

## **How To: Edit existing shapefiles using ArcMap 9.3**

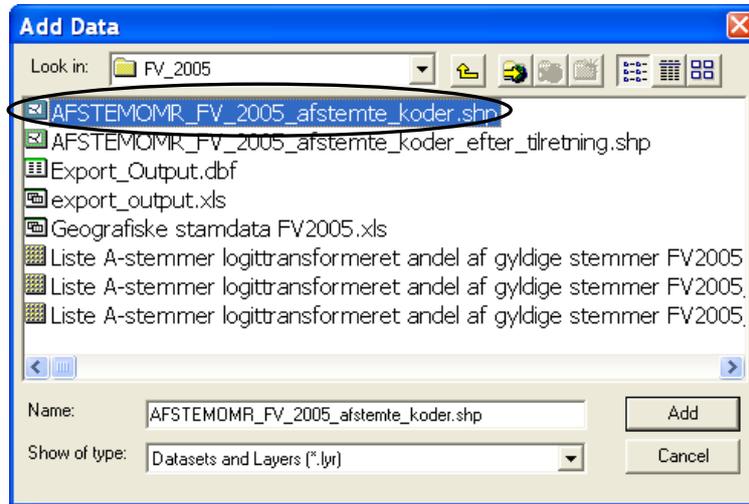
This paper is concerned with providing a step-by-step guide on how to edit existing shapefiles using ArcMap 9.3's "Modify Feature"-tool including an introduction on how to use the "Snapping tool" to avoid the creation of slivers and overlapping polygons during the editing process. Editing the shapefile "AFSTEMOMR\_FV\_2005\_afstemte\_koder", which contains the 1855 Danish polling districts at the Danish National Parliamentary Election on February 8<sup>th</sup> 2005, to make it consistent with a map of the 1645 polling districts at the Danish National Parliamentary Election on November 13<sup>th</sup> 2007, will serve as a practical illustration of this procedure. The paper consists of two parts. The first one deals with the editing-operations in general, whereas the last part is particularly concerned with the use of ArcMap's so-called "Snapping tool".

### **1) Editing an existing shapefile in ArcMap 9.3**

Launch ArcMap 9.3 (or possibly an earlier version) and choose to start with a new empty map. Then, following the procedure, which you can learn about in the papers "How To: Prepare for, carry out and display a cluster analysis in ArcMap using the Ward's cluster analysis technique" and "How To: Make a map displaying party support using ArcMap 9.3", add to the empty data frame the layer-files/shapefiles as well as the standalone tables in dBase-file format which you want to use. In this particular example we shall add only the shapefile "AFSTEMOMR\_FV\_2005\_afstemte\_koder" located in O:\PEDA\GIS\Afstemningsområdekort i GIS\FV\_2005 (see figure 1 below).

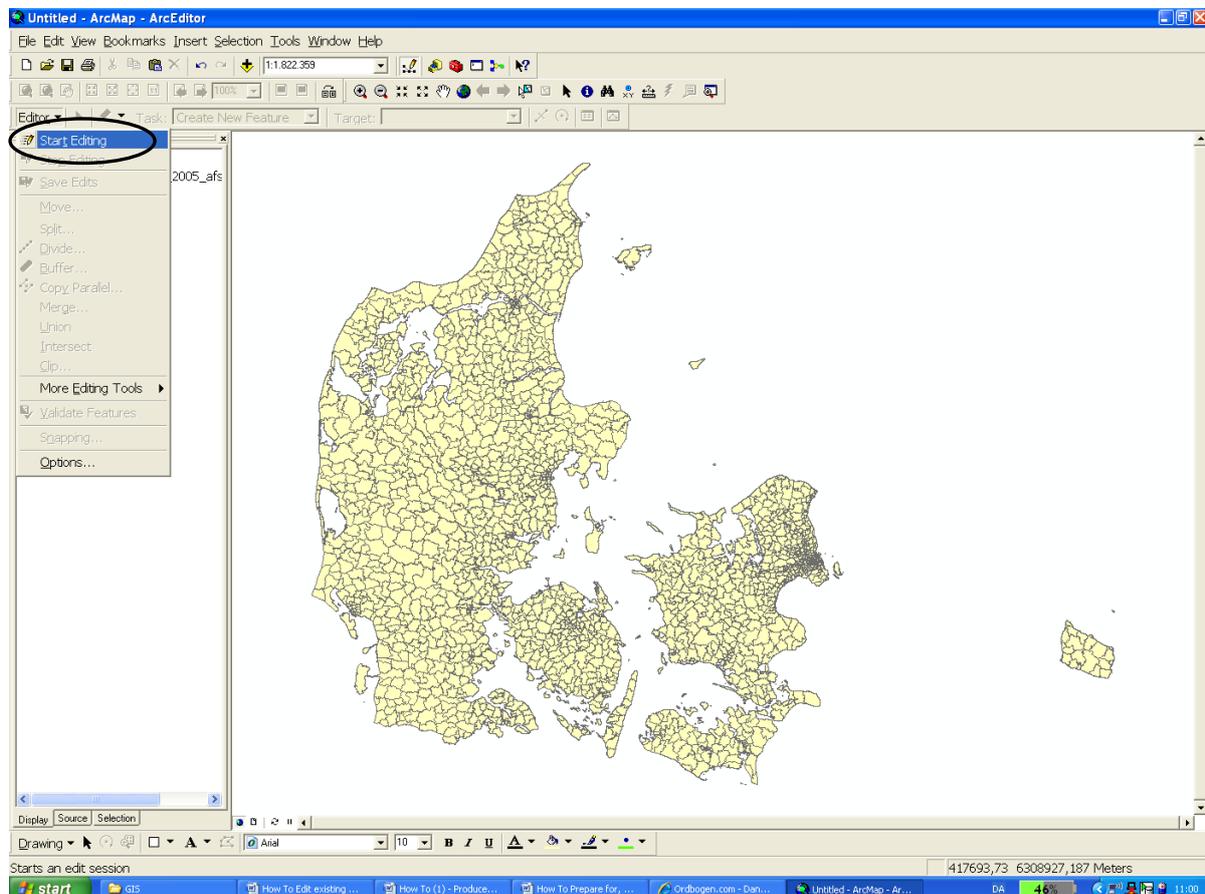
In case the "Editor"-toolbar is not already displayed above in the main panel, navigate to the "View"-drop bar in the menu bar at the top of the screen and find the "Toolbars"-option. From there you should pick the "Editor"-toolbar which will now be displayed in the main panel. The "Editor"-toolbar has many interesting functionalities, a few of which will be introduced more thoroughly in this paper.

