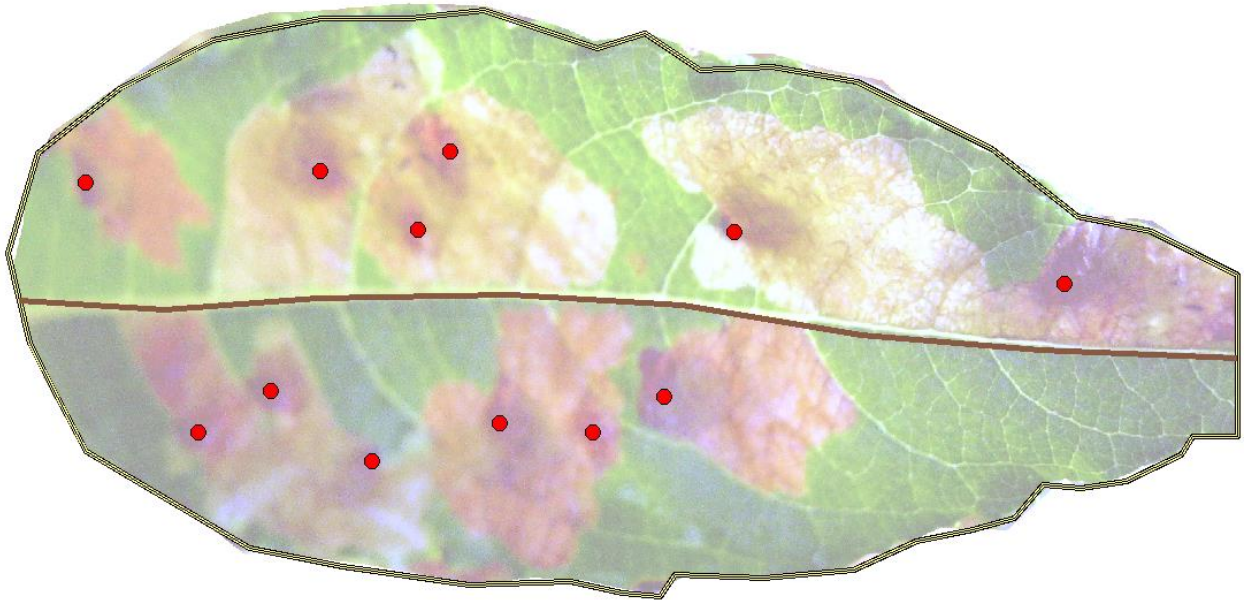


Five Dimensions of GIS Data

- 1) Location or Position
- 2) Lengths and Areas
- 3) Measures and Linear Events
- 4) Heights and Depths
- 5) Time

Locations or Positions

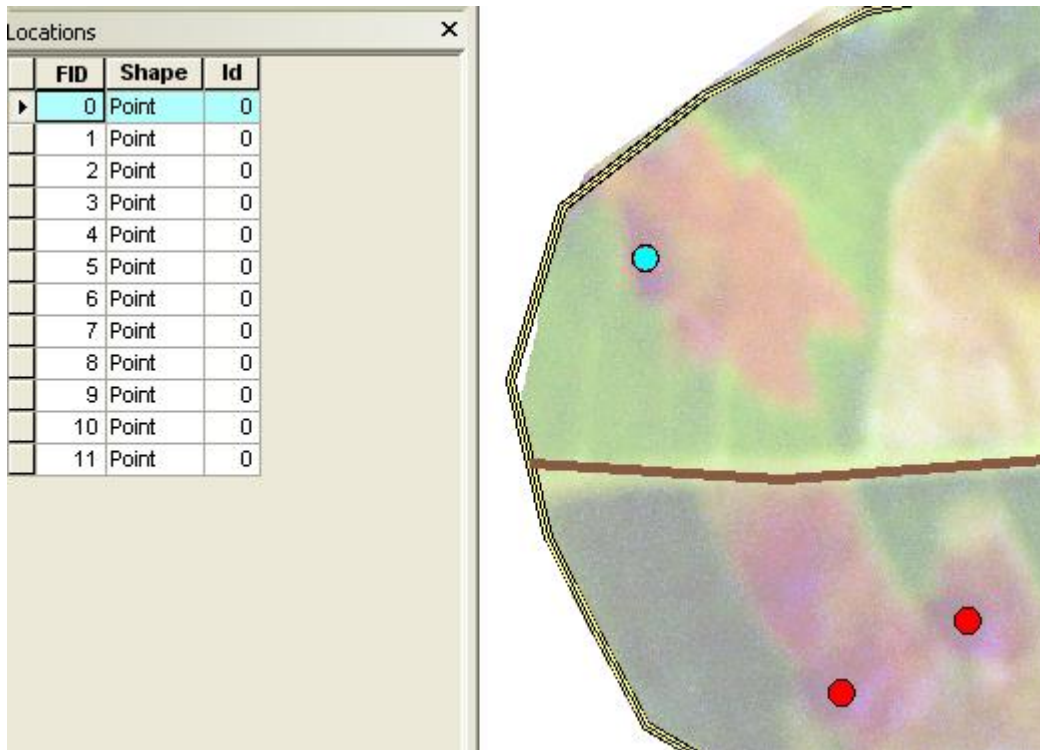
For each red location, which is closer, the leaf center axis or leaf margin?



