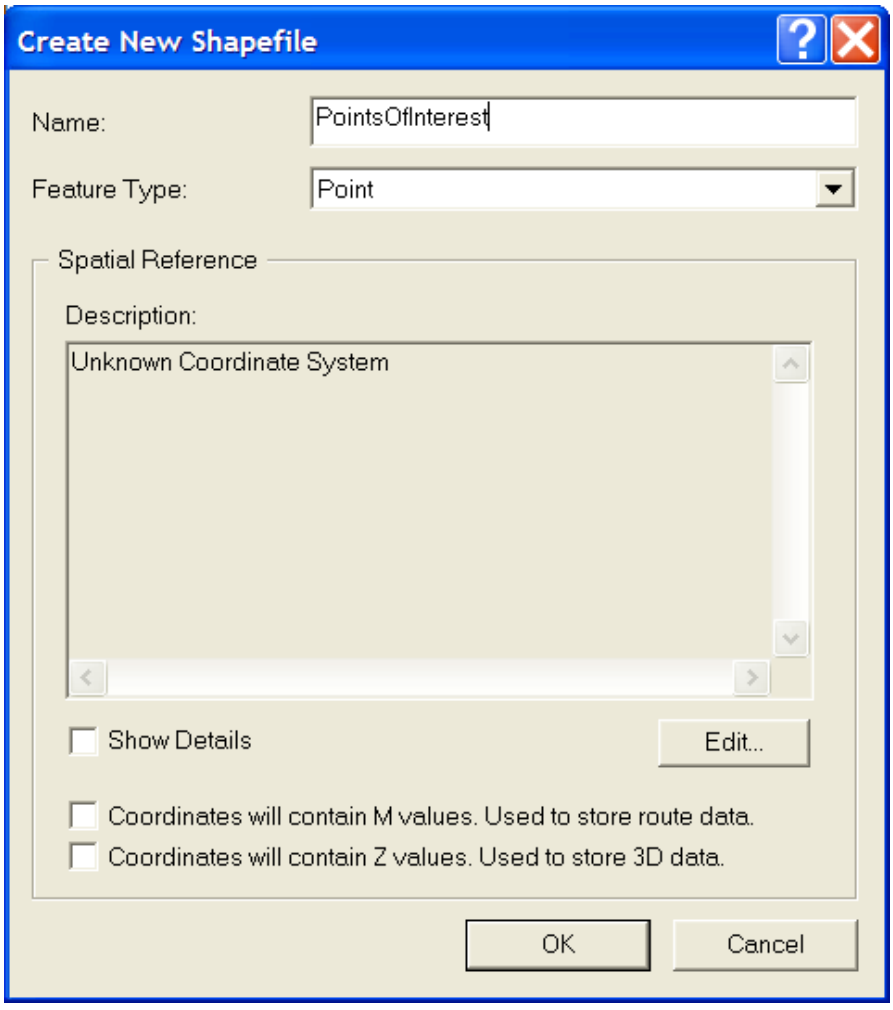
Exercise # 2: Linking Data to the NHD – Last Updated on 4/30/2008

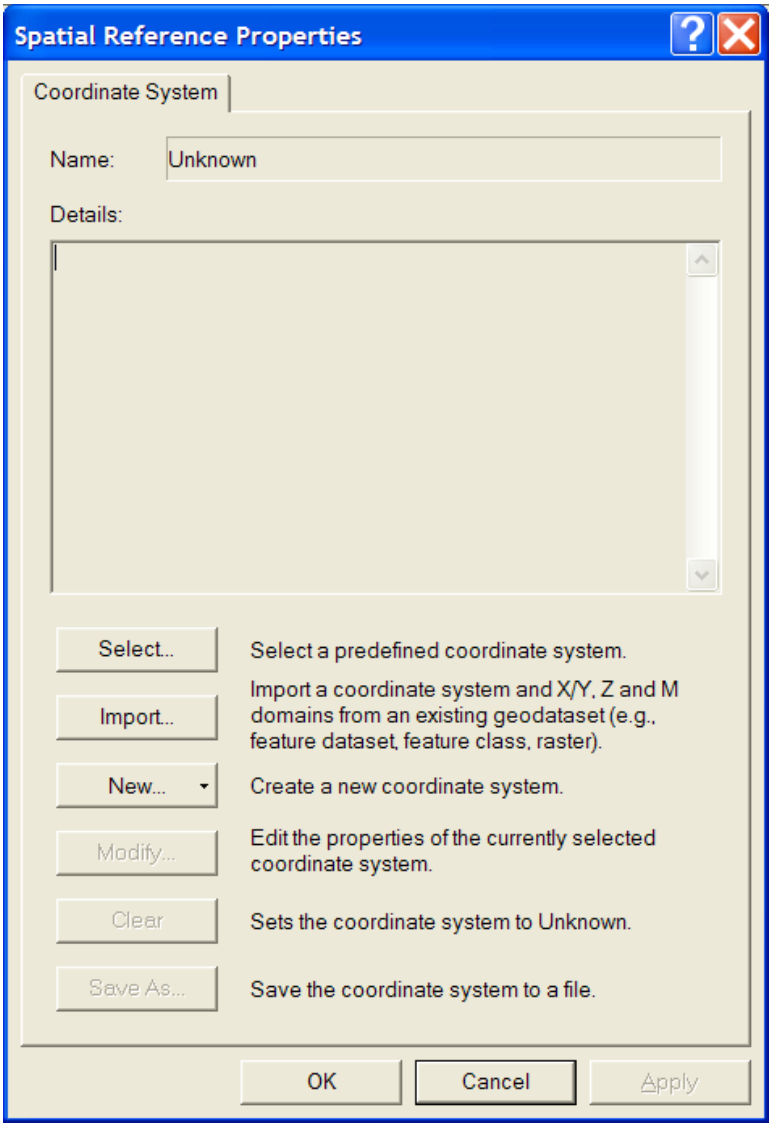
1. Start ArcCatalog.

Note: In steps 2-5 of this exercise, you will create a point dataset, which you will link to NHD during step 6. An existing point dataset may be used instead of creating a new one. The point dataset need not be in the same projection as the NHDPlus data as long as the point dataset has its projection defined.

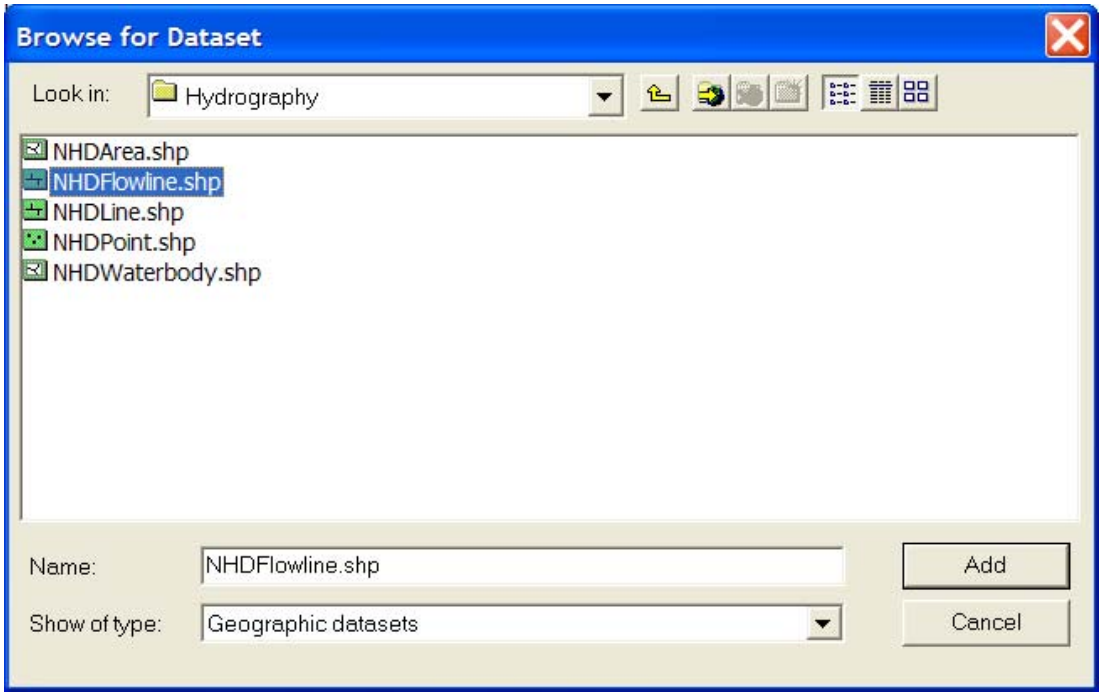
2. Using ArcCatalog, create a new point shapefile.
    a. Right-click on the \NHDPlus06 folder, go to **New**, **Shapefile**. In the **Create New Shapefile** dialog,
        i. Give the shapefile a **Name** of PointsOfInterest.
        ii. Use the **Feature Type** pull down to select **Point.**
        iii. Click **Edit** to create a **Spatial Reference** for the shapefile.