Figure 1: Adding the relevant shapefile to the empty data frame



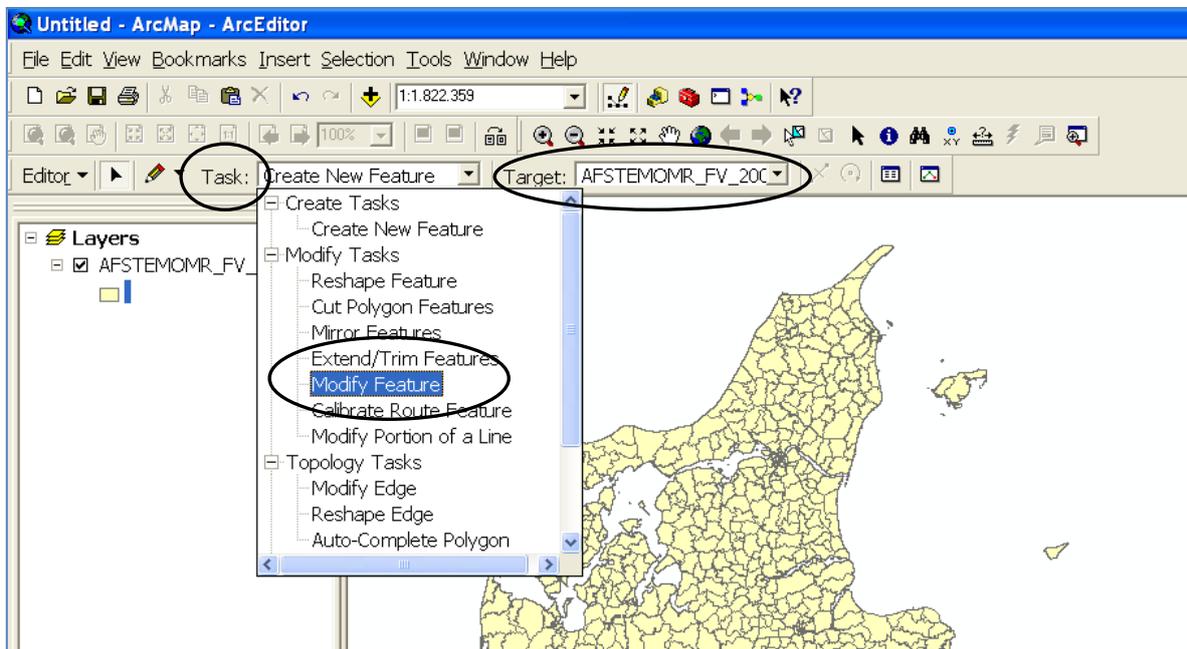
Whenever you want to edit an existing shapefile choose to start with the “Start Editing”-option in the “Editor”-toolbar’s drop bar.