Use the Generate Near Table geoprocessing tool to create an output table of nearest distances...

IN_FID	NEAR_DIST	NEAR_FC
0	142.731934	LeafOutline
1	335.449309	LeafCenterAxis
2	364.426371	LeafOutline
3	173.517234	LeafCenterAxis
4	237.182227	LeafCenterAxis
5	193.230541	LeafOutline
6	286.479685	LeafOutline
7	342.075269	LeafCenterAxis
8	352.882272	LeafCenterAxis
9	244.668875	LeafCenterAxis
10	213.822189	LeafCenterAxis
11	177.779142	LeafCenterAxis

So for the point with the feature ID of 0, the LeafOutline was closer at a distance of 142.7 units. Visually check that this make sense..



What is the mean distance? Use the Summary Statistics geoprocessing tool...

Locations_Mean_Distances		
NEAR_FC	FREQUENCY	MEAN_NEAR_DIST
LeafCenterAxis	8	259.672065
LeafOutline	4	246.717133

What are the X,Y coordinates of each point location? Use the Add XY geoprocessing tool to add these point properties to the attribute table...

Locations				
	Shape	Id	POINT_X	POINT_Y
	Point	0	584.3	-909.6
	Point	0	1,207.2	-879.2
	Point	0	1,551.5	-828.5
	Point	0	1,465.5	-1,036.2
	Point	0	1,075.5	-1,461.6
	Point	0	883.1	-1,573.0
	Point	0	1,343.9	-1,649.0
	Point	0	1,683.2	-1,547.7
	Point	0	1,931.4	-1,573.0
	Point	0	2,118.8	-1,476.8
	Point	0	2,306.1	-1,041.2
	Point	0	3,182.3	-1,178.0

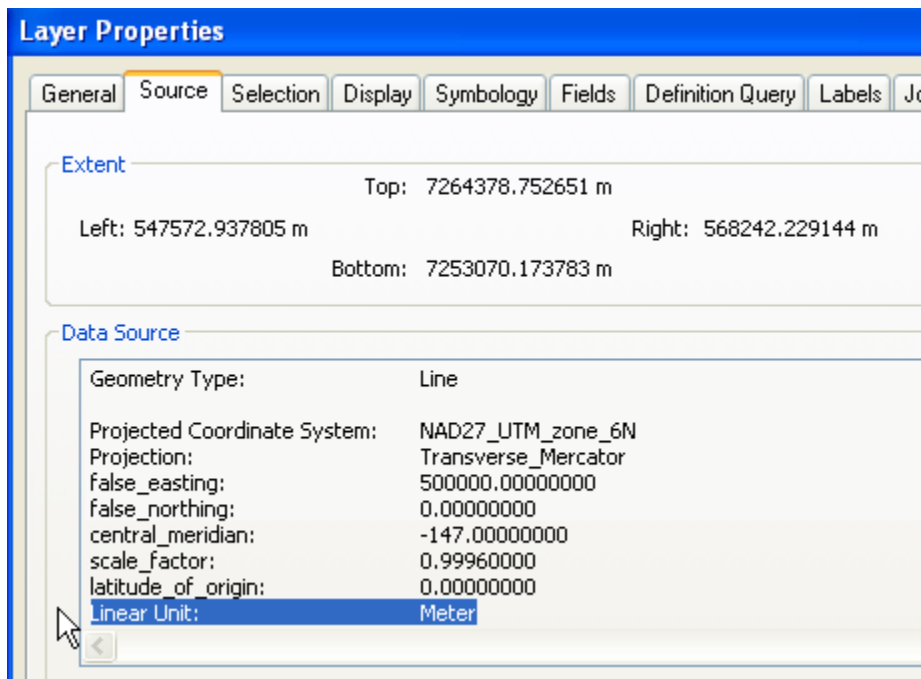
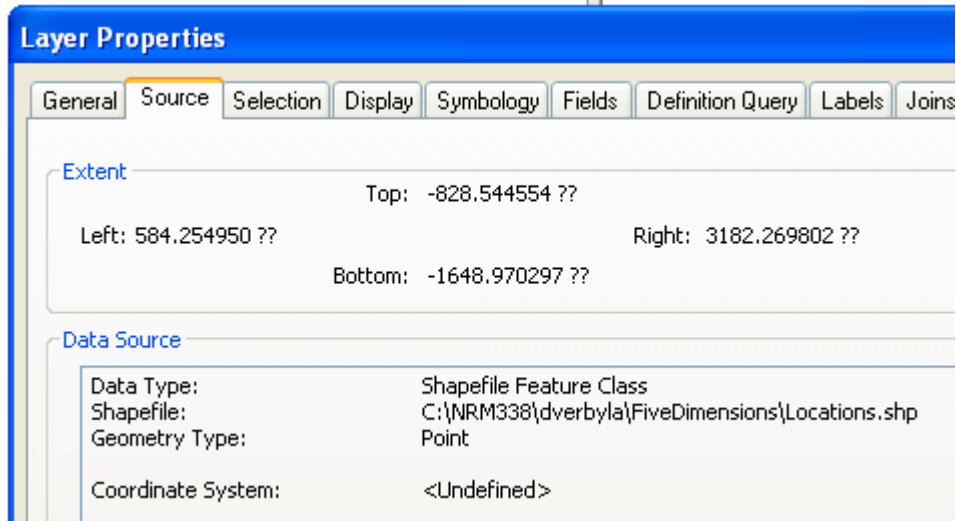
Length and Areas

