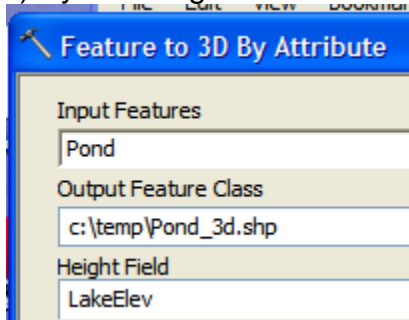


Exercise#7 3D Analysis

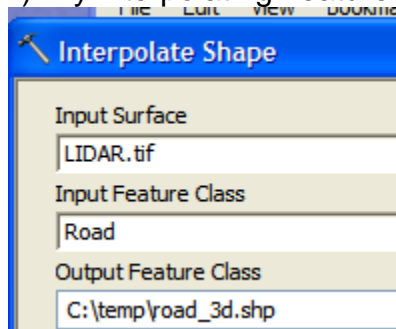
Analogous to measures stored in PointM or PolylineM shapes, elevation or depths can be stored as an invisible Z measure for every point that makes up a point, line, or polygon theme.

There are 2 basic ways to convert 2D features to 3D features.

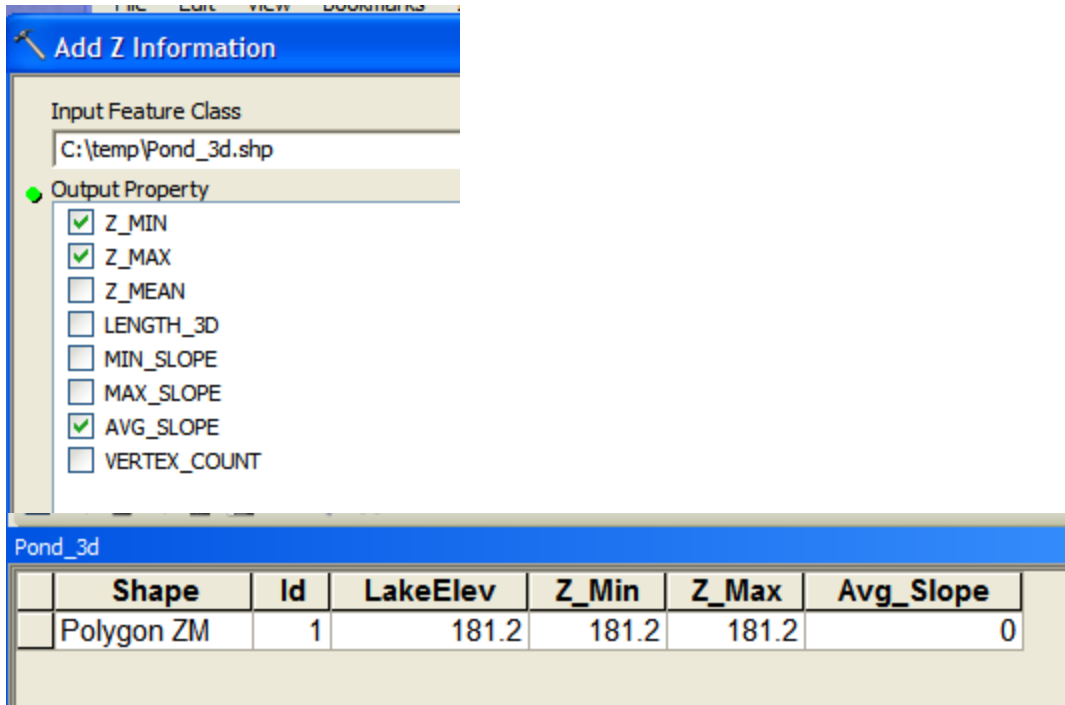
1) By deriving feature elevation from a constant value or attribute value.