Figure 2: The “Start editing”-option within the “Editor”-toolbar’s drop bar



When having clicked the “Start Editor”-option, you are given the opportunity to choose 1) which shapefile to edit by using the “Target”-drop bar (in our case where we have only added one shapefile to the empty data frame, not surprisingly, we can choose this one, “AFSTEMOMR\_FV\_2005\_afstemte\_koder”, only) and 2) we should choose what editing task that is to be carried out on your shapefile using the “Task”-drop bar – there are quite a few tasks to choose from, see figure 3 below.

**Figure 3: Choosing to start editing gives you various different editing-choices**



In this example we will work with the “Modify Feature”-tool only and leave the others untouched (for an introduction to the “Create New Feature”-option consult the paper “How To: Create your own shapefiles using ArcCatalog 9.3 and ArcMap 9.3”). You should try, however, to experiment with the other options yourself and supplement this with reading relevant literature on what functionalities these other options contain.

The main task in this paper is to modify the existing shapefile, “AFSTEMOMR\_FV\_2005\_afstemte\_koder”, displaying the 1855 Danish polling districts as they existed at the Danish National Parliamentary Election on February 8<sup>th</sup> 2005, to make a shapefile displaying the 1645 polling districts at the following national election on November 13<sup>th</sup> 2007. As should be evident

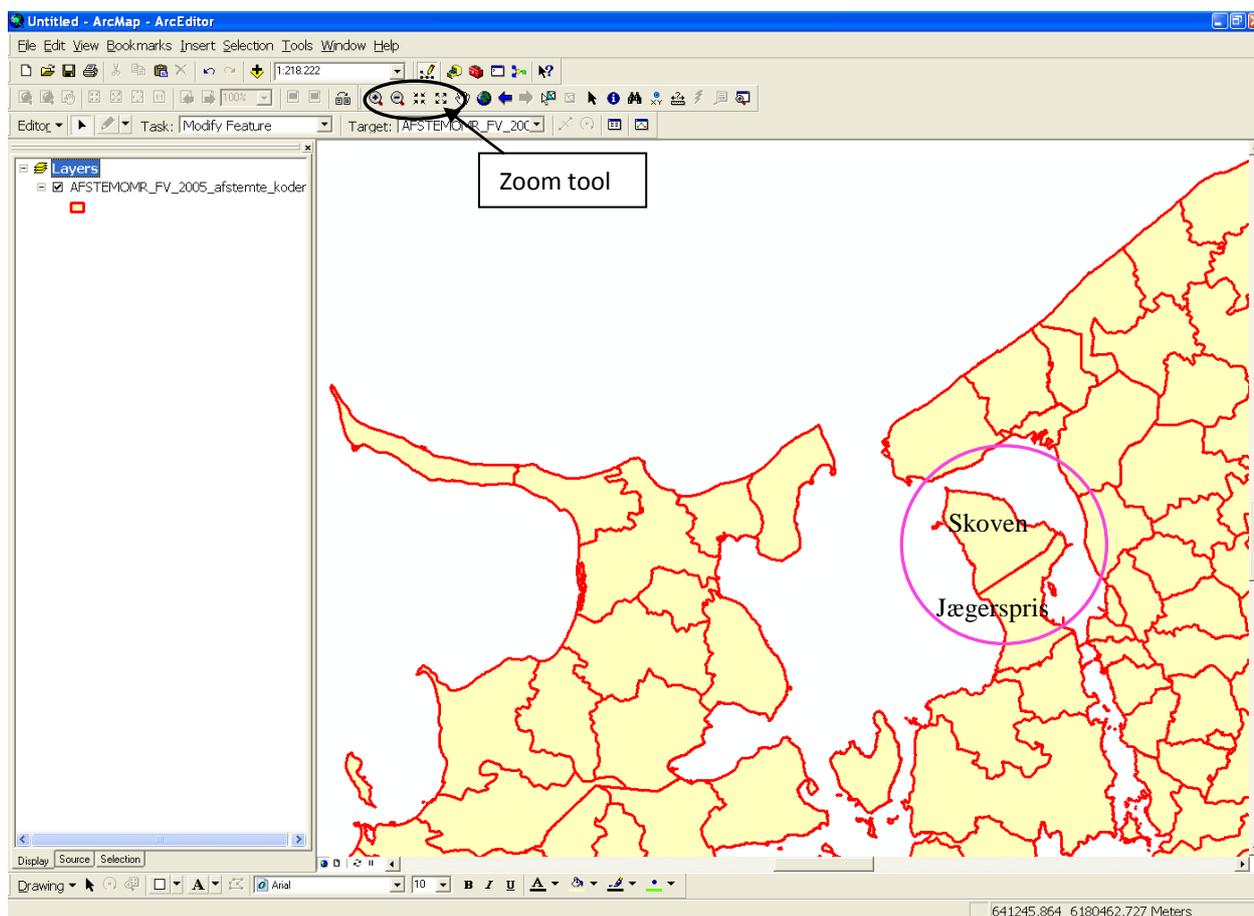
from the number of polling districts mentioned above, respectively, several changes were made to the Danish polling districts in the period between these two elections. Since we pretend here not to have the shapefile containing the polling districts at the 2007 election already, it is necessary to modify our shapefile of the 2005 election to make it resemble a map of the 1645 2007 polling districts.