Point---no width or length, only X,Y position

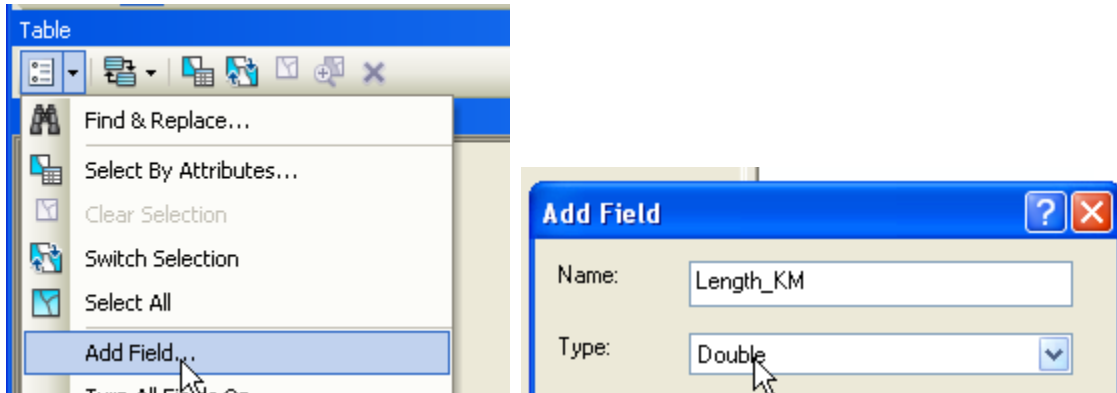
Polyline—no width, has length property as well as start, midpoint, end XY properties

Polygon---has area property

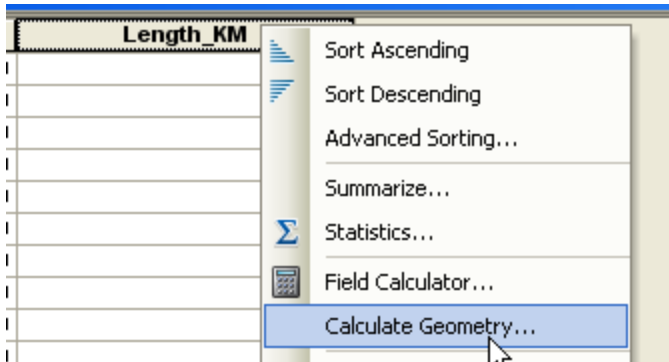
Layer must be in known coordinate system



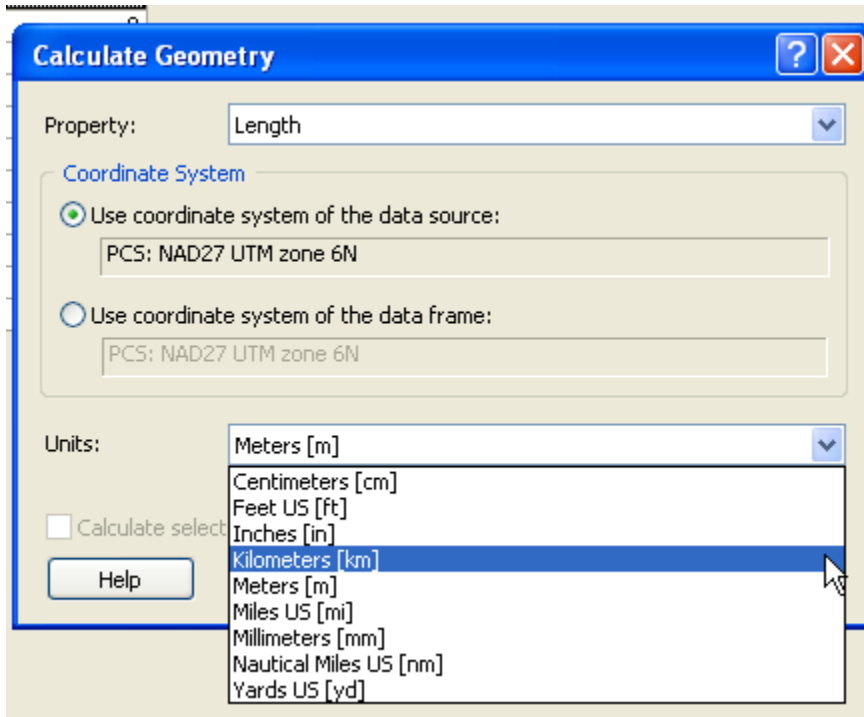
Step 1) Add a Double Precision field to contain length or area



Step 2) Select Calculate Geometry for you new field



Step 3) Select appropriate units for your field



For polygons, you can Calculate Geometry for area of each polygon

Shape *	Id	Area
Polygon	0	

Calculate Geometry

Property:

Coordinate System

Use coordinate system of the data source:

Use coordinate system of the data frame:

Units:

Calculate selected features

-
-
-
-
-
-
-
-

Measured Lines

Examples:

