

How to Semi-Automate the “Joining” of Ice Chart Attributes to Animal Locations by the Appropriate Date

These instructions enable you to reclassify a point shapefile of locations according to a specified date range as defined by the temporal resolution of ice charts. Using ESRI ArcGIS and MS Excel software, you perform the following:

ESRI ArcGIS – combine all ice data together for processing and reclassify points to select and intersect with individual ice charts

- Append ice charts into one file
- Summarize by DATE_CARTE
- Export to dBase
- Once date range expressions have been calculated, reclassify locations into a new field
- Use a toolbox model to intersect selected points with the appropriate ice chart

MS Excel – calculate new fields and concatenate into reclassification expressions

- Import dBase
- Calculate mid value of days between ice chart dates
- Calculate lower and upper bounds in date range
- Concatenate expressions for use in ArcGIS

All functionality is available out-of-the box from MS Excel and ArcGIS(ArcView) 9.0.

ORIGINAL DATA

Goodbears_iceLL.shp	A shapefile of point locations with the following critical field: Date_
YYYYMMDD.shp	Various shapefiles of polygon ice charts with the following critical field: Date_Carte

CREATED DATA

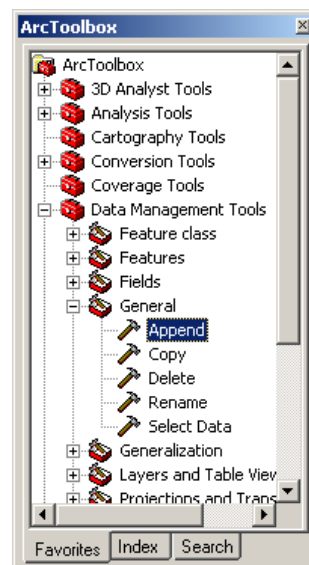
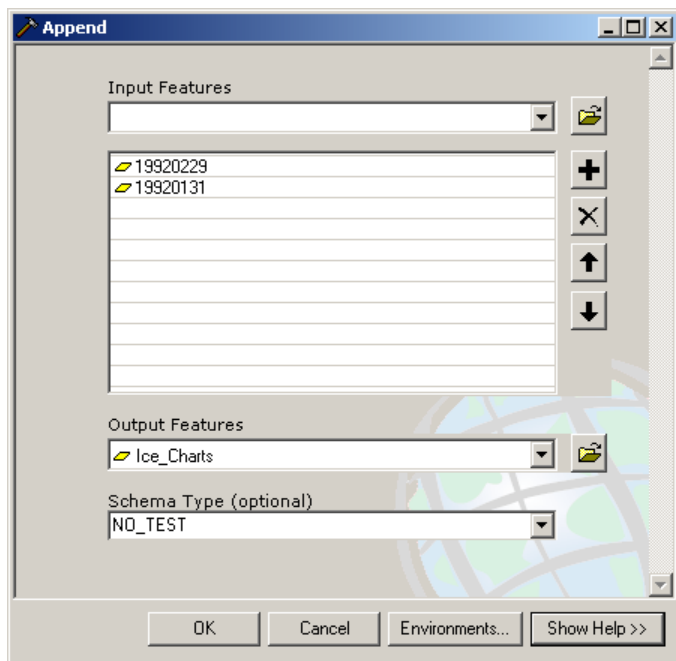
Ice_Charts.shp	Huge shapefile of all ice chart polygon layers appended together
Sum_Date_Carte.dbf	dBase table resulting from the summarizing of All_Charts.shp to obtain unique Date_Carte values from all ice charts
Sum_Date_Carte_Exp.xls	MS Excel worksheet containing reclassification calculations
pts_YYYYMMDD.shp	Various point shapefiles resulting from the selection/intersection toolbox model
BearPts_Charts.shp	A shapefile of all points resulting from the model appended together

Start in ArcMap:

1. Add all the ice charts to a new empty map document
2. Right-click on the first layer in the table of contents and choose
3. Use the output name **Ice_Charts.shp** and click SAVE and then OK



DATA >>> EXPORT DATA to create a copy



4. In ArcToolbox, locate the APPEND tool and open it
5. Set Ice_Charts.shp as the output layer and all other ice charts (except the one you copied!) as the input layers
6. Choose NO_TEST as the schema type
7. Click OK
8. Right-click on Ice_Charts.shp in the table of contents, and choose OPEN ATTRIBUTE TABLE

 A screenshot of the 'Attributes of Ice_Charts' table. The table has columns: A, LEGEND, REGION, and DATE_CARTE. The rows are: Land, Land, Land, and Fast ice. The 'Summarize...' button is highlighted.