By drawing the attention to a single instance of change between the 2005 and 2007 elections, we exemplify the “Modify feature”-tool’s functionality. We will choose to look at the two polling districts Jægerspris, 2005 polling district code: 255002, and Skoven, 2005 polling district code: 225003, see figure 4 below where we have zoomed in on the area surrounding these two polling districts using ArcMap’s zoom tool. On December 31<sup>st</sup> 2006 these two polling districts were merged together<sup>1</sup> as part of the bigger Danish administrative structural reform that formally came into effect on the 1<sup>st</sup> of January 2007. This meant that at the Danish National Parliamentary Election held on November 13<sup>th</sup> 2007 there were only one polling district instead of the two polling districts that existed at the 2005 election. The newly merged polling district was named Jægerspris just like one of the old polling districts, but given the 2007 polling district code 225005.

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<sup>1</sup> According to information in the Excel-file ”VSKONKORDANS” (see the references at the end of this paper)

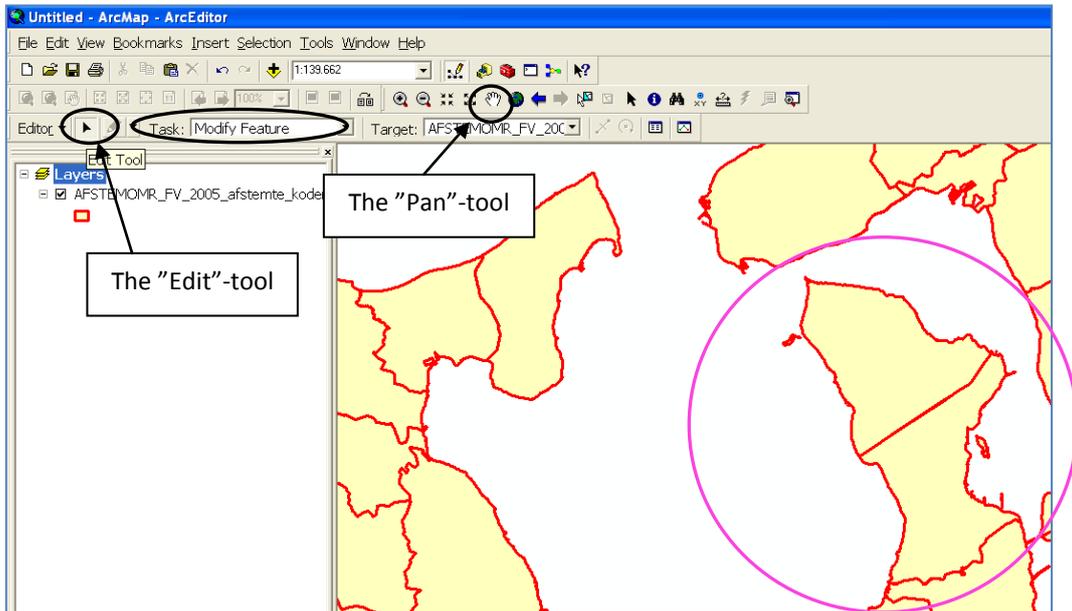
Figure 4: Zooming in on the two polling districts to be merged



The question then is: *How do we modify the existing shapefile to take account of this change in the geographic extent of the polling districts between the 2005 to the 2007 National Parliamentary Election?*