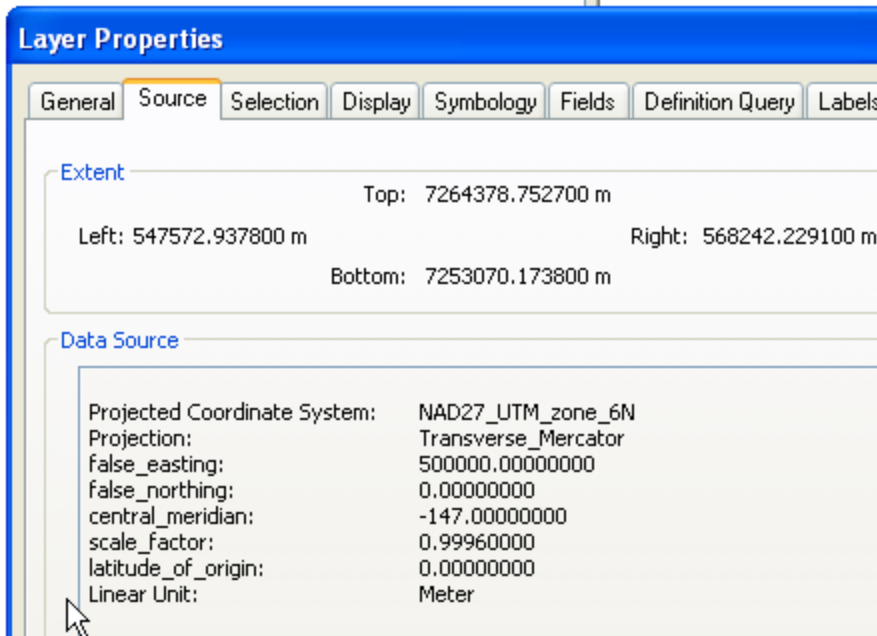
Mile markers on highway

River kilometers

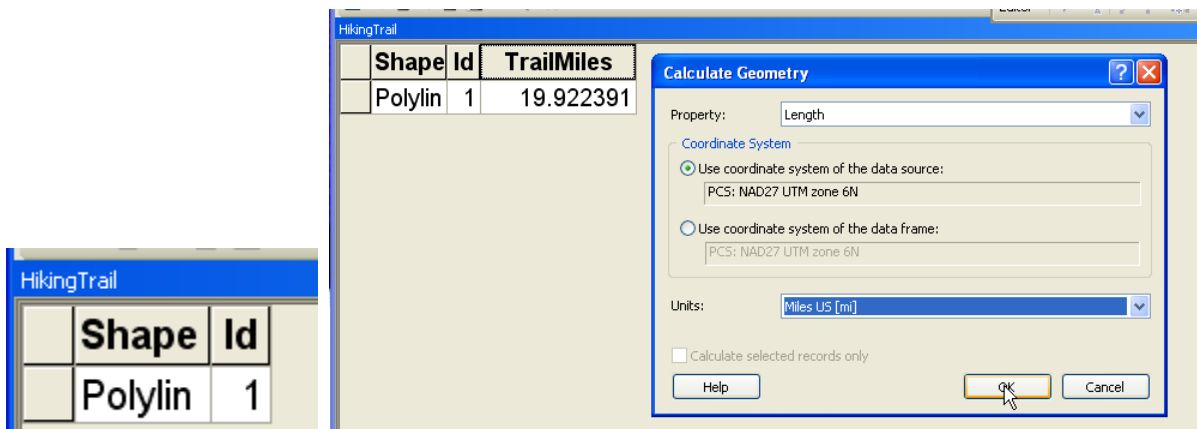
KM on hiking trail

Meters along transect

Example, want hiking trail measured in miles, but coordinate system is in meters.



Step 1) Create a field of line in miles.