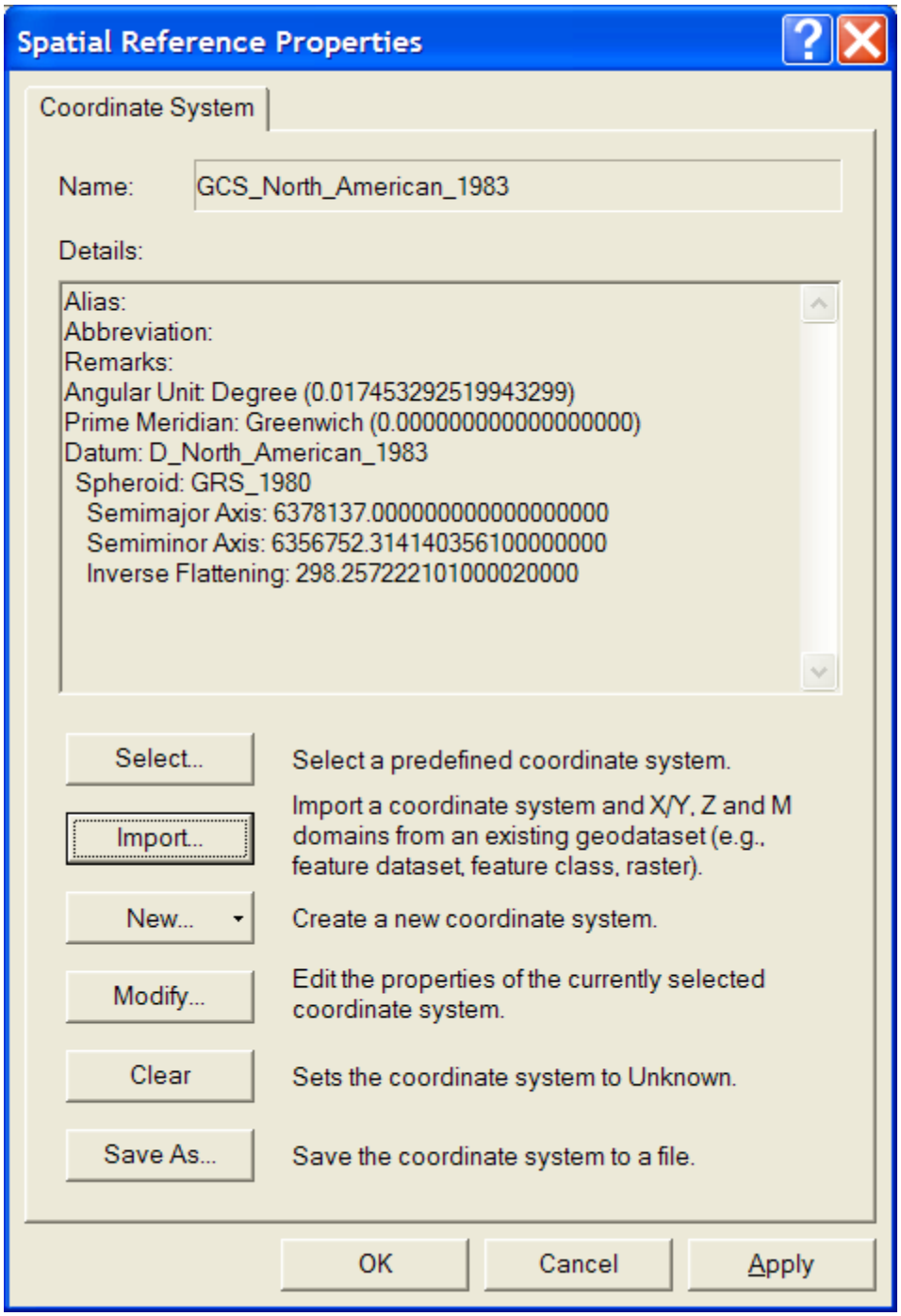
iv. In the **Spatial Reference Properties** dialog, click **Import**.



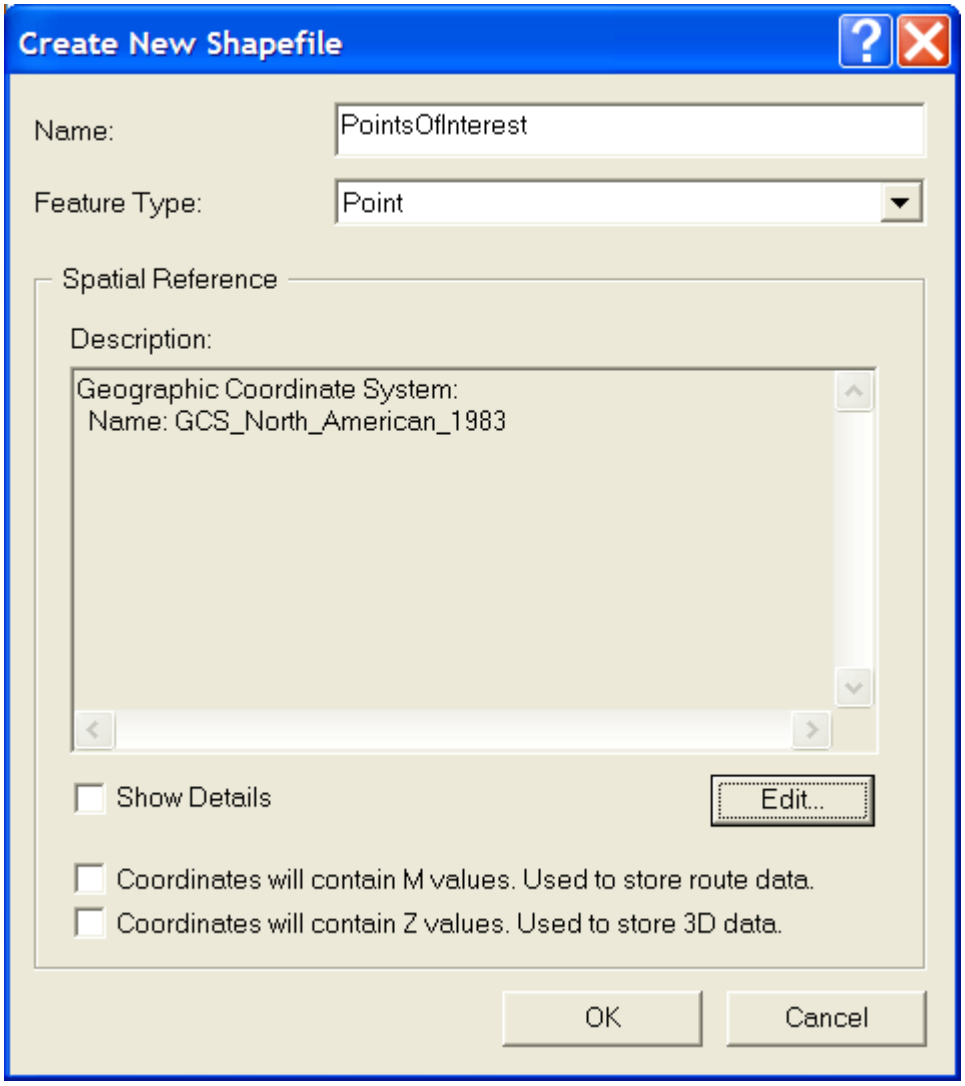
v. In the **Browse For Dataset** dialog, browse to the \NHDPlus06\Hydrography folder and select NHDFlowline.shp. Click **Add**.



vi. The **Spatial Reference Properties** dialog will now contain the same spatial reference as the NHDFlowlines. Click **OK**.