A	LEGEND	REGION	DATE_CARTE
	Land		
	Land		
	Land		
	Fast ice		

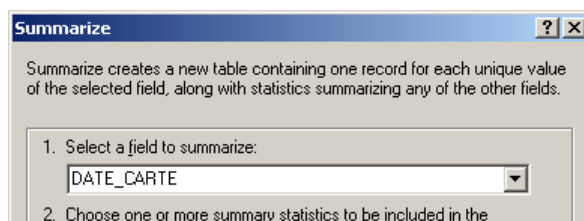
9. Right-click on the heading of any field containing text values (e.g. LEGEND)
10. Choose SUMMARIZE
11. In the Summarize dialog switch the field to **DATE_CARTE** as the field to summarize on

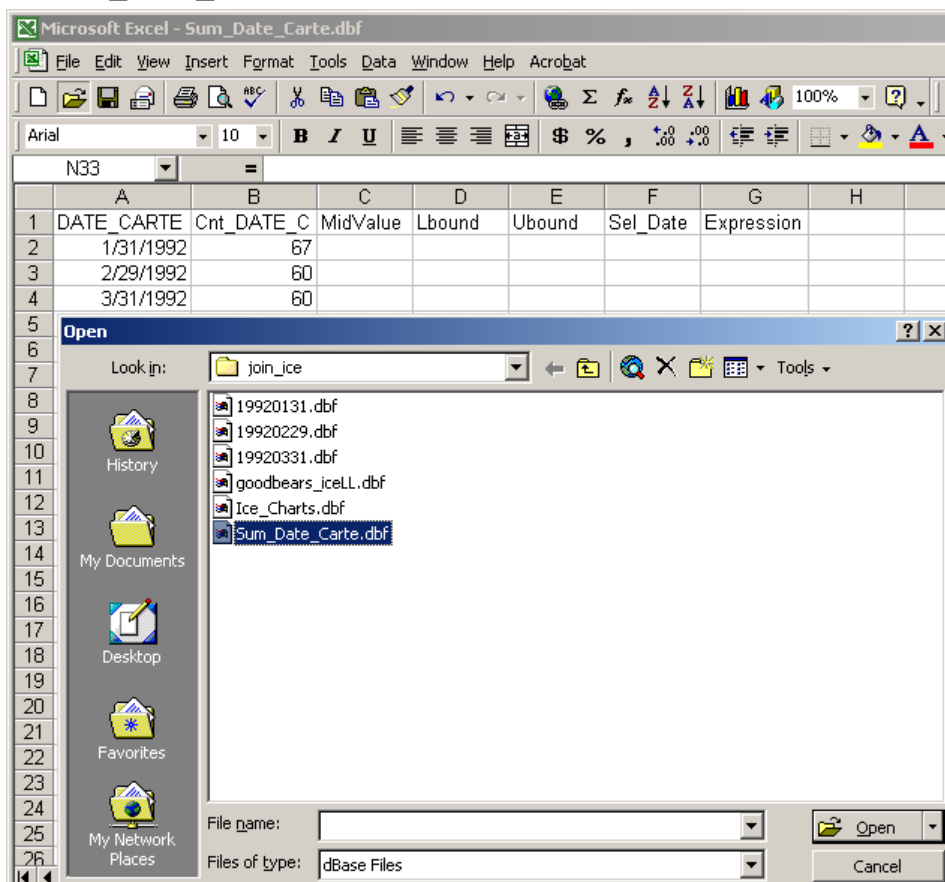
12. Ignore the rest and name the output **Sum_Date_Carte.dbf**

13. Click OK

You now have a table containing the unique date values for all ice charts. These will be used to determine the mid-point between dates that will aid in calculating lower and upper bounds of date ranges.