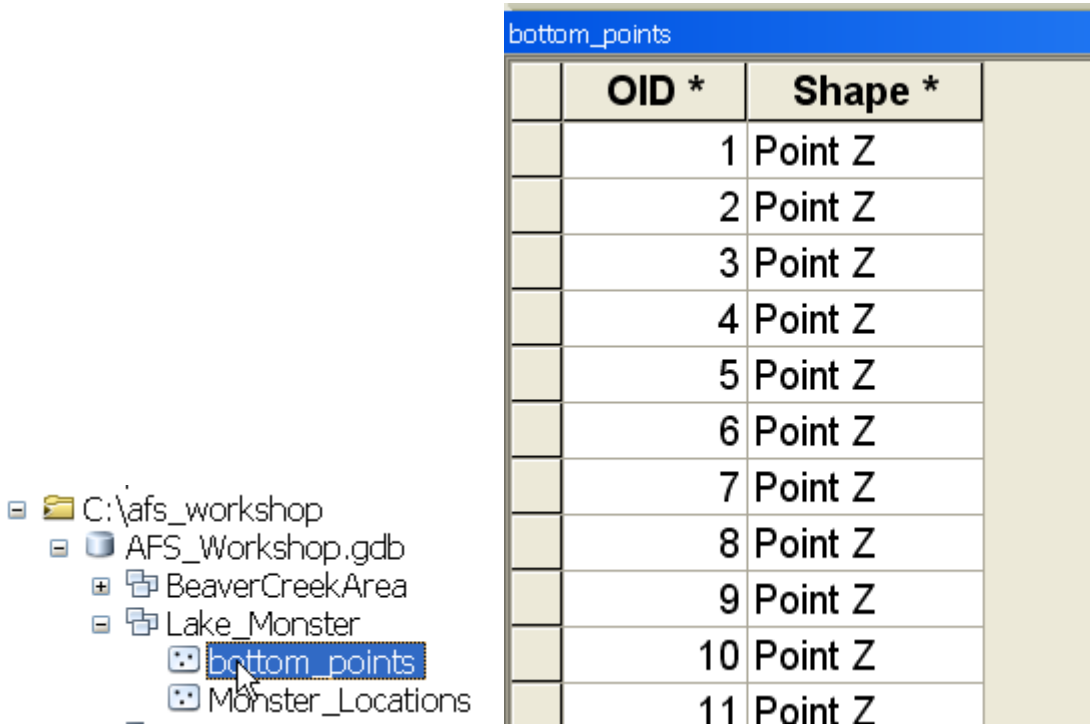
2) By interpolating feature elevation from an elevation surface...



Sometimes you want see what the depth or elevation is within a the pointZ, lineZ or polygonZ feature.



In our example, we have bottom points from soundings..



We can add the depth to bottom at each point by running the **Add Z Information** geoprocessing tool...

Shape *	Z
Point Z	-139
Point Z	-145
Point Z	-153
Point 7	-114

In this hypothetical example, depth was in feet...

Next, use the **IDW geoprocessing** tool to create a depth raster from your sounding points...take the default values, except specify the cell size to be 10 meters.

How well does your bottom raster represent the soundings? Use the **Extract Values to Points** geoprocessing tool...compare the raster value with the original sounding value from each point to assess the error in IDW interpolation.

Add the Monster_Locations point feature class to your data frame...



The monster points have the depth from surface to the monster as determined using sonar

monster_locations			
Shape *	TIME	DEPTH	
Point	DAY	-197.746	
Point	DAY	-195.704	
Point	DAY	-192.017	

Is the distribution of the monster different during the day versus the night? Use ArcGIS to determine the following information:

Determine the mean depth from the surface for the monster during day versus night time periods. Use the **Summary Statistics** tool with Time as the case field

MeanDepth_By_Time		
TIME	FREQUENCY	MEAN_DEPTH
DAY	10	-192.8
NIGH	20	-22.6

So at night the monster is closer to the surface...but we do not know how far off the bottom it was...we need to transfer the bottom depth values to each point location...you can do this using the **Extract Values to Points** geoprocessing tool

TIME	DEPTH	RASTERVALU
DAY	-197.746	-197.629196
DAY	-195.704	-195.028397
DAY	-192.017	-190.963898
DAY	-196.809	-195.374084
DAY	-194.609	-194.124985
DAY	-195.475	-192.347092
DAY	-186.652	-187.663864
DAY	-189.4	-188.058731
DAY	-189.273	-188.129028
DAY	-190	-190.124588
NIGHT	-29.001	-39.194481
NIGHT	-33.834	-42.428524

Compute the height above the bottom for each monster location.