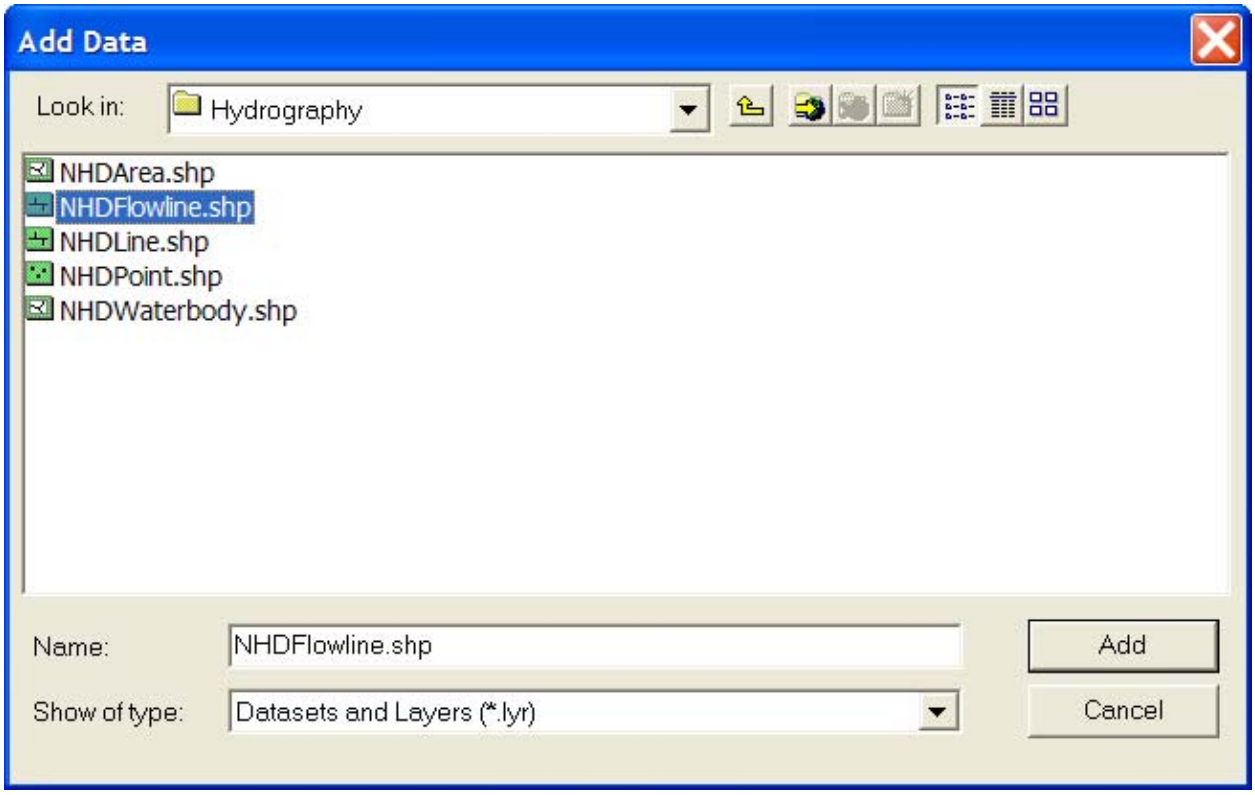
vii. The **Create New Shapefile** dialog is now complete. Click **OK**.



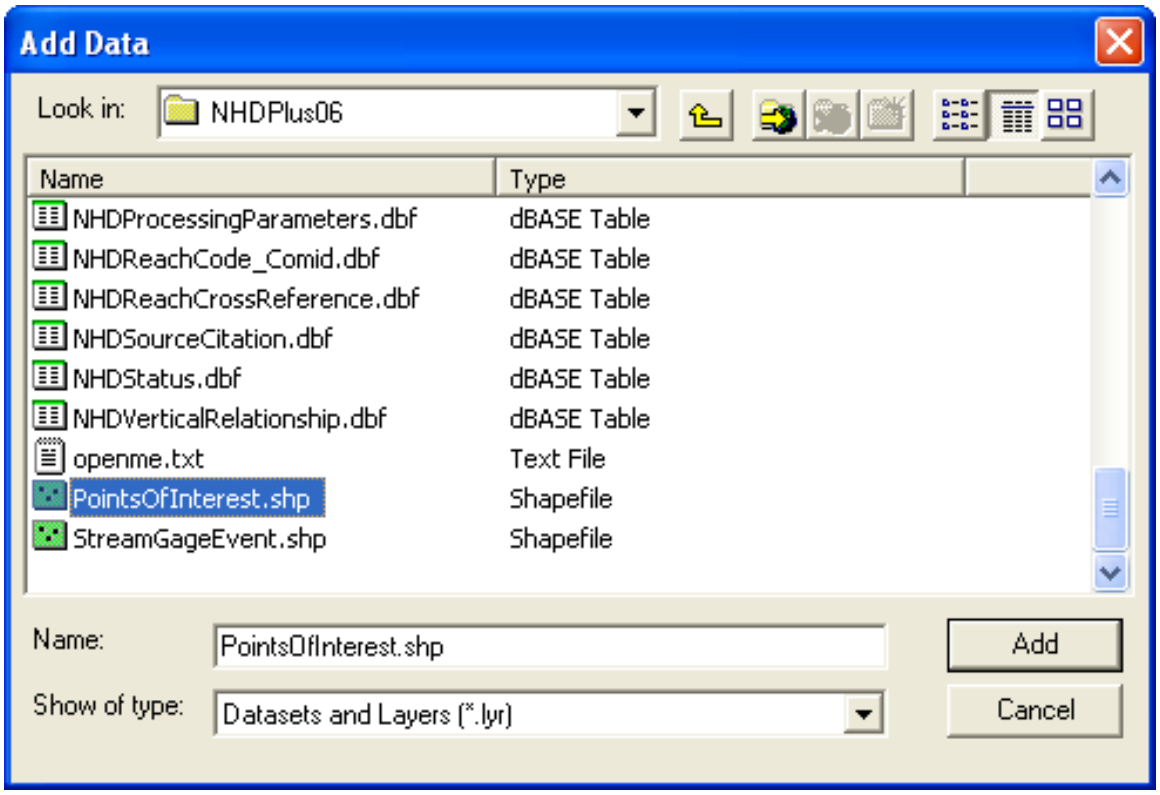
b. Close ArcCatalog.

3. Start ArcMap.

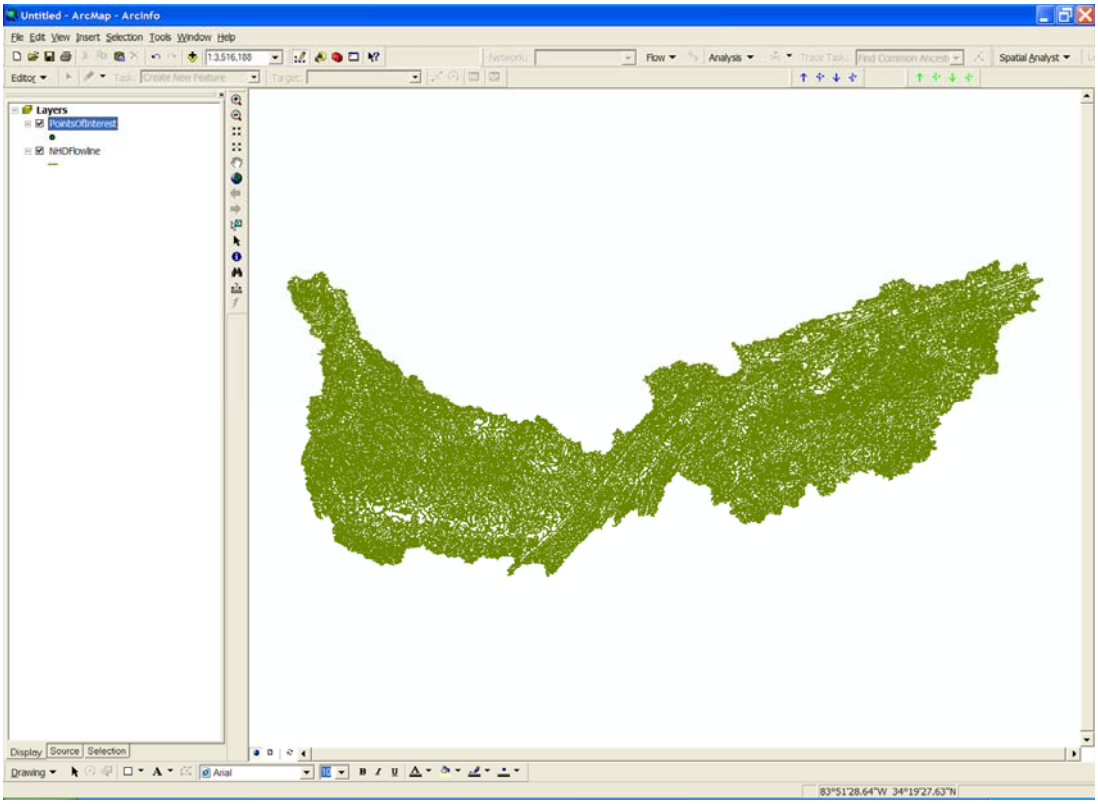
4. Using ArcMap,
    a. Use the **File**, **Add Data** menu. In the **Add Data** dialog, navigate to the \NHDPlus06\Hydrography folder, select NHDFlowline.shp, and click **Add**.