14. Close ArcMap



Steps in Excel:**15. Open Sum_Date_Carte.dbf****16. Add the following new headings:**

- **MidValue** – the mid-point between one date and the next
- **Lbound** – the actual before date to be included
- **Ubound** – the actual after date to be included
- **Sel_Date** – reformatted ice chart date as YYYYMMDD
- **strLbound** – conversion of date type to string type
- **strUbound** – conversion of date type to string type
- **Expression** – concatenation of date ranges

17. Enter the following functions into the first empty cell below each new heading:

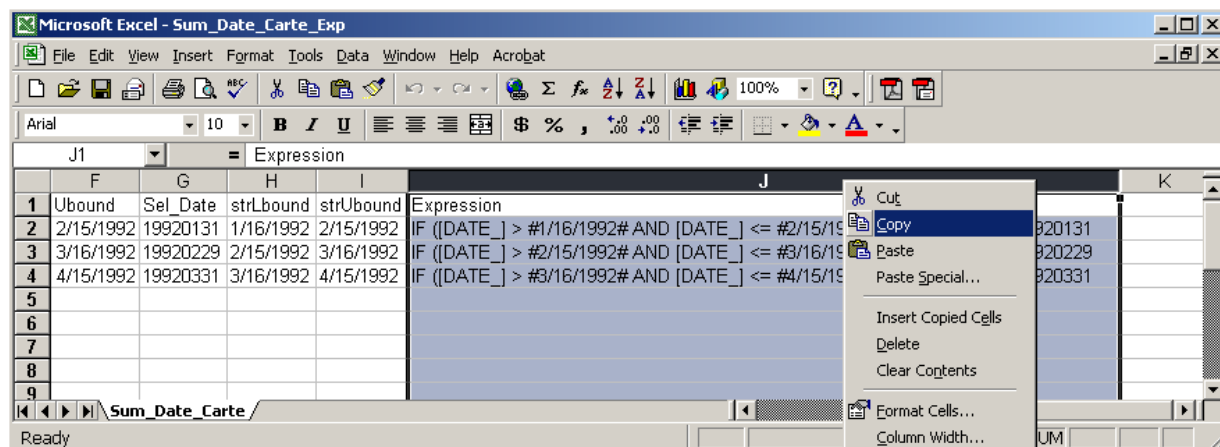
Cell Reference	Heading	Function(s)
D	MidValue	=IF(ISERROR((B2-B1)/2),INT(DAY(B2)/2),INT((B2-B1)/2))
E	Lbound	=B2-D2
F	Ubound	=IF(ISBLANK(E3),(B2+D2),E3)
G	Sel_Date	= IF(AND((MONTH(B2) < 10),(DAY(B2) < 10)), (YEAR(B2) & "0" & MONTH(B2) & "0" & DAY(B2)), IF((MONTH(B2) < 10), (YEAR(B2) & "0" & MONTH(B2) & DAY(B2)), IF((DAY(B2) < 10), (YEAR(B2) & MONTH(B2) & "0" & DAY(B2)), (YEAR(B2) & MONTH(B2) & DAY(B2)))))

H strLbound =MONTH(E2) & "/" & DAY(E2) & "/" & YEAR(E2)
 I strUbound =MONTH(F2) & "/" & DAY(F2) & "/" & YEAR(F2)
 J Expression ="IF ([DATE_] > #" & H2 & "# AND [DATE_] <= #" & I2 & "#)
 THEN ptDate = " & G2