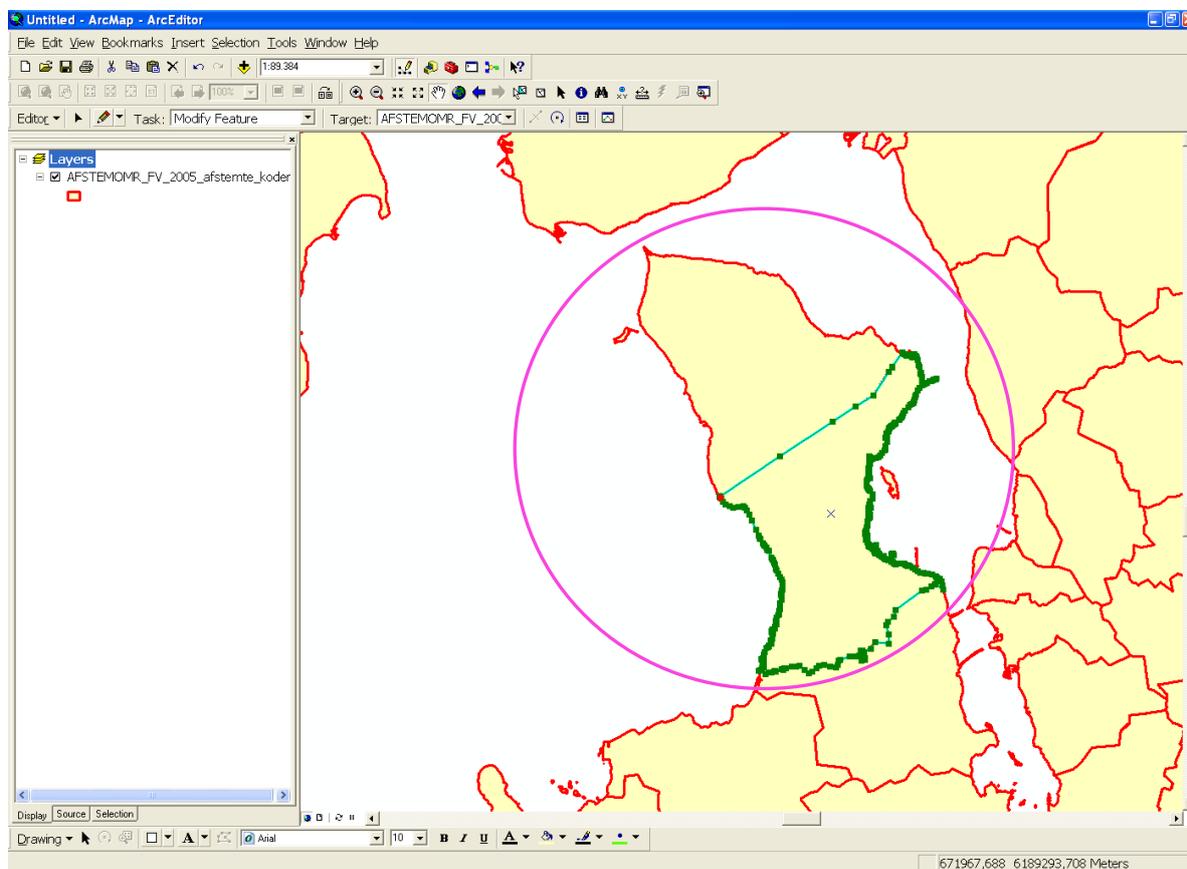
We need to use the “Modify Feature”-tool within the “Editor”-toolbar. Therefore, navigate to the “Task”-drop bar and from there choose the “Modify Feature”-tool (since, as mentioned earlier, there is only one shapefile to choose from in the “Target”-drop bar, namely “AFSTEMOMR\_FV\_ 2005\_afstemte\_koder”, in our example this first choice is redundant). Having done this, click the “Edit”-tool just to the left of the “Task”-drop bar in the main panel (depicting the head of a black arrow), see figure 5 below.

**Figure 5: The “Edit”-tool and the “Pan”-tool**



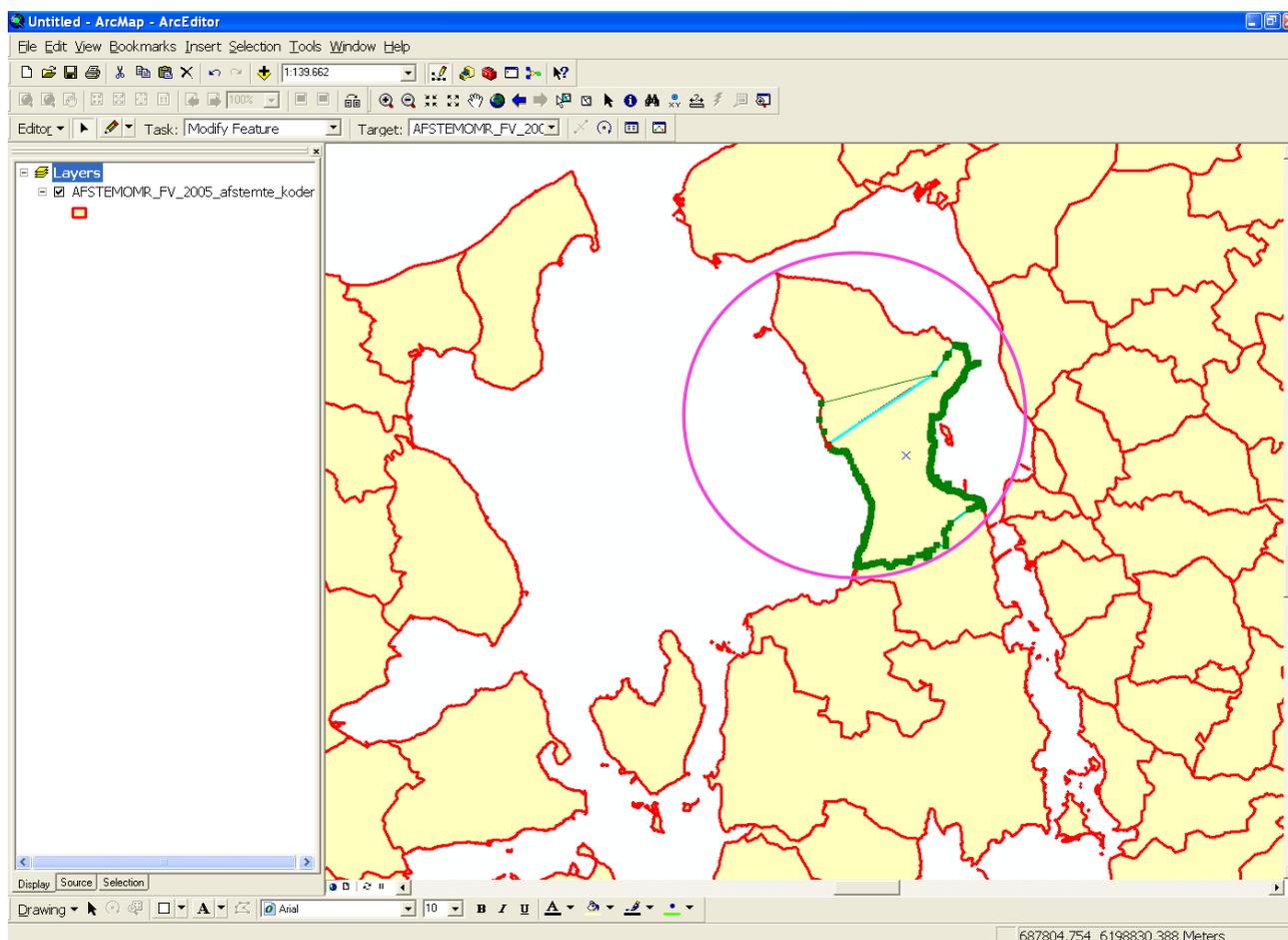
Having clicked the “Edit”-tool we are now ready to zoom and pan to the polling districts of interest (if we have not already done so), that is, in our case to the two polling districts Jægerspris and Skoven, which we want to modify, i.e. merge. Then click for example on Jægerspris polling district and you will see the following happen on your screen (see figure 6 on the next page):

