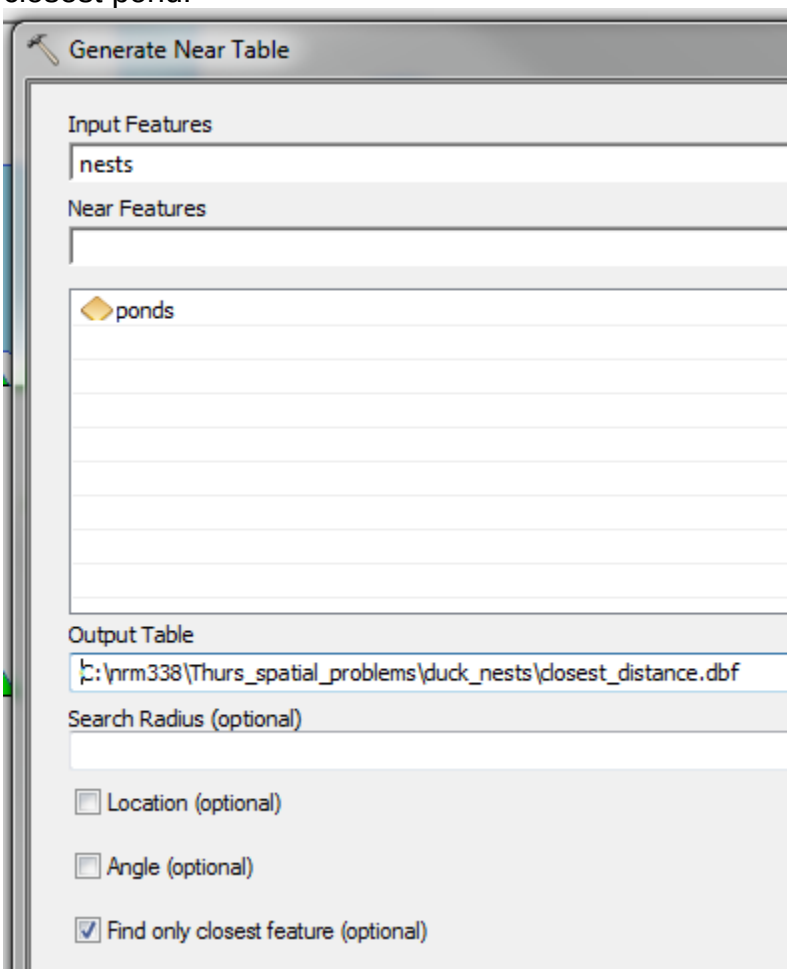
Duck Nests

Download the geodatabase container ***duck_nests..mdb*** from
http://nrm.salrm.uaf.edu/~dverbyla/nrm338/thurs_GIS_problems

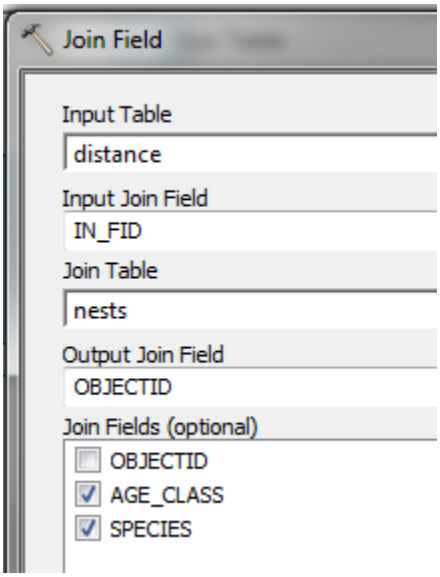


The point layer nests contains an attribute for species (1=Mallard, 2=Pintail, 3=Widgeon).
Use the geoprocessing tools *Generate Near Table,Join Field, Summary Statistics* to *determine the mean distance to the closest pond for each species* and ageclass.