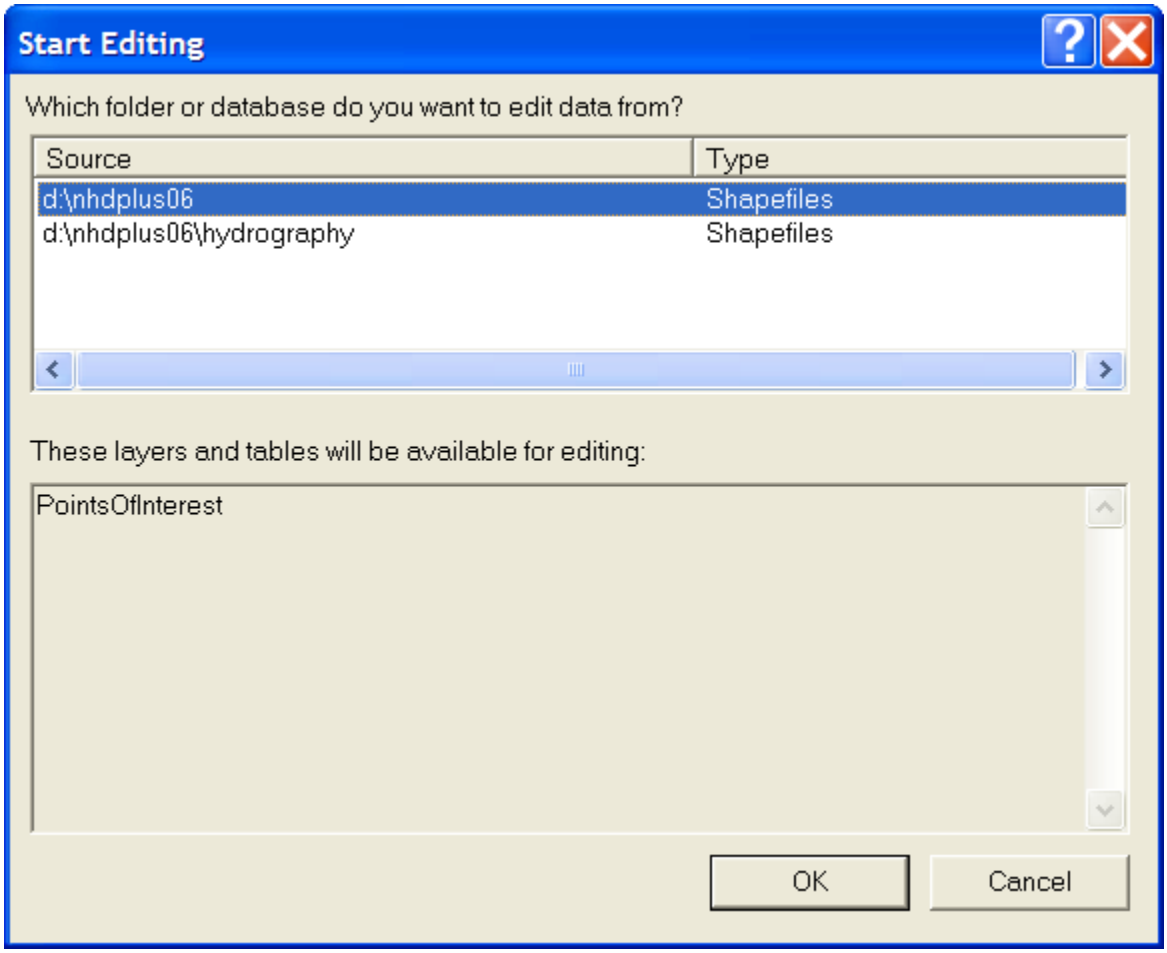
b. Use the **File**, **Add Data** menu. In the **Add Data** dialog, navigate to the \NHDPlus06 folder, select PointsofInterest.shp and click **Add**.



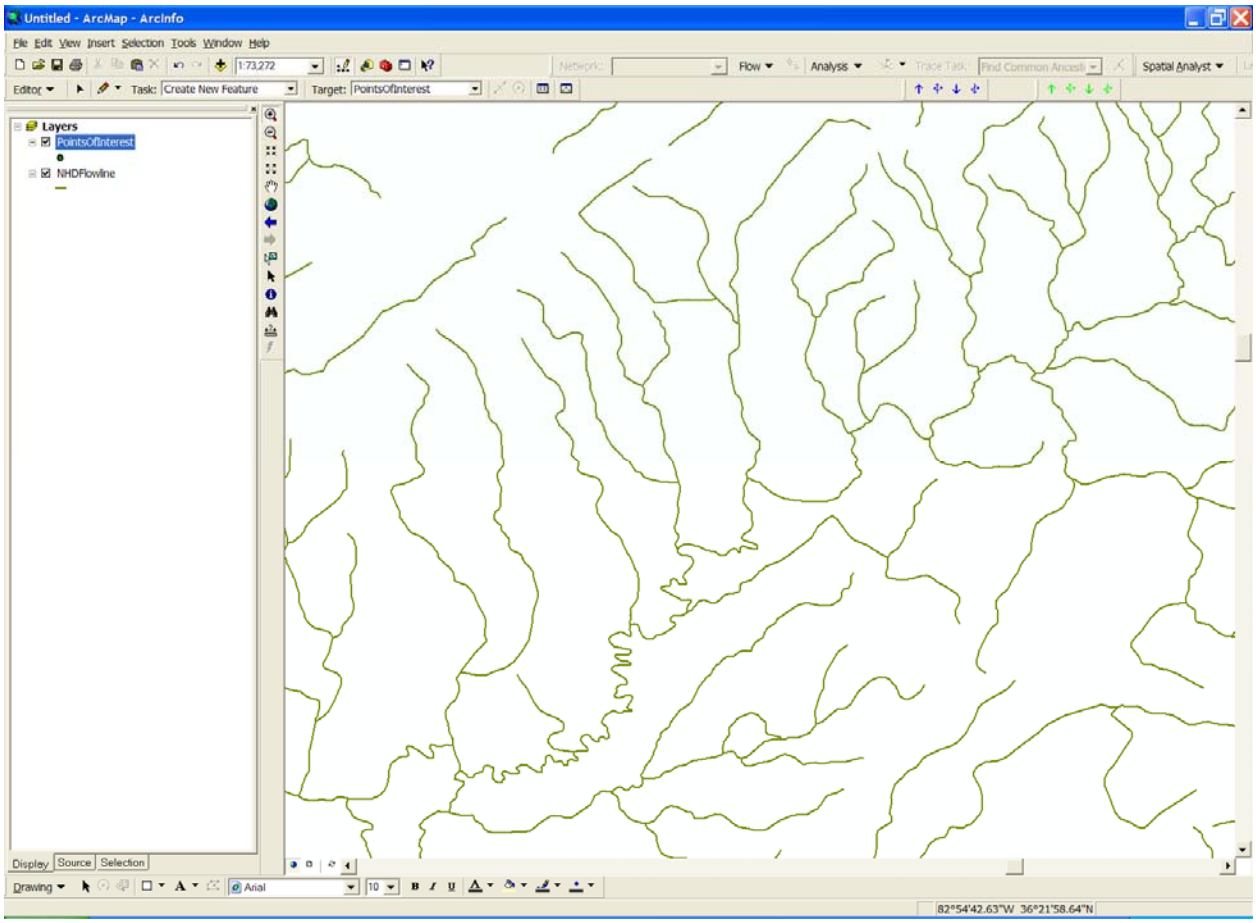
c. At this point, the content of your map should look like this:



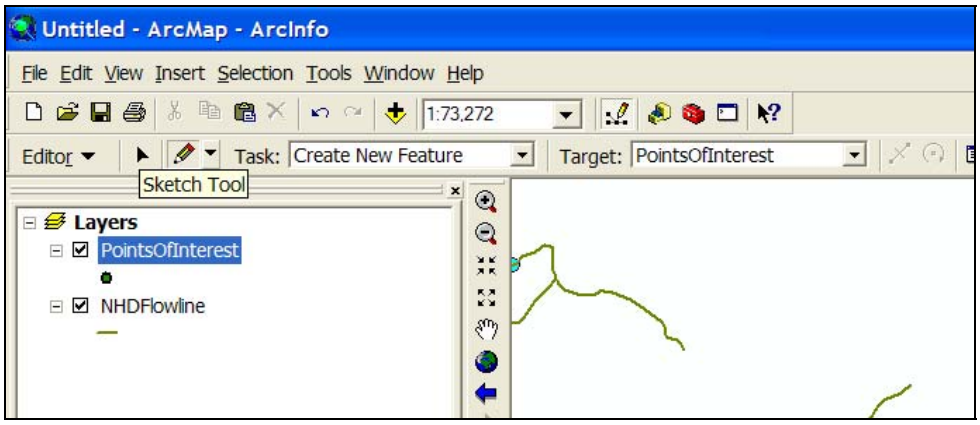
5. Use ArcMap editor to create point features in PointsOfInterest.
    a. Add the **Editor** toolbar if it is not present in ArcMap. Click on **Editor** and select **Start Editing**. In the top window of the **Start Editing** dialog, the \NHDPlus06 directory should be selected and PointsOfInterest should appear in the bottom window. Click **OK**.



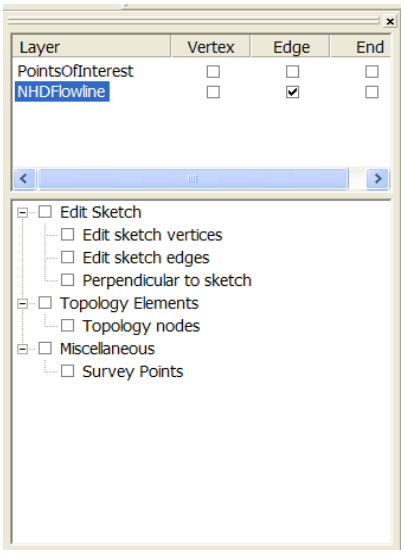
b. Use the zoom-in tool  , to zoom in to an area in the NHDFlowline layer.