**Figure 6: The 2005 polling district Jægerspris is ready to be modified when having right-clicked on it with the “Edit”-tool**



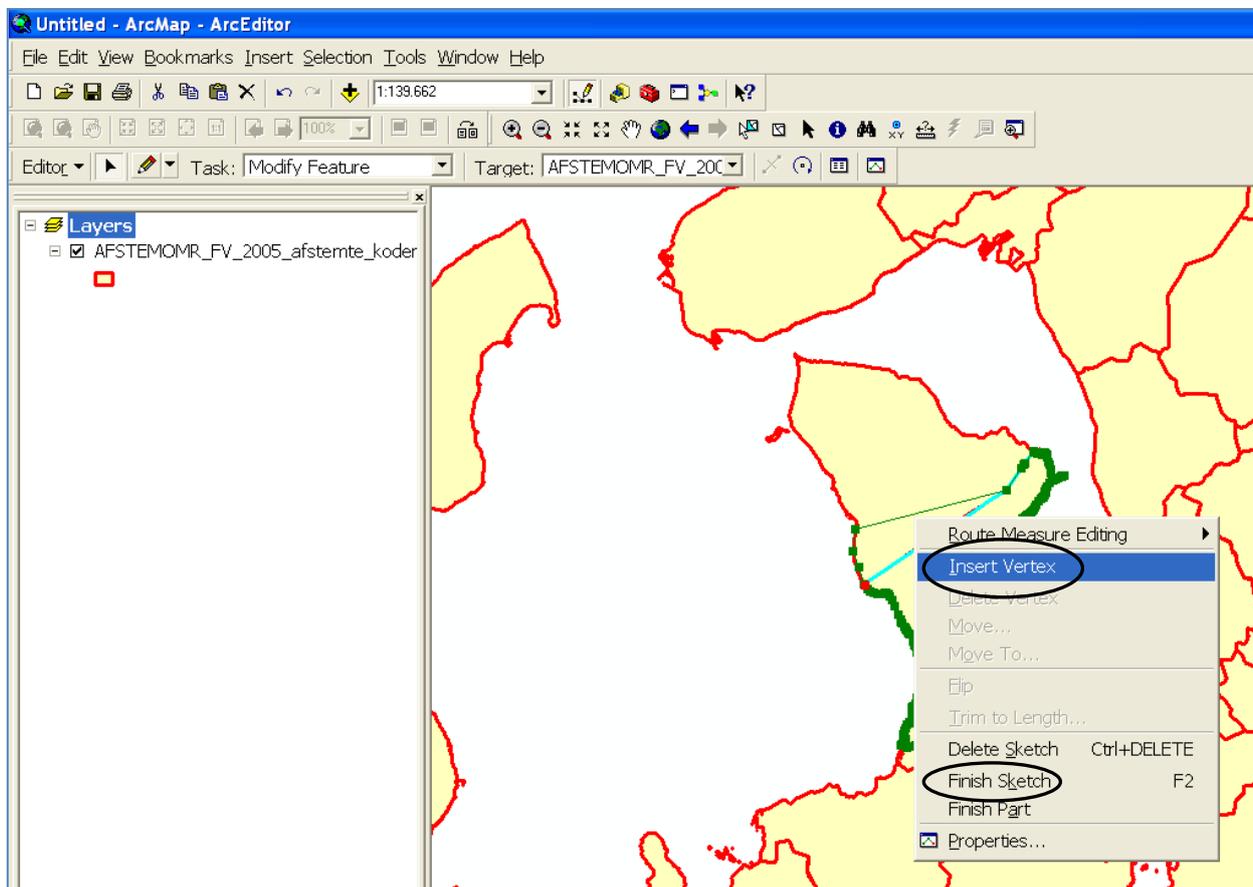
Now, one way of creating the 2007 polling district Jægerspris on the basis of its 2005 counterpart is to click with the “Edit”-tool on the small green squares (vertices) that separate the polling districts Jægerspris and Skoven (from figure 6 it looks like eight green vertices were originally used to create the border). Then drag these eight green vertices one by one to the edge of the polling district Skoven (see the procedure illustrated in figure 7 below) until you have used them all.