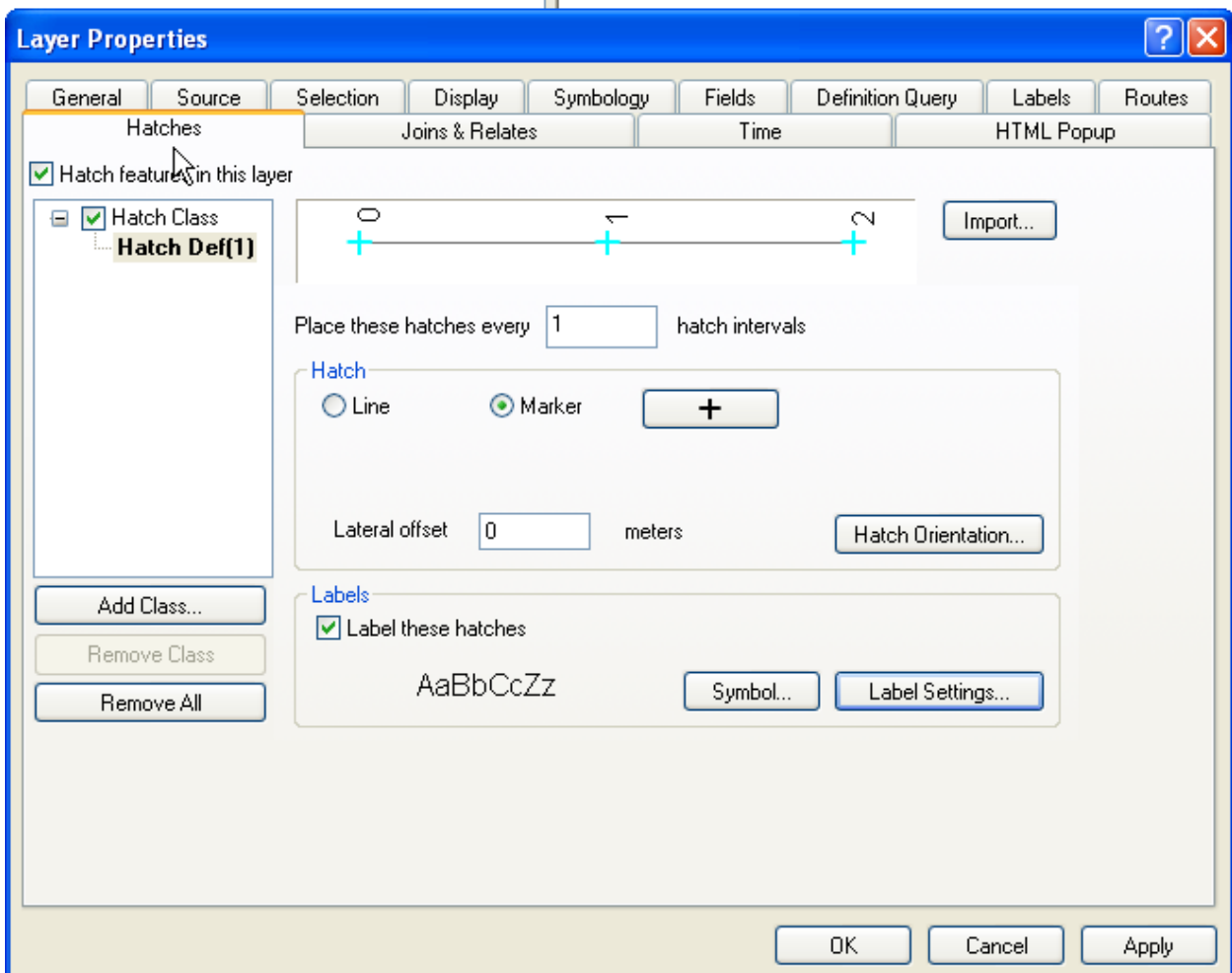


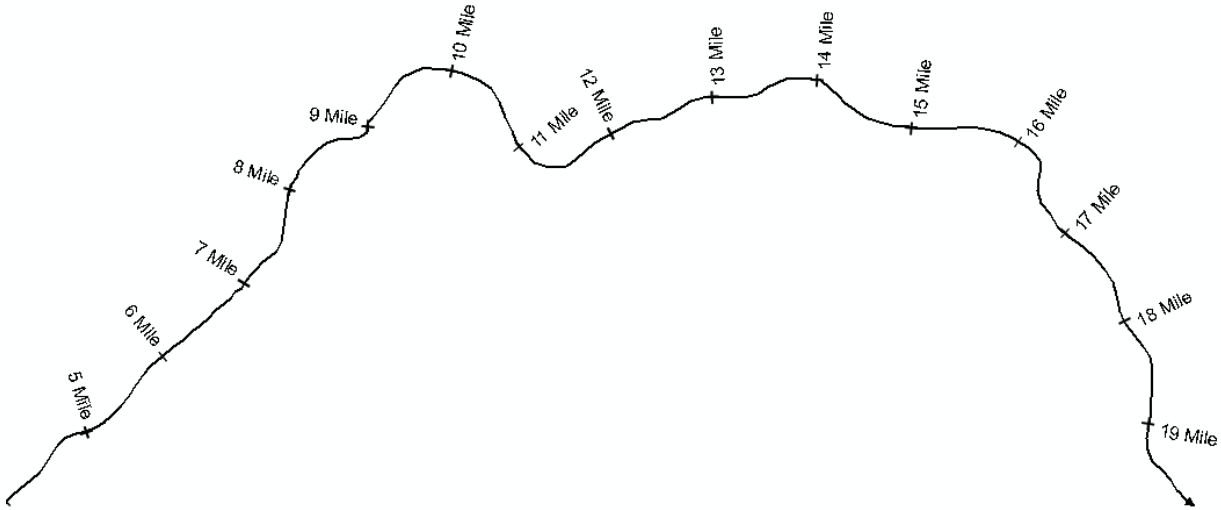
Step 2) Use Create Routes geoprocessing tool to measure line using the one field in trail miles.

