# 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: <b>Date_</b>					
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.xl	Is 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

DATA >>> EXPORT DATA to create a copy

3. Use the output name **Ice\_Charts.shp** and click SAVE and then OK

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- 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

I	I Attributes of Ice_Charts											
ſ		A_LEG	END REGION DATE_CARTI									
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ľ		Fast ice	Summarize									

- 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

DATE CARTE

- 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 midpoint between dates that will aid ion calculating lower and upper bounds of date ranges.

Summarize creates a new table containing one record for each unique value of the selected field, along with statistics summarizing any of the other fields.

1. Select a field to summarize:

2. Choose one or more summary statistics to be included in the

14. Close ArcMap

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### Steps in Excel:

#### 15.Open Sum\_Date\_Carte.dbf

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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** 

Heading	Function(s)
MidValue	=IF(ISERROR((B2-B1)/2),INT(DAY(B2)/2),INT((B2-B1)/2))
Lbound	=B2-D2
Ubound	=IF(ISBLANK(E3),(B2+D2),E3)
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)))))
	Heading MidValue Lbound Ubound Sel_Date

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- 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**

Microsoft Excel - Sum_Date_Carte_Exp										<u>- 🗆 ×</u>		
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- 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

🛃 expressions - Notepad		
<u>File E</u> dit F <u>o</u> rmat <u>H</u> elp		
Dim ptDate As String IF ([DATE_] > #1/16/199 IF ([DATE_] > #2/15/199 IF ([DATE_] > #3/16/199	92# AND [DATE_] <= #2/15/1992#) 92# AND [DATE_] <= #3/16/1992#) 92# AND [DATE_] <= #4/15/1992#)	THEN ptDate = 19920131 THEN ptDate = 19920229 THEN ptDate = 19920331

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: ptDate30. Right-click on the ptDate
  - heading and choose CALCULATE VALUES

Add Field	<u>?</u> ×
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Length	50
	OK Cancel

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

Field Calculator		?	Ŀ
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		<u>H</u> elp	
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ptDate =		OK	
ptDate		Cancel	

- 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 <u>Model</u> 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 <u>Model</u> 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.*)

I	Attributes of BearPts_Charts													
Γ	FID	Shape	PTT_ID	DATE_	LOC_CODE	LAND	X	Y	ptDate	A_LEGEND	REGION	DATE_CARTE	EGG_ATTR	
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L		1 Point	01010A	2/6/1992	1	0	646741.4	6721225.	19920131	Remote egg	BH	1/31/1992	9+_3_7_@_@_@_41@_@_@_5_5_@_@_@_@_9	Ē
L		2 Point	01010A	2/14/1992	1	0	601003.9	6567003.	19920131	Remote egg	BH	1/31/1992	9+_3_7_ <u>@_@_</u> 41. <u>@_@_@_5_5_@_@_@_</u> @_9	Į.
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L		4 Point	01011A	2/6/1992	1	0	677182.8	6770567.	19920131	Remote egg	BH	1/31/1992	9+_3_7_@_@_@_41@_@_@_5_5_@_@_@_@_9	Į.
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L		6 Point	01011A	2/14/1992	2	0	682453.6	6653693.	19920131	Remote egg	BH	1/31/1992	9+_3_7_@_@_@_41@_@_@_5_5_@_@_@_@_9	J-
L		7 Point	01010A	2/22/1992	1	0	598280.1	6627094.	19920229	Remote egg	BH	2/29/1992	9+_7_3_ <u>@_@_4</u> 1 <u>@_@_@_6_5_@_@_@_</u> @_9	j.
L		8 Point	01010A	3/1/1992	2	0	622769.8	6651225.	19920229	Remote egg	BH	2/29/1992	9+_7_3_@_@_@_41@_@_@_6_5_@_@_@_9	Į-
L		9 Point	01010A	3/5/1992	1	0	655224.4	6740539.	19920229	Remote egg	BH	2/29/1992	9+_7_3_@_@_41@_@_@_6_5_@_@_@_9	μ <u>.</u>
L		0 Point	01011A	2/18/1992	2	0	659528.1	6574582.	19920229	Remote egg	BH	2/29/1992	9+_5_5_ <u>@_@_</u> 41. <u>@_@_@_5_5_@_@_@_</u> @_9	Į-
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50. Export for use in a stats package



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