**Figure 7: Dragging with the “Edit”-tool the eight vertices that originally separates the 2005 polling districts Jægerspris and Skoven to the border of Skoven**



However, as will soon become evident, more green vertices are needed to make them follow closely around the whole border of Skoven, eight green vertices are far from enough. To get more vertices, use the “Edit”-tool to point to the green line connecting the vertices and right click on the line. When doing so, a drop bar will appear on the screen, from where you can choose the option “Insert Vertex”. Click on this option and you will get an extra green vertex to use, see figure 8 below. Do this as many times as you need vertices! Of course you can also choose to delete a superfluous vertex by right-clicking it and choosing “Delete vertex” from the drop bar (NB: It is important that you have clicked the “Edit”-tool within the “Editor”-toolbar during all of these operations, otherwise you won’t be able to carry them out!).

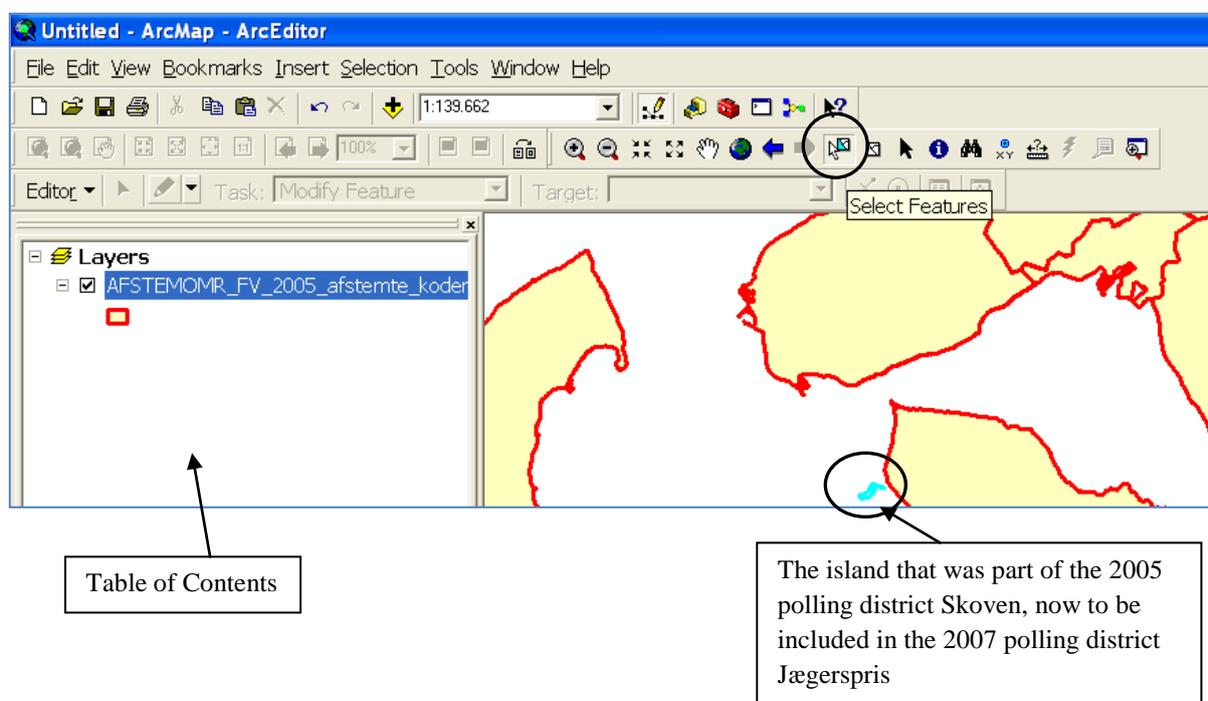
**Figure 8: The drop bar from which you can choose either to insert a new vertex, delete a superfluous vertex, finish your sketch, delete your sketch etc.**