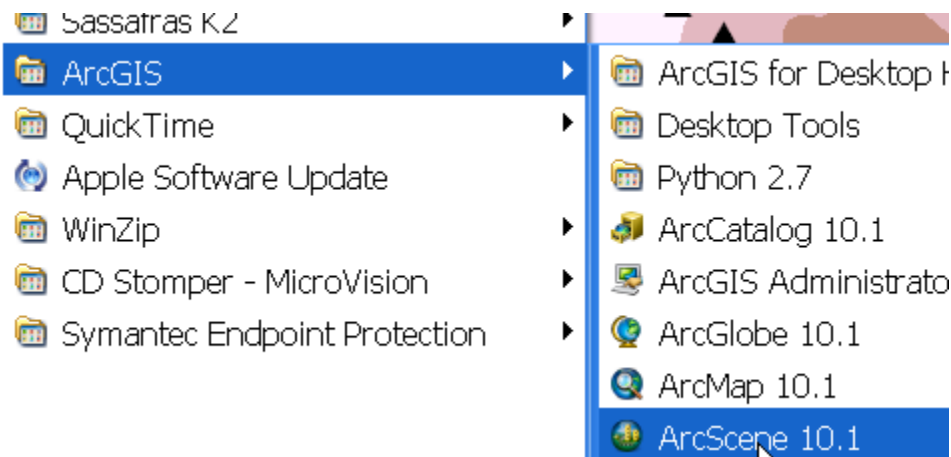
Shape	TIME	DEPTH	Z	ABOVE
Point	DAY	-197.746	-197.7455	0.000
Point	DAY	-195.704	-195.7040	0.000
Point	DAY	-192.017	-192.0174	0.000
Point	DAY	-196.809	-196.8090	0.000
Point	DAY	-194.609	-194.6091	0.000
Point	DAY	-195.475	-195.4754	0.000
Point	DAY	-186.652	-186.6521	0.000
Point	DAY	-189.4	-189.4003	0.000
Point	DAY	-189.273	-189.2725	0.000
Point	DAY	-190	-190	0.000
Point	NIGHT	-29.001	-39.00079	10.000
Point	NIGHT	-33.834	-41.83383	8.000
Point	NIGHT	-35.814	-45.81353	10.000

Then determine the mean distance above the bottom for monster locations during the day versus the night.

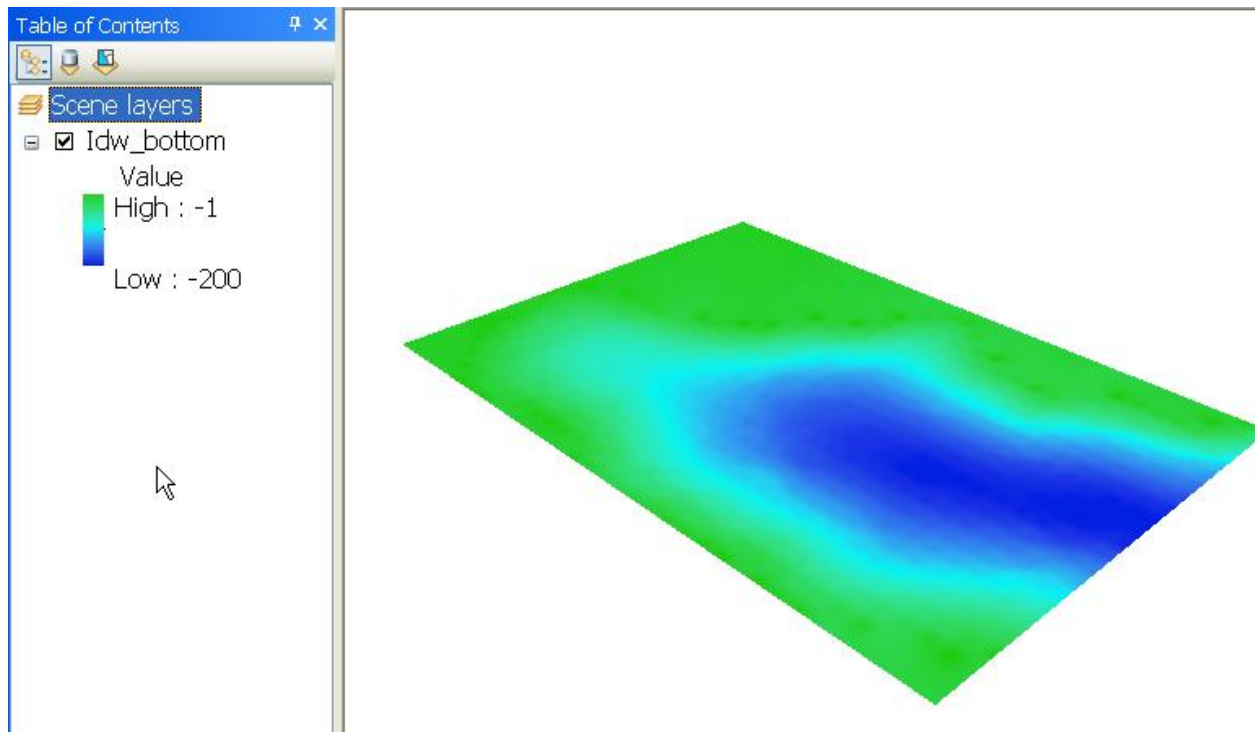
TIME	FREQUENCY	MEAN_ABOVE
DAY	10	0.00
NIGHT	20	12.20