TrailMiles	
Shape *	Id *
Polyline M	1

A line that measured will have a Shape Polyline M, M=measured

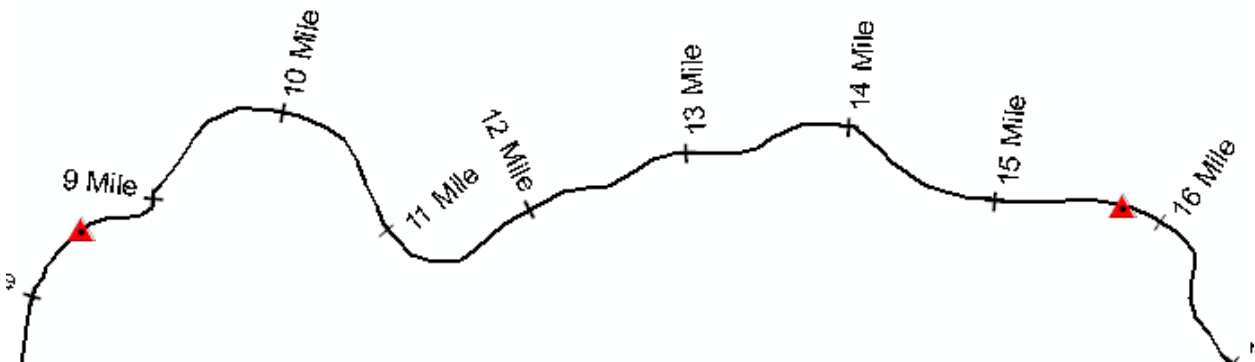
A line that is measured can be hatched to display the measures...





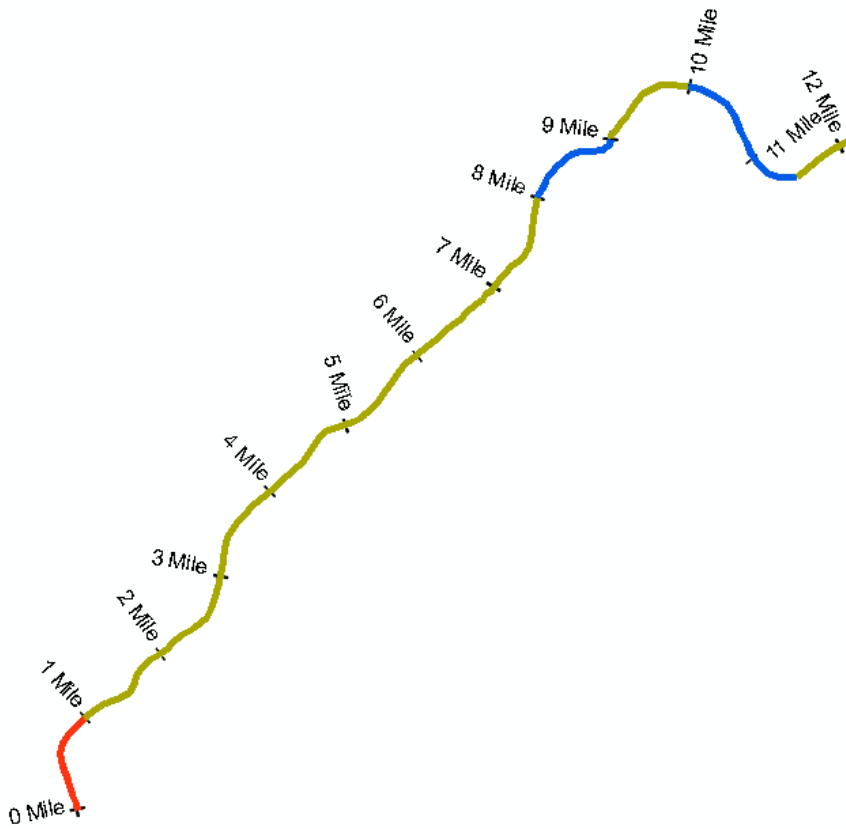
Tabular events can be displayed using the Make Route Event Layer geoprocessing tool. For example, 2 point events (shelters)

TrailID	ShelterId	Mile
1	1	8.5
1	2	15.75



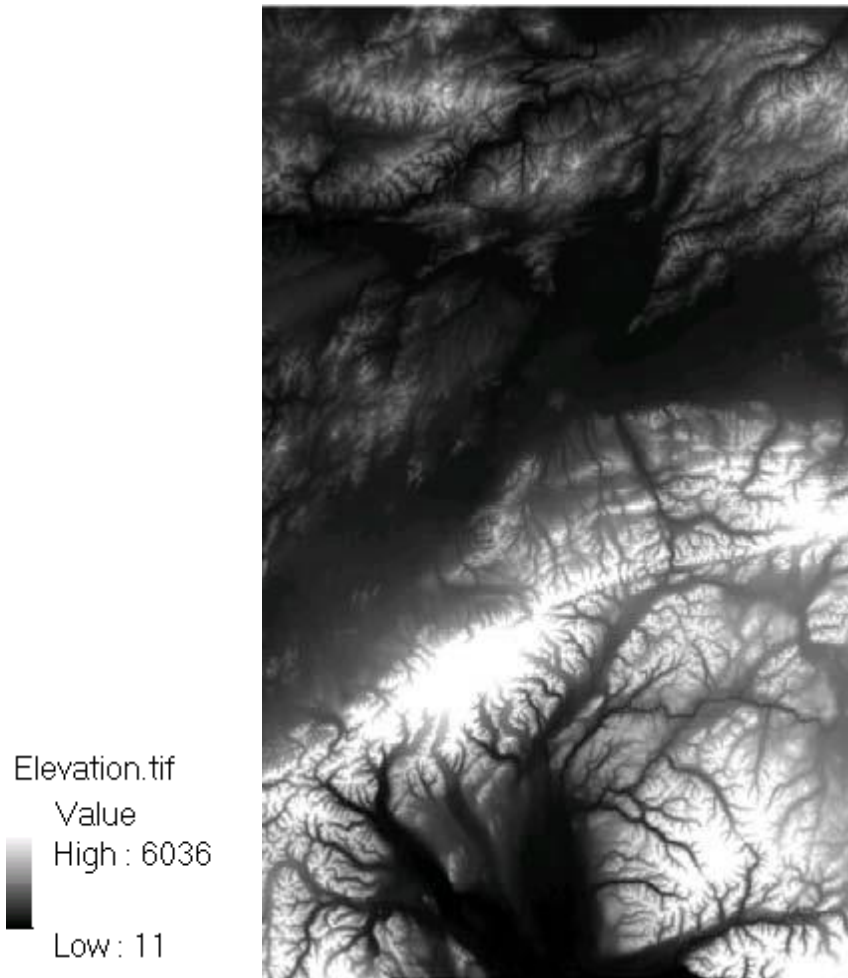
Tabular events as linear events can also be displayed using the Make Route Event Layer geoprocessing tool.