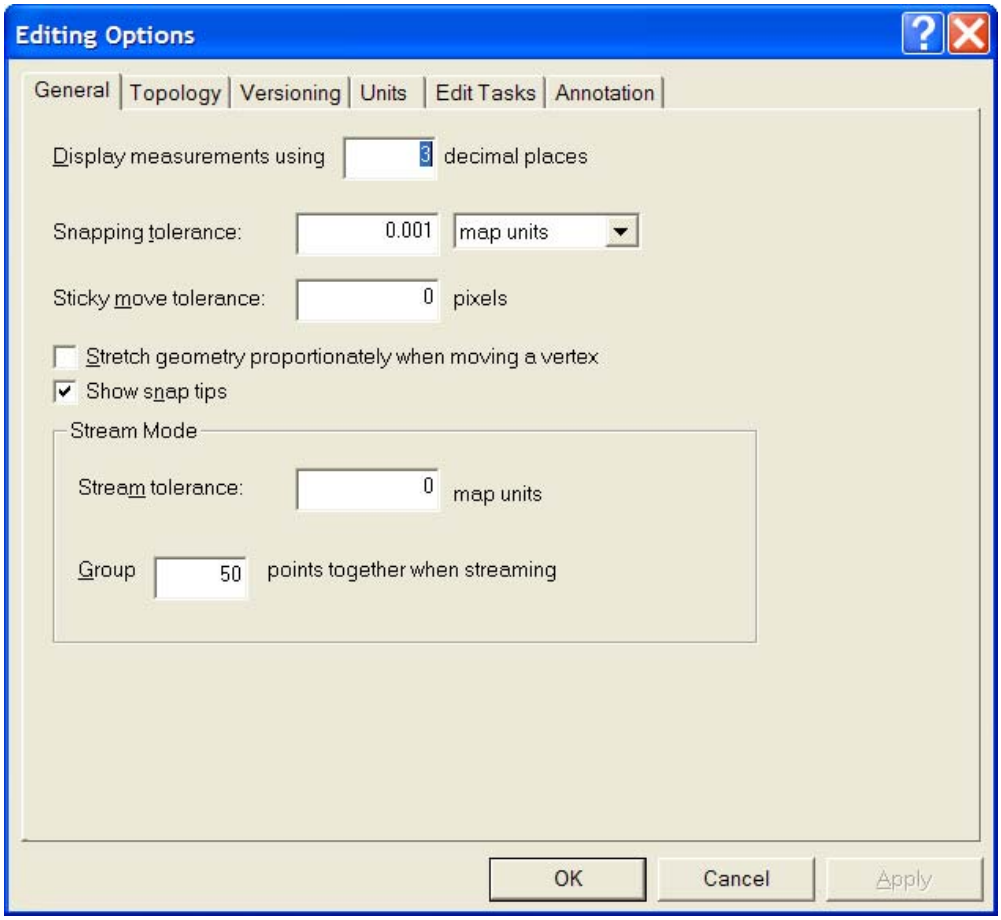
c. On the **Editor toolbar**, use the **Task:** pull down to select **Create New Feature** and the **Target:** pull down to select **PointsOfInterest**.



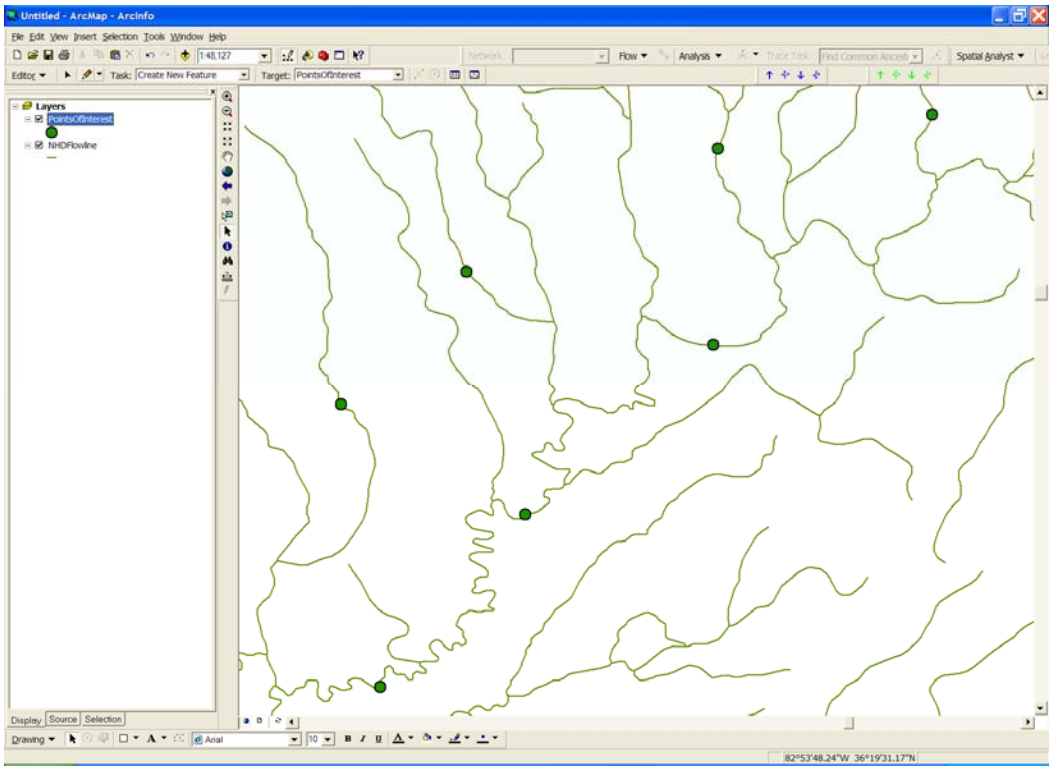
d. It's convenient to snap the new points to the NHDFlowlines. To set the snapping environment, select **Editor** and **Snapping** to open the snapping properties window. Highlight NHDFlowline and checkmark "Edge". This will result in new points being snapped to the nearest point on the NHDFlowlines.



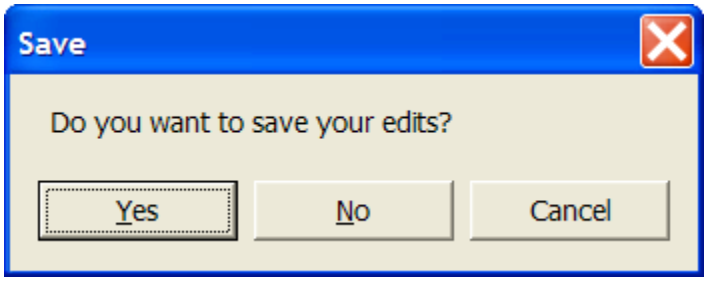
Set other snapping options, by selecting Editor and Options. In the **Editing Options** dialog, change the **Snapping tolerance:** to “0.001” “map units”. Check mark **Show snap tips**. New points will be snapped



e. On the **Editor toolbar**, select the sketch tool  . Point at various locations on NHDFlowlines and click to create a point feature in the PointsOfInterest layer.

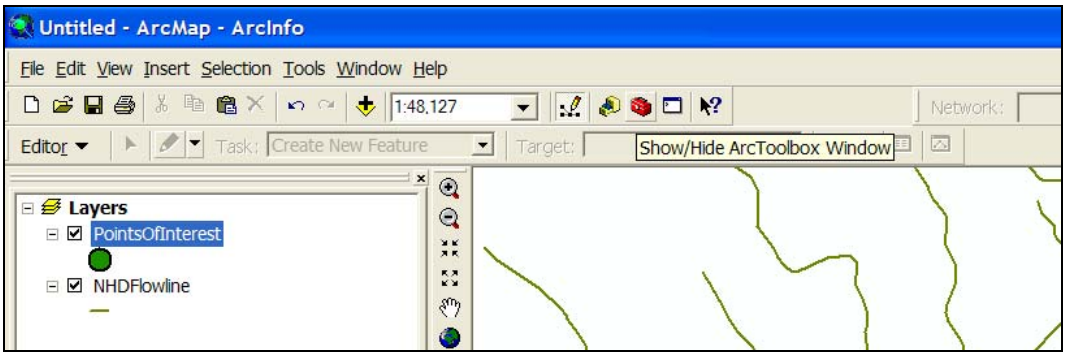


f. Click on **Editor** and select **Stop Editing** and click **Yes** on the **Save** dialog.