So the monster was on the bottom during the day and at least 8 meters above the bottom during the night.

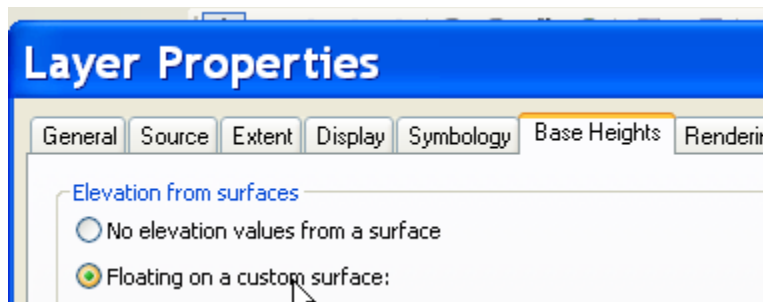
Use ArcScene to visualize the monster's locations in 3D. Start ArcScene



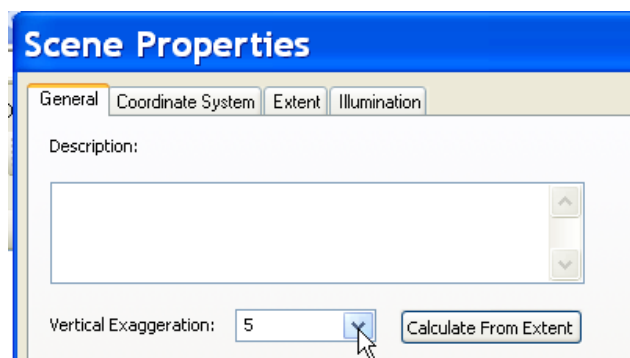
Add your bottom raster into your arcscene data frame.