18. Copy down each column for all records

19. Inspect for any errors and correct them

20. SAVE AS a MS Excel Workbook: **Sum_Date_Carte_Exp.xls**

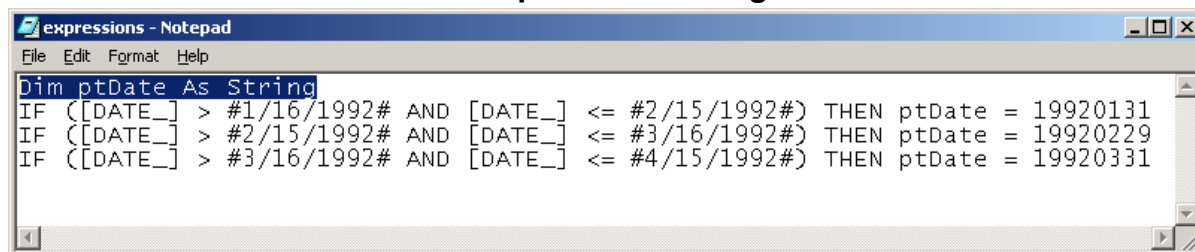


21. Select the Expression column and copy and paste into Notepad

22. Close Excel

23. Replace the first line 'Expression' with the following statement:

Dim ptDate As String



24. SAVE the text file of expressions for future reference

Final Steps in ArcMap:

25. Open ArcMap

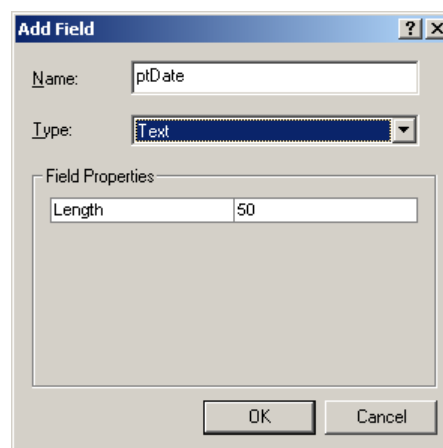
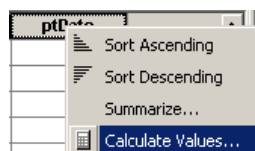
26. Add the **Goodbears_iceLL.shp** data and **all individual ice charts** to a new empty map document

27. Right-click on Goodbears_iceLL.shp and **OPEN ATTRIBUTE TABLE**

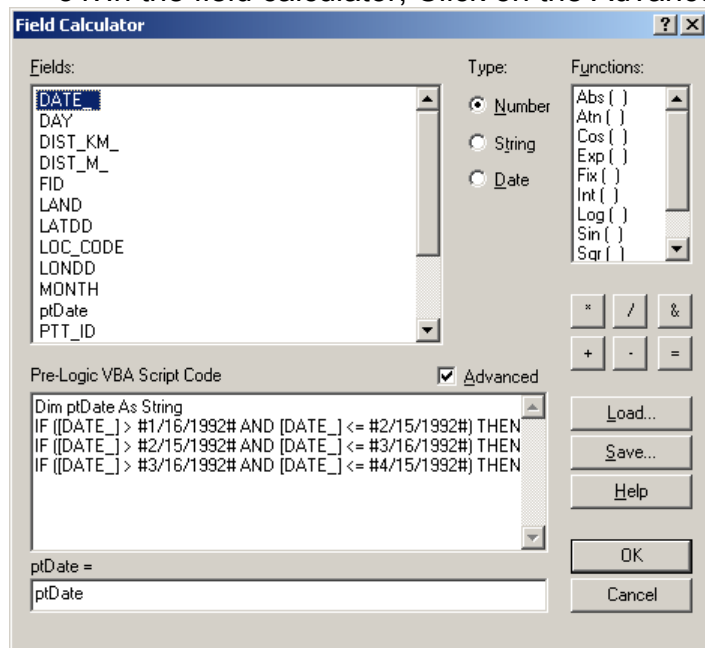
28. Choose **OPTIONS >>> ADD FIELD**

29. Name this new **Text** field of width **8**: **ptDate**

30. Right-click on the **ptDate** heading and choose **CALCULATE VALUES**



31. In the field calculator, Click on the Advanced check box



32. Select the expressions in your text file, COPY (Ctrl-C) and PASTE (Ctrl-V) into the pre-logic VBA script code window of the field calculator
33. Type **ptDate** in the second window
34. Click OK
35. Right-click on the DATE_ heading and choose SORT ASCENDING
36. Inspect that the reclassification values from the date range expressions did a proper job at grouping the actual locations dates as defined by the ice chart temporal resolution