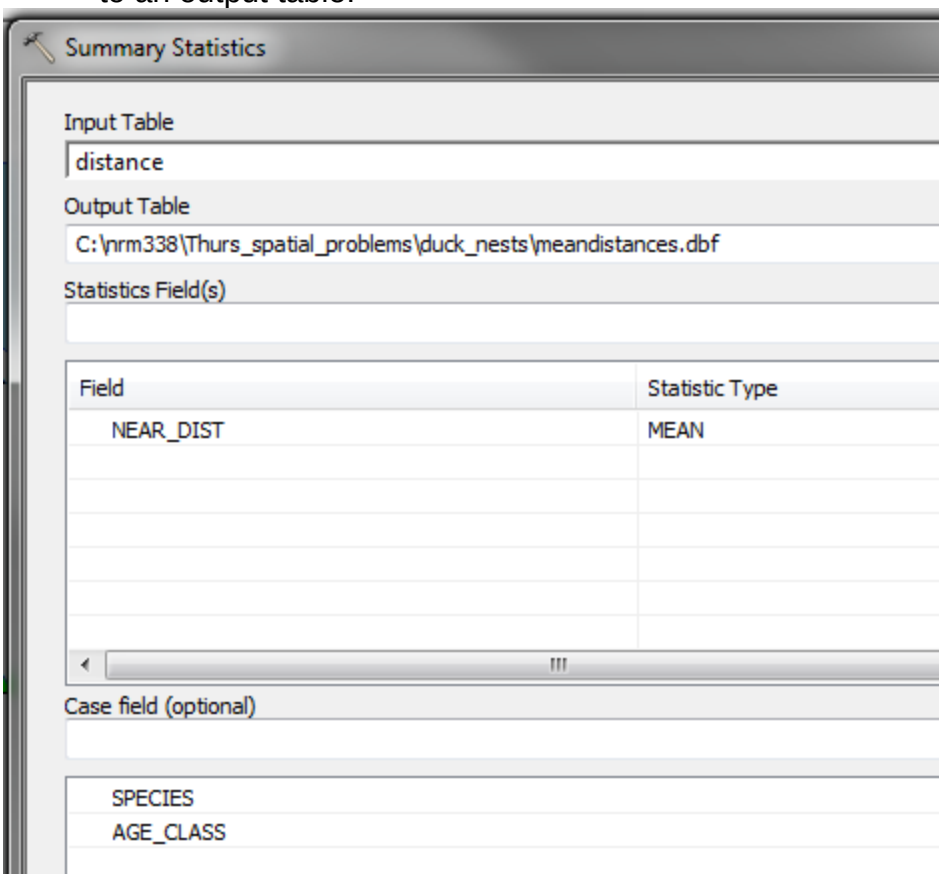
1) Use Generate Near Table geoprocessing tool to determine distance from each nest to closest pond.



2) Use Join Field to join duck species and age class to table



3) Use Summary Statistics geoprocessing tool to compute mean distance by species code to an output table.



SPECIES	AGE_CLASS	FREQUENCY	MEAN_NEAR_
1	1	43	311.048097
1	2	10	60.024462
1	3	5	13.313348
2	1	3	99.50307
2	2	4	19.207896
2	3	6	43.438855
3	1	11	427.774073
3	2	3	20.965123

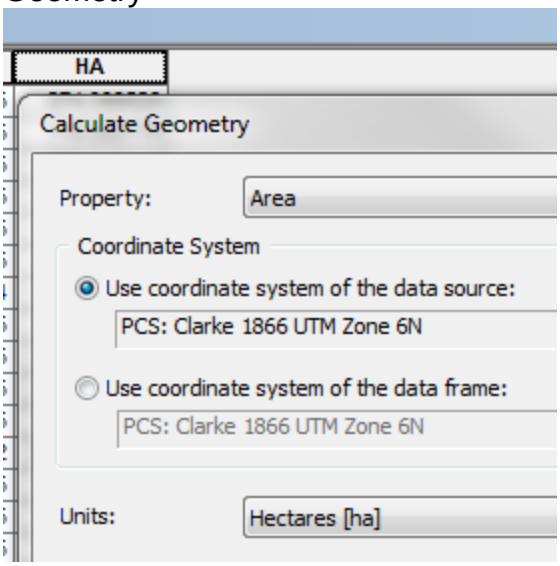
So nmean distance to closest pond decreased with age class for species 1 and species 3.

Montague Island

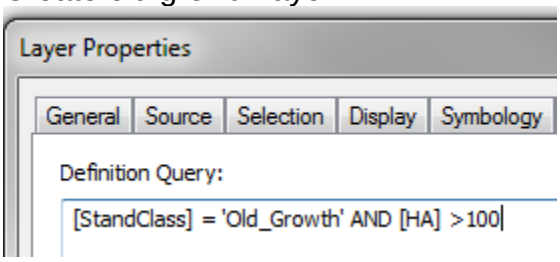
Download the geodatabase container ***Montague_Island.mdb*** from
http://nrm.salrm.uaf.edu/~dverbyla/nrm338/thurs_GIS_problems

Find all the old growth polygons larger than 100 hectares in area, that border a seedling-sapling polygon.
:

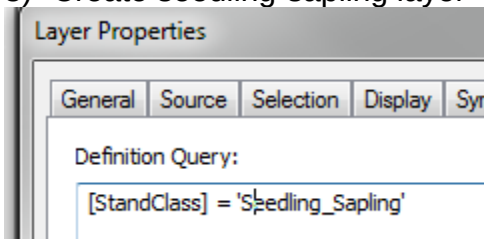
1) Add a double precison field for Hectares, righ mouse click on new field select Calculate Geometry



2) Create old growth layer



3) Create seedling-sapling layer



4) Select By Location