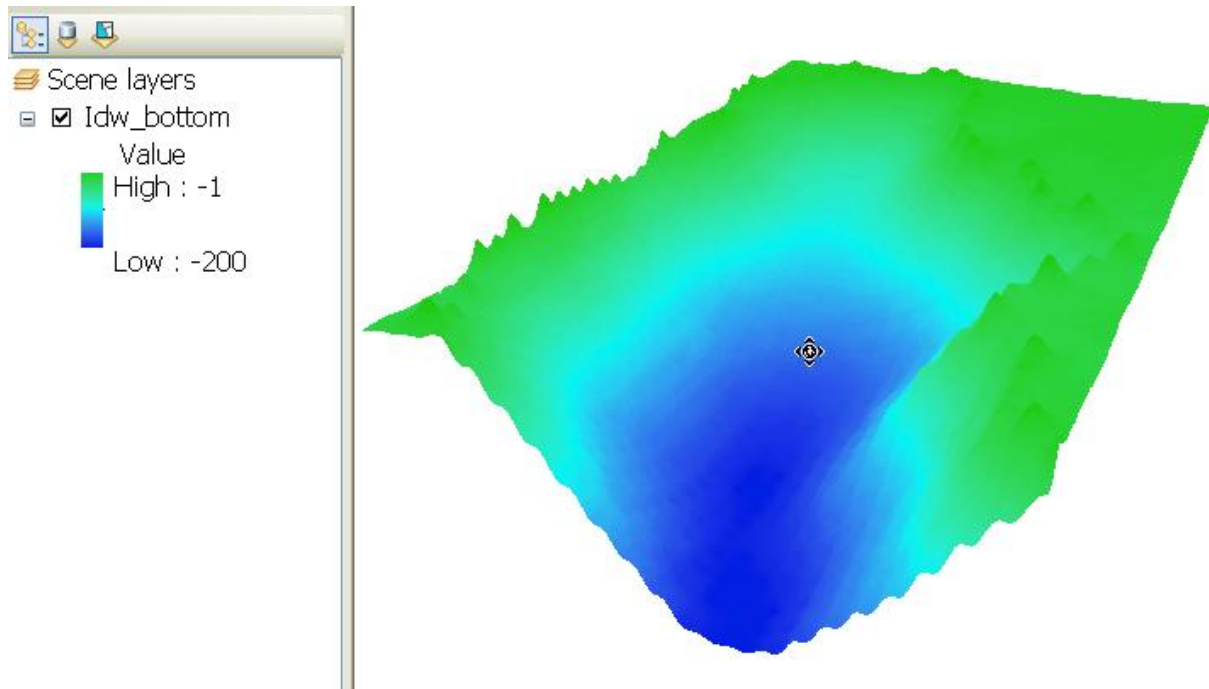


From your layer properties, specify that the values represent base heights (actually depths in this case)



And specify your data frame vertical exaggeration as 5.





Next add your monster locations

Layer Properties

General Source Selection Display Symbology Fields Definition Query

Base Heights Time Extrusion Rendering

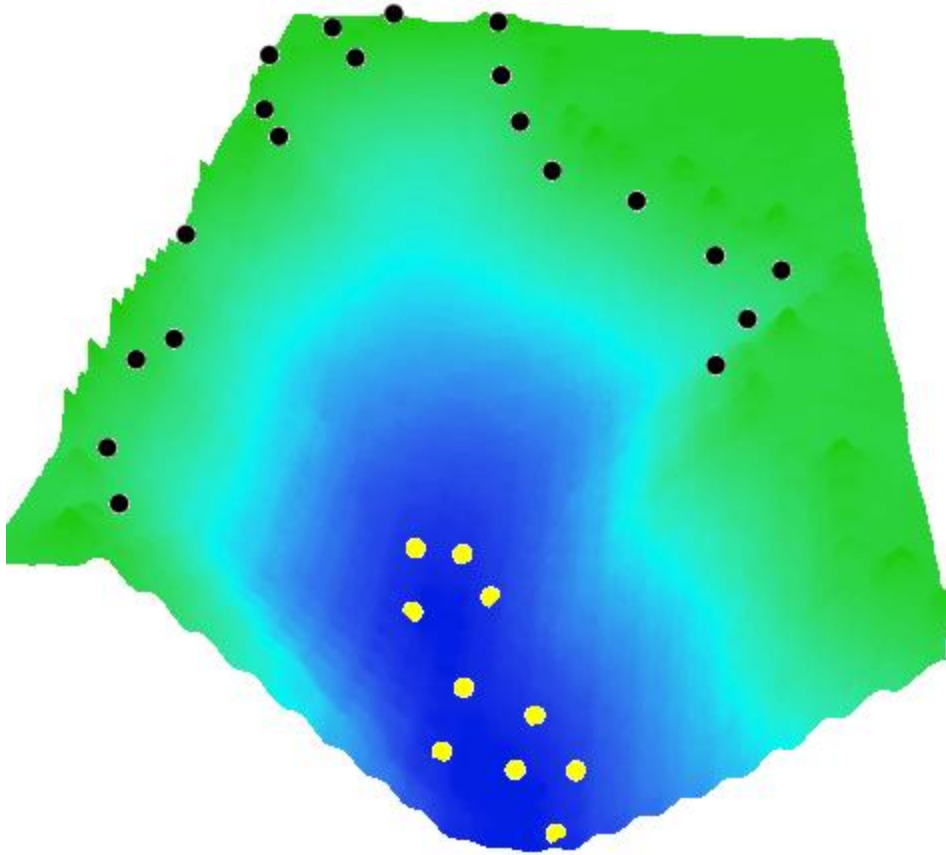
Elevation from surfaces

- No elevation values from a surface
- Floating on a custom surface:
C:\Documents and Settings\Dave\My Documents\ArcGIS\Default1.gdb\Idw_bottom
Raster Resolution...

Elevation from features

- No feature-based heights
- Use elevation values in the layer's features
Factor to convert layer elevation values to scene units: custom 1.0000
- Use a constant value or expression:
[DEPTH]

and specify the monster locations
monster locations depth is based on a field value



So during the day, the monster is deep and on the bottom. At night the locations are in shallow waters and off the bottom.