37. In ArcToolbox, right-click on the main toolbox (named ArcToolbox at the top of the list) and choose ADD TOOLBOX

38. Navigate to the folder where **join_ice.tbx** is stored, select it, and click OPEN

39. Double click on the **Model** tool (*I'm working on a ScriptTool that will require less user input*)

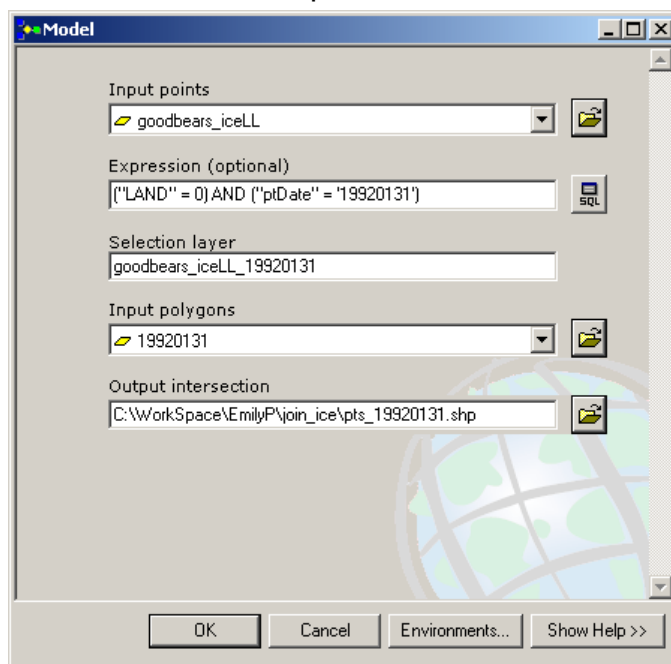
40. Set the parameters as required for each selection of locations and intersection with the corresponding ice chart

41. REPEAT, REPEAT, REPEAT for each ice chart date

42. When using the **Model** tool, make sure to substitute in the YYYYMMDD format in the following boxes:

- Expression >>> ("LAND" = 0) AND ("ptDate" = 'YYYYMMDD')
- Selection layer >>> goodbears_iceLL_YYYYMMDD
- Input polygons >>> YYYYMMDD
- Output intersection >>> pts_YYYYMMDD

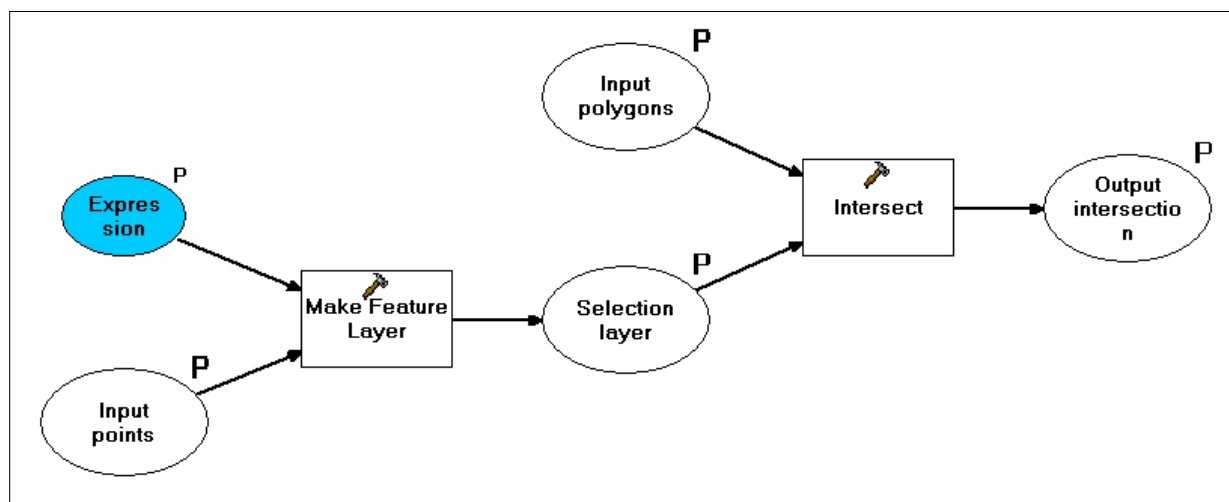
43. When finished running the tool repetitively, create a copy of the first pts_YYYYMMDD and name it **BearPts_Charts.shp**