When you are done dragging the extra green vertices around the whole border of Skoven, you should right-click either the green line or a green vertex and choose the option “Finish Sketch” from the drop bar. Having done this, you will now have a new polling district which covers the extent of both Jægerspris and Skoven, and which therefore corresponds to the 2007 polling district Jægerspris. Since the 2005 polling district Skoven did not exist as an independent polling district at the 2007 election, we need to delete it in the shapefile. Consequently, choose once again the “Modify Feature”-tool (if meanwhile it has gone back to its default setting: “Create New Feature”). Now, use the “Edit”-tool to click the old polling district Skoven, right click it and choose the option “Delete Sketch” from the drop bar. Now we are done editing this instance of change between the 2005 and 2007 elections. We should therefore go to the “Editor”-toolbar’s drop bar, from here choose to save our changes and finally click the “Stop Editing”-option.

Yet, because the polling district Skoven was actually composed of two separate polygons since it also includes an island, this island should also be part of the new polling district Jægerspris and therefore has to change its name (from Skoven to Jægerspris) as well as its polling district code (from 225003 to 225005) in the modified shapefile. To do so, navigate to the “Select Features”-icon in the main panel (depicting a white arrow and a square with three polygons inside it, one of them highlighted), see figure 9 below. Point to the island and click on it to highlight it.

**Figure 9: Selecting the island included in the old polling district Skoven with the “Select Features”-tool**



Next, navigate to the “Table of Contents” in the left-most side of your screen, right-click the shapefile and choose to open the shapefile’s “Attribute Table” from the drop bar. Inside the “Attribute Table”, click the “Selected”-button at the bottom of the “Attribute Table”-window and you will notice that only the highlighted polygon now appears in the table among other attributes together with its old name and polling district code. To change this information choose to start editing again and fill in the new information “VALGSTEDDNA”: Jægerspris and “VALGSTEDID”: 225005, instead of the existing information, that is, “VALGSTEDDNA”:

Skoven and “VALGSTEDID”: 225003 (see figure 10 and 11 below). Save your changes and stop editing.

Figure 10: The shapefile’s “Attribute Table” with the highlighted polygon (the island) selected

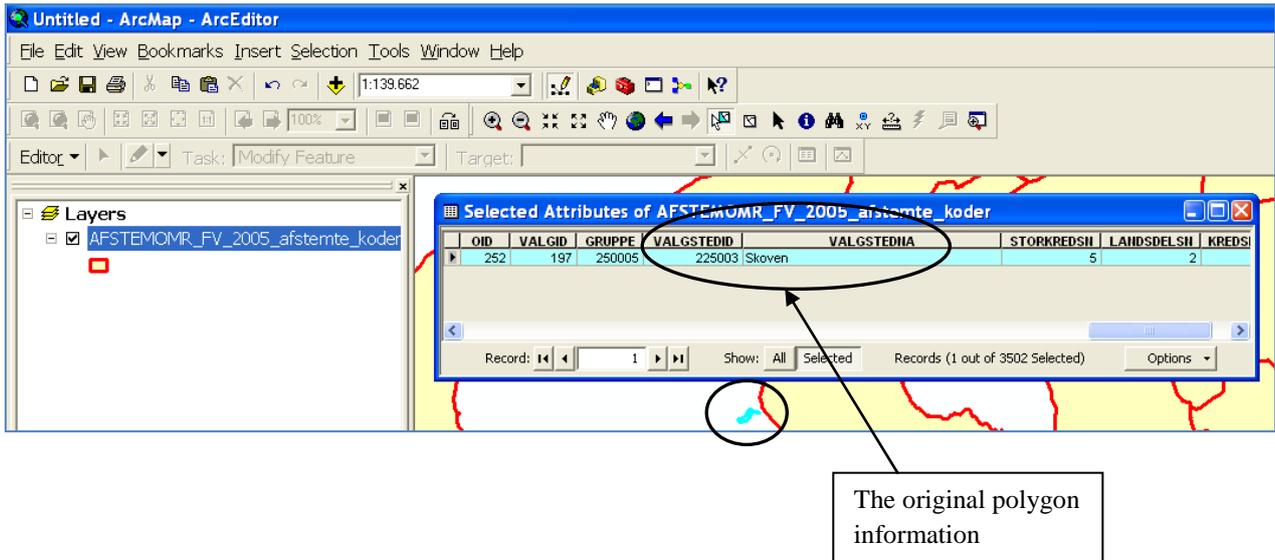