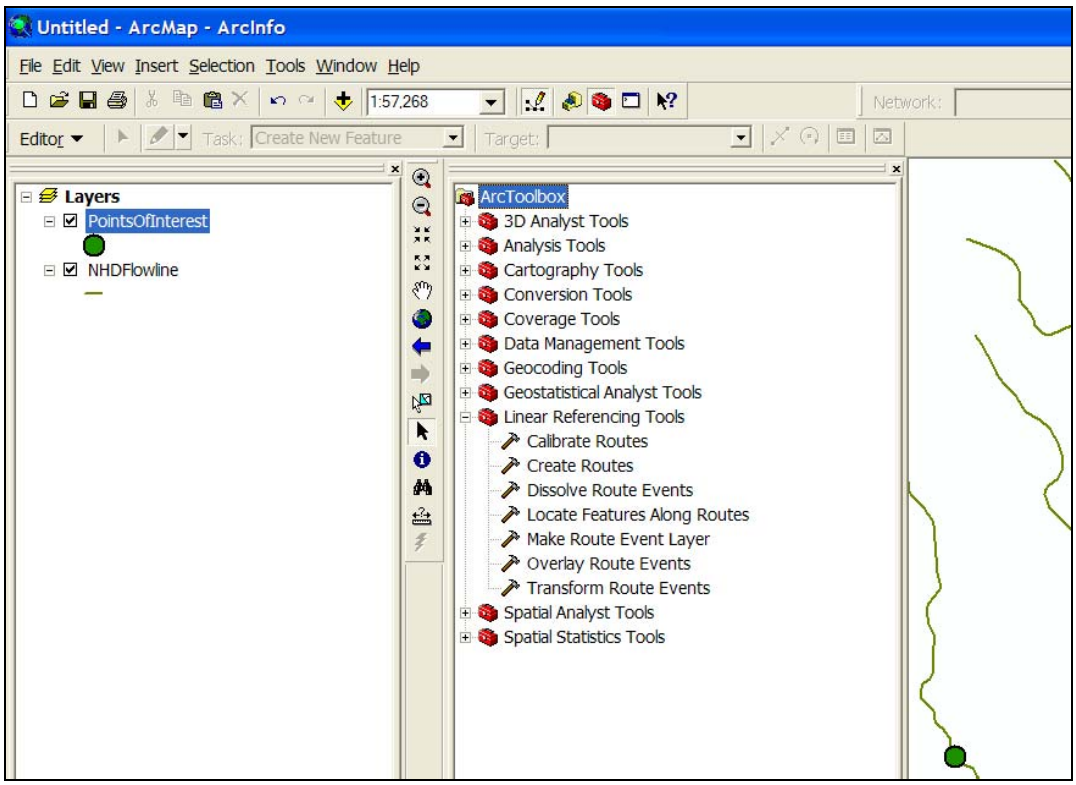


g. We have now identified a number of locations along NHDFlowlines that are our points of interest.

6. To turn PointsOfInterest into a point event table, use Show/Hide ArcToolbox Window to add the ArcToolbox to ArcMap.

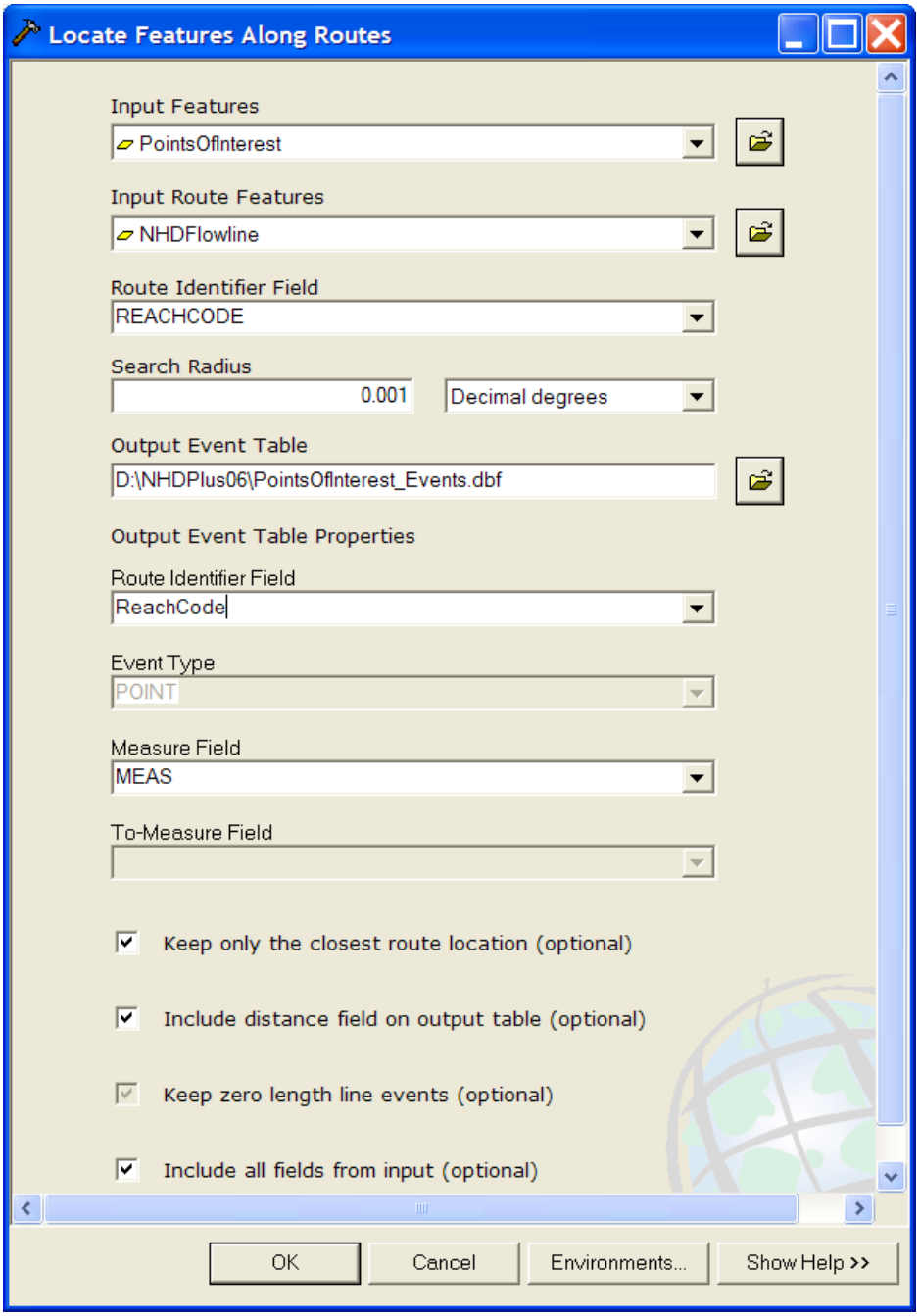


a. Expand the **Linear Referencing Tools** list.

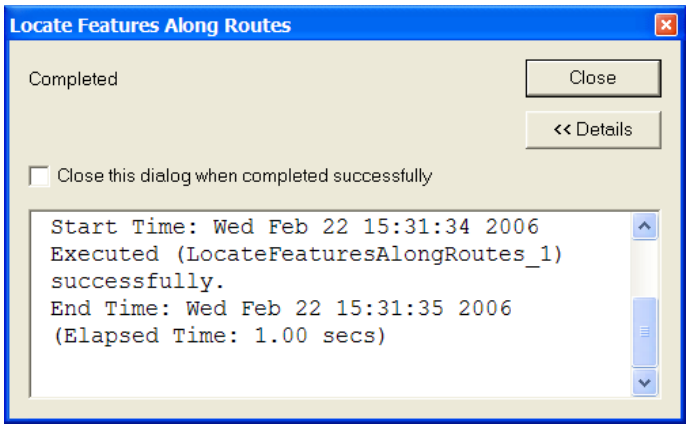


b. Double click on **Locate Features Along Routes** to open the dialog. In the dialog,
    i. Use the **Input Features** pull down to select **PointsOfInterest** as the feature class that will be located along routes.
    ii. Use the **Input Route Features** pull down to select **NHDFlowline** which is the route class of the NHD.
    iii. Use the **Route Identifier Field** pull down to select **Reachcode** which is the route identifier for the NHD.