44. In ArcToolbox, locate the APPEND tool and open it
45. Set **BearPts_Charts.shp** as the output layer and all other pts_YYYYMMDD (except the one you copied!) as the input layers
46. Choose NO_TEST as the schema type
47. Click OK
48. Right-click on **BearPts_Charts.shp** in the table of contents, and choose OPEN ATTRIBUTE TABLE
49. Examine the combined attributes of the original points and the intersected ice charts by appropriate date (*Note: some of the fields have been hidden in the example below.*)

FID	Shape	PTT_ID	DATE	LOC_CODE	LAND	X	Y	ptDate	A_LEGEND	REGION	DATE_CARTE	EGG_ATTR
0	Point	01010A	2/2/1992	1	0	617896.9	6628777.	19920131	Remote egg	BH	1/31/1992	9+ 3 7 @ @ @ 4 1 @ @ @ 5 5 @ @ @ 9-
1	Point	01010A	2/6/1992	1	0	646741.4	6721225.	19920131	Remote egg	BH	1/31/1992	9+ 3 7 @ @ @ 4 1 @ @ @ 5 5 @ @ @ 9-
2	Point	01010A	2/14/1992	1	0	601003.9	6567003.	19920131	Remote egg	BH	1/31/1992	9+ 3 7 @ @ @ 4 1 @ @ @ 5 5 @ @ @ 9-
3	Point	01011A	2/2/1992	2	0	709305.9	6776790.	19920131	Remote egg	BH	1/31/1992	9+ 3 7 @ @ @ 4 1 @ @ @ 5 5 @ @ @ 9-
4	Point	01011A	2/6/1992	1	0	677182.8	6770567.	19920131	Remote egg	BH	1/31/1992	9+ 3 7 @ @ @ 4 1 @ @ @ 5 5 @ @ @ 9-
5	Point	01011A	2/10/1992	1	0	662117.9	6708502.	19920131	Remote egg	BH	1/31/1992	9+ 3 7 @ @ @ 4 1 @ @ @ 5 5 @ @ @ 9-
6	Point	01011A	2/14/1992	2	0	682453.6	6653693.	19920131	Remote egg	BH	1/31/1992	9+ 3 7 @ @ @ 4 1 @ @ @ 5 5 @ @ @ 9-
7	Point	01010A	2/22/1992	1	0	598280.1	6627094.	19920229	Remote egg	BH	2/29/1992	9+ 7 3 @ @ @ 4 1 @ @ @ 6 5 @ @ @ 9-
8	Point	01010A	3/1/1992	2	0	622769.8	6651225.	19920229	Remote egg	BH	2/29/1992	9+ 7 3 @ @ @ 4 1 @ @ @ 6 5 @ @ @ 9-
9	Point	01010A	3/5/1992	1	0	655224.4	6740539.	19920229	Remote egg	BH	2/29/1992	9+ 7 3 @ @ @ 4 1 @ @ @ 6 5 @ @ @ 9-
10	Point	01011A	2/18/1992	2	0	659528.1	6574582.	19920229	Remote egg	BH	2/29/1992	9+ 5 5 @ @ @ 4 1 @ @ @ 5 5 @ @ @ 9-
11	Point	01011A	2/22/1992	1	0	654704.1	6509728.	19920229	Remote egg	BH	2/29/1992	9+ 5 5 @ @ @ 4 1 @ @ @ 5 5 @ @ @ 9-

50. Export for use in a stats package



Model workflow: Parameters can be modified to suit your needs.