TrailID	Start	End	Condition
1	0	1	Steep Up
1	1	8	Gentle
1	8	9	Down
1	9	10	Gentle
1	10	11.5	Down
1	11.5	16.25	Gentle
1	16.25	17	Down
1	17	19.25	Gentle
1	19.25	19.925	Down



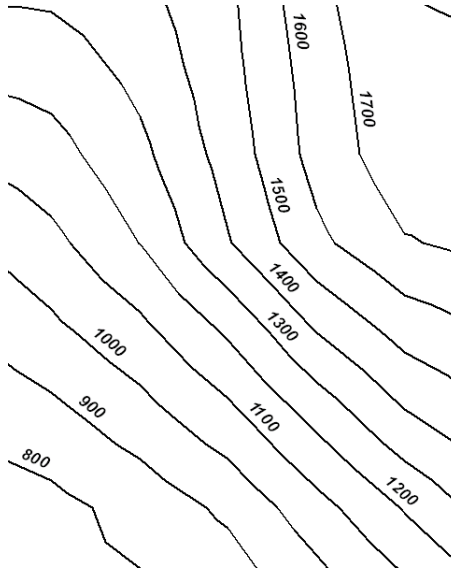
Z-Dimension (Height or Depth)

Expressed as grid-cells or raster:



Expressed as contour lines of equal elevation

Shape *	ID	CONTOUR
Polyline	1	300
Polyline	2	400
Polyline	3	800
Polyline	4	500
Polyline	5	300
Polyline	6	500
Polyline	7	700
Polyline	8	400
Polyline	9	900
Polyline	10	200
Polyline	11	300



Expressed a Points with Z property

Shape *	POINTID
Point ZM	1
Point ZM	2

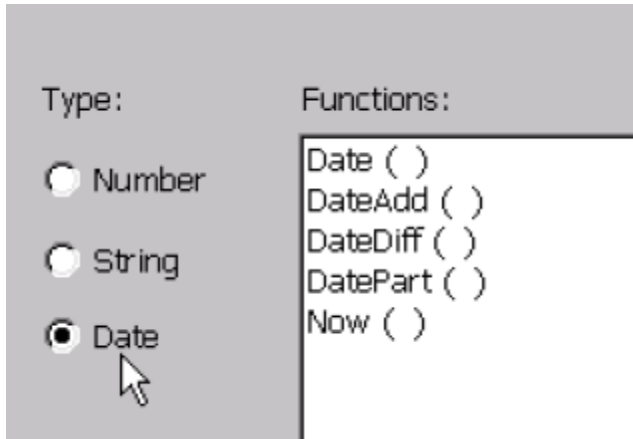


Shape *	POINTID	POINT_X	POINT_Y	POINT_Z
Point ZM	1	150,807	1,457,361	6036
Point ZM	2	151,107	1,457,361	6018

Time Dimension

Date type attribute field

Field Calculator Date Functions:



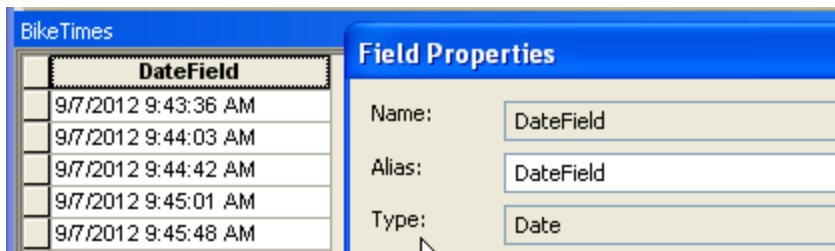
DateAdd—add two dates/times together

DateDiff—subtract two dates/times together

DatePart—extract parts of a date field (seconds, days, month, year, etc)

The *interval* argument has these settings:

Setting	Description
yyyy	Year
q	Quarter
m	Month
y	Day of year
d	Day
w	Weekday
ww	Week
h	Hour
n	Minute
s	Second