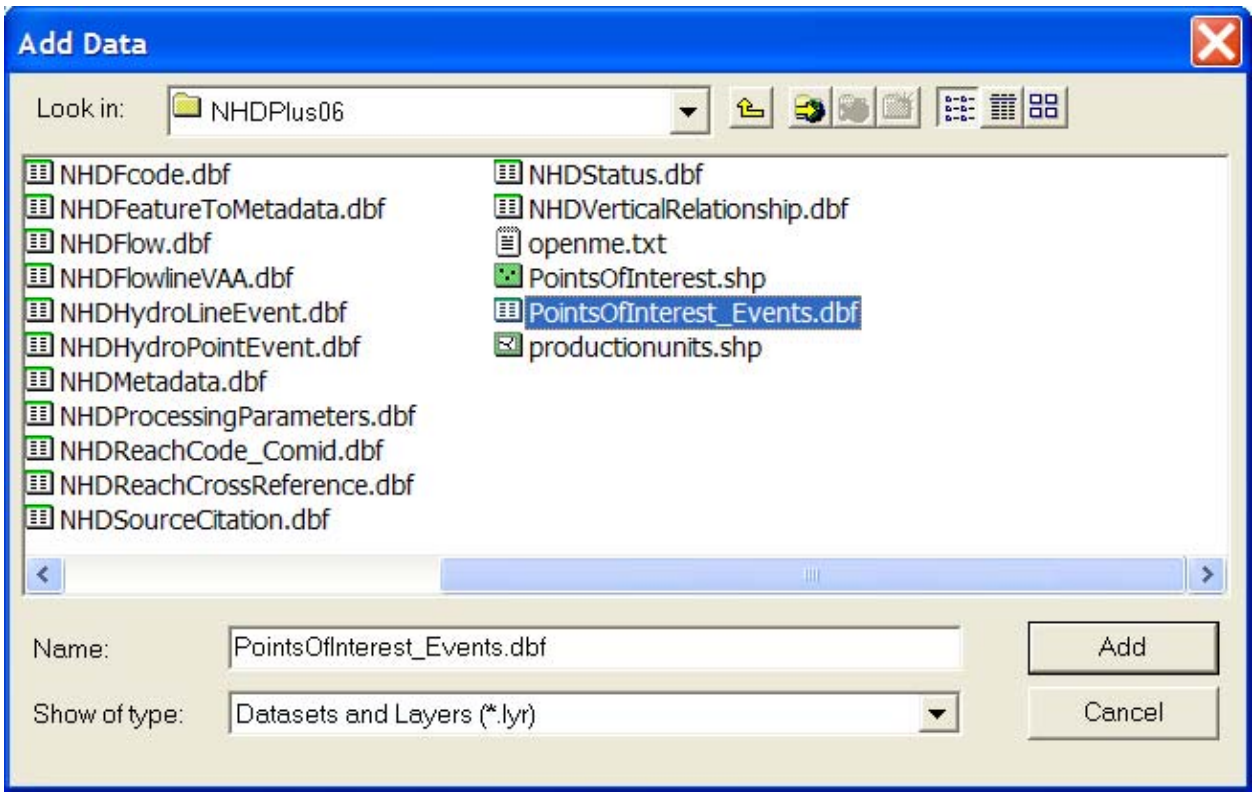
iv. Set the **Search Radius** to **.001 decimal degrees** (approx. 370 ft). This will make sure that PointsOfInterest that are not located exactly on an NHDFlowline will be snapped to the nearest NHDFlowline within the search radius.
v. Output Event Table: **\PointsOfInterest_Events.dbf**
vi. Type in **ReachCode** in the Route Identifier Field



c. Click OK and the **Locate Features Along Routes** tool will execute. When the word **Completed** is shown in the window, click **Close**.

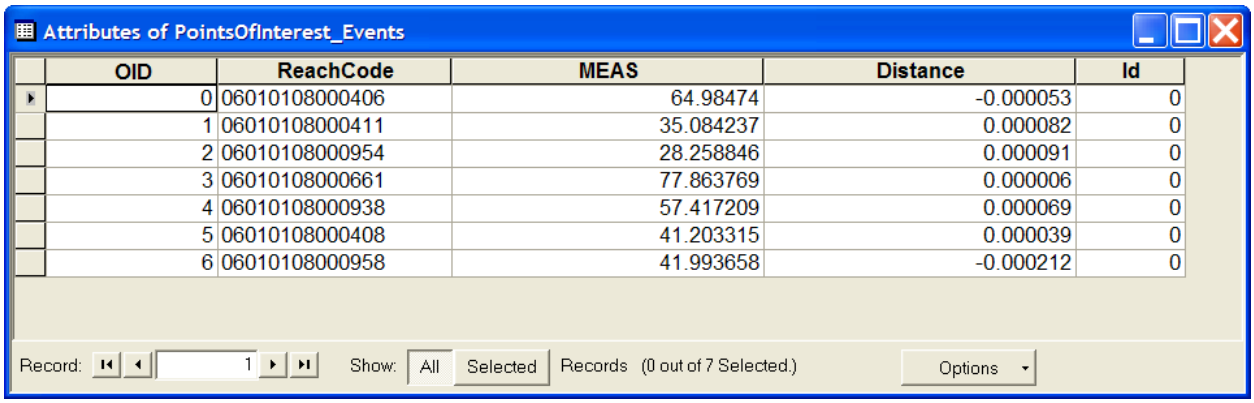


d. There now exists an event table called PointsOfInterest_Events.dbf. Use **File**, **Add Data**, to add this event table to the map. The table resides in the \NHDPlus06 folder.



e. Right click on PointsOfInterest_Events in the Layers list and select **Open** to display the attribute table for PointsOfInterest_Events. Note the ReachCode field which tells us which reach each point is located on and the Meas field which tells us where along the reach the point is located.

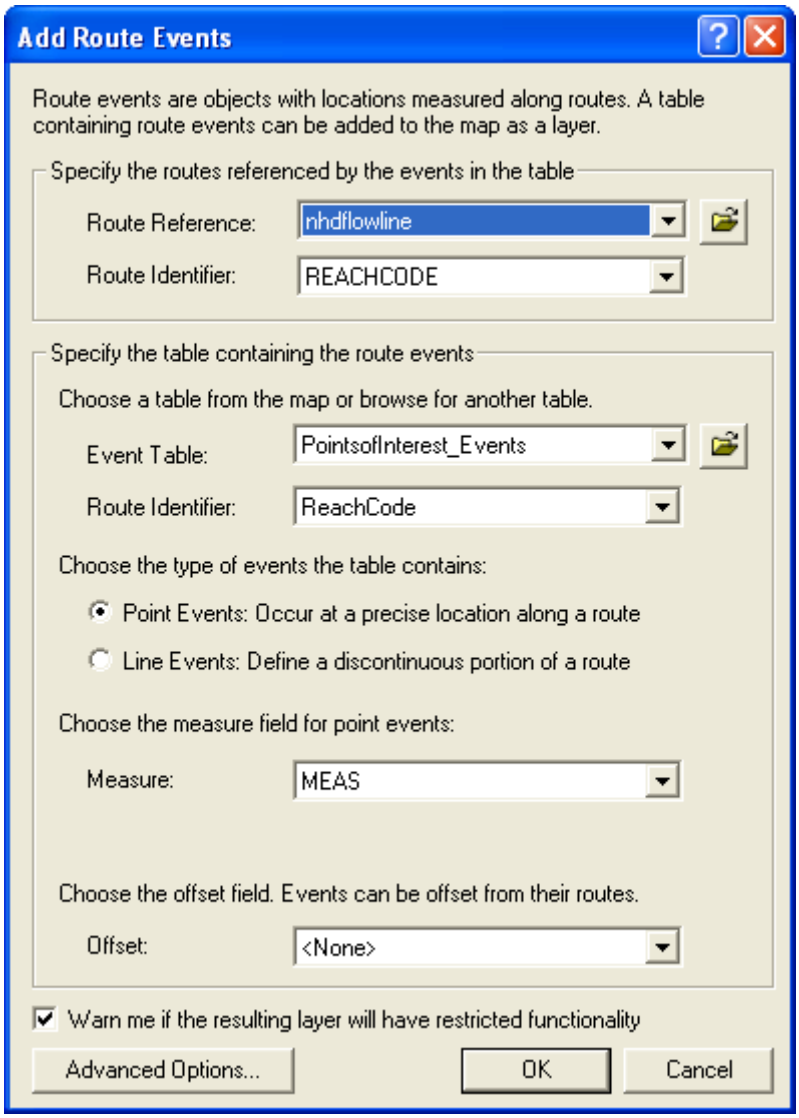
The Distance field tells us how far (in decimal degrees), the point was moved in order to snap it to the nearest NHDFlowline.

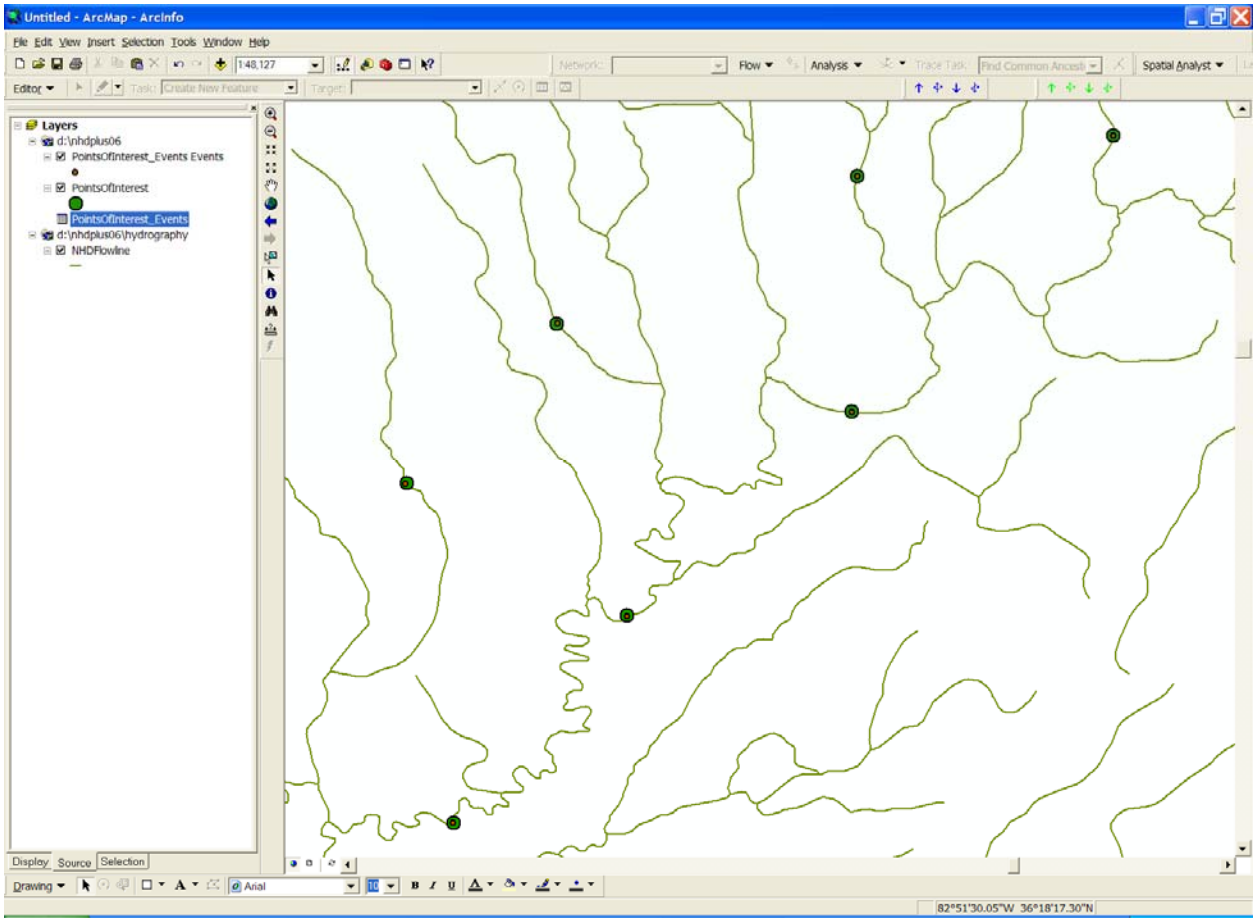


OID	ReachCode	MEAS	Distance	Id
0	06010108000406	64.98474	-0.000053	0
1	06010108000411	35.084237	0.000082	0
2	06010108000954	28.258846	0.000091	0
3	06010108000661	77.863769	0.000006	0
4	06010108000938	57.417209	0.000069	0
5	06010108000408	41.203315	0.000039	0
6	06010108000958	41.993658	-0.000212	0

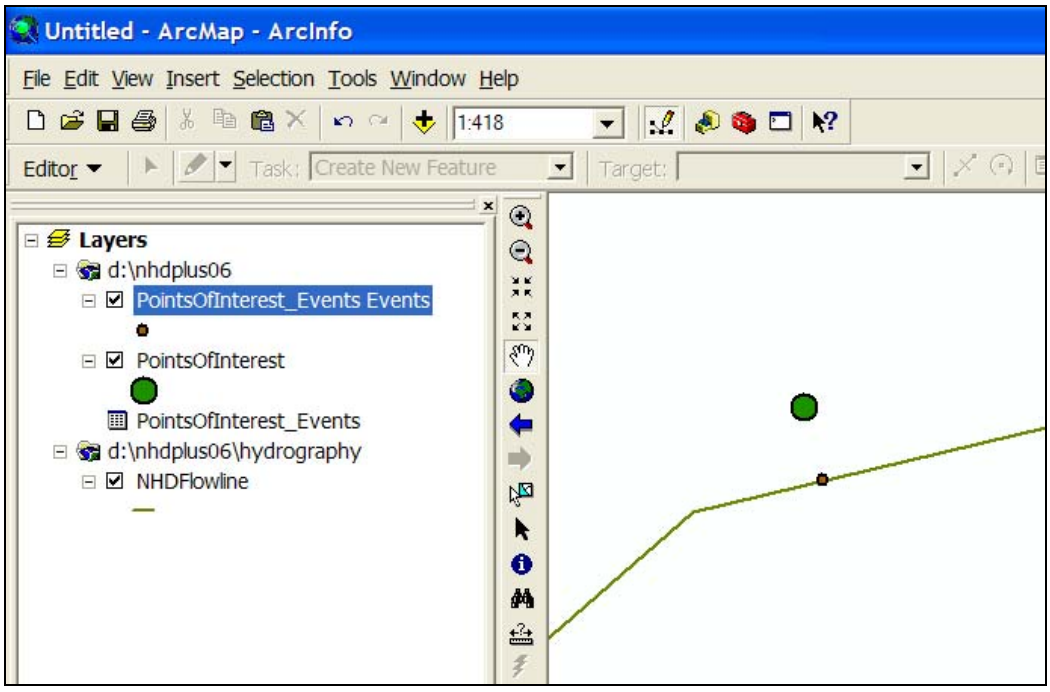
Record: 1 Show: All Selected Records (0 out of 7 Selected.) Options

f. Now we have an event table. Lets render (draw) the events using the Reach codes and measures to determine a point shape for each event. Click on main menu choice: **Tools**: then **Add Route Events…**
   i. Specify the routes referenced by the events in the table: Under Route Reference select **nhdflowline** and Route Identifier: **REACHCODE**
   ii. Specify the table containing the route events: Event Table: **PointsofInterest_Events.** Route Identifier: **ReachCode**
   iii. Select **Point Events**: Occur at a precise location along route
   iv. Use the **Input Event Table** pull down to select **PointsOfInterest_Events**.
   v. Measure: **MEAS**
   vi. Leave the remaining items at their default values.
   vii. Click **OK**.

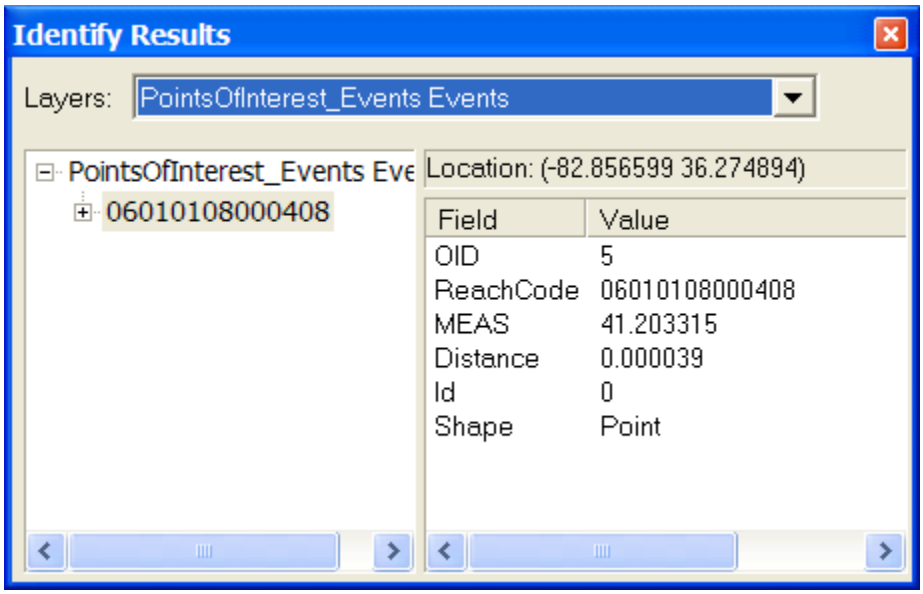




g. Change the symbol for the PointsOfInterest to Circle 2 by double-clicking on the symbol in the Layers window. Select Circle 2 and click **OK**
If the points were snapped to the NHDFlowlines as they were created in step 5, move on to step 6h.
Otherwise, an attempt is made to snap the points to the NHDFlowlines during step 6b. To examine the results, use the  (Zoom In) button to zoom very close to some of the points. Note that even though the PointsOfInterest point may be slightly off of the NHDFlowline, the point in PointsOfInterest_Events is exactly on the NHDFlowline. This happens when the PointsOfInterest are snapped to the nearest NHDFlowline when PointsOfInterest_Events is created in step 6b.



h. If we use the Identify tool to click on the PointsOfInterest_Event point, we see that the point is on a specific reachcode at a specific measure



Note: Points that are not within the snapping tolerance to an NHDFlowline are not assigned reachcodes and measures during step 6b.

7. Linear events, ones that are linked to a stretch along a reach, can be created in a similar manner.