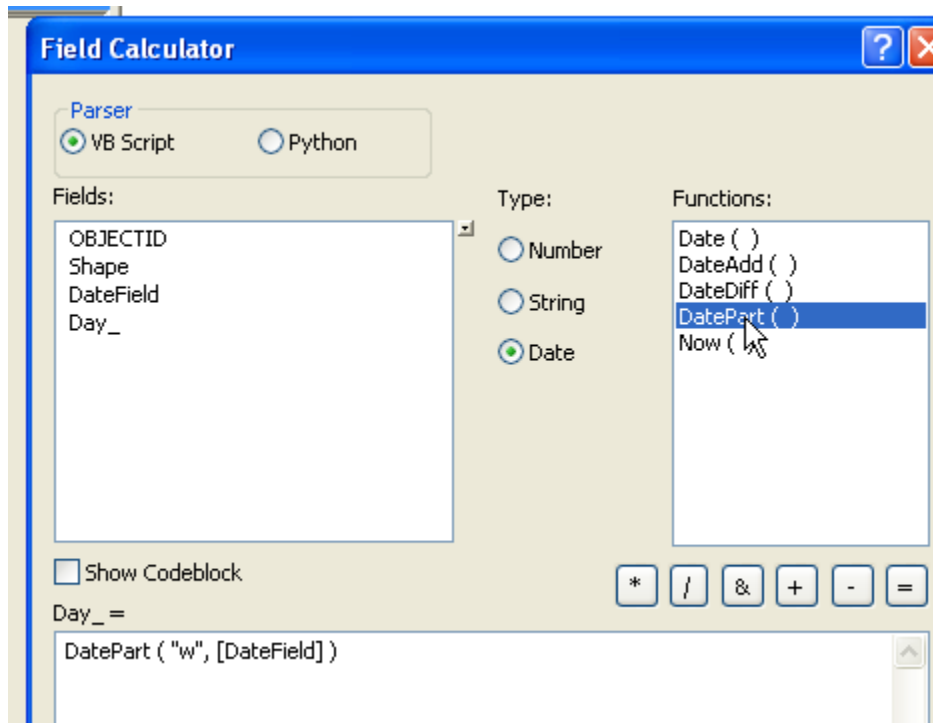
What is the day of each datefield?

The screenshot shows the ArcGIS interface. At the top, the 'Add Field' dialog box is open, with 'Name' set to 'Day_' and 'Type' set to 'Short Integer'. Below it, the 'Field Calculator' window is open, with 'VB Script' selected as the parser. In the 'Functions' list, 'DatePart()' is highlighted. The 'Type' section has 'Date' selected. The code block contains the expression: `DatePart ("d", [DateField])`. Below the calculator, a table displays the results of the calculation:

DateField	Day_
9/7/2012 9:43:36 AM	7
9/7/2012 9:44:03 AM	7
9/7/2012 9:44:42 AM	7

Day 7 since Sept 7th

What was the day of the week?

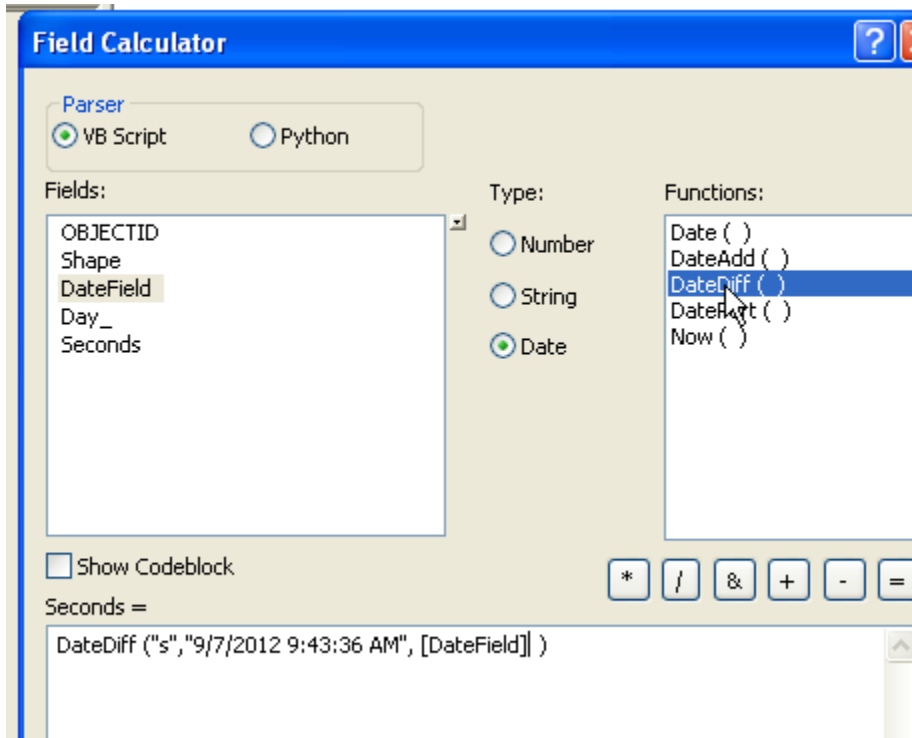


DateField	Day
9/7/2012 9:43:36 AM	6
9/7/2012 9:44:03 AM	6
9/7/2012 9:44:42 AM	6

Day 6 is Friday, since Sunday is day 1

How many seconds between each location?

DateField	Day
9/7/2012 9:43:36 AM	6
9/7/2012 9:44:03 AM	
9/7/2012 9:44:42 AM	



DateField	Day_	Seconds
9/7/2012 9:43:36 AM	6	0
9/7/2012 9:44:03 AM	6	27
9/7/2012 9:44:42 AM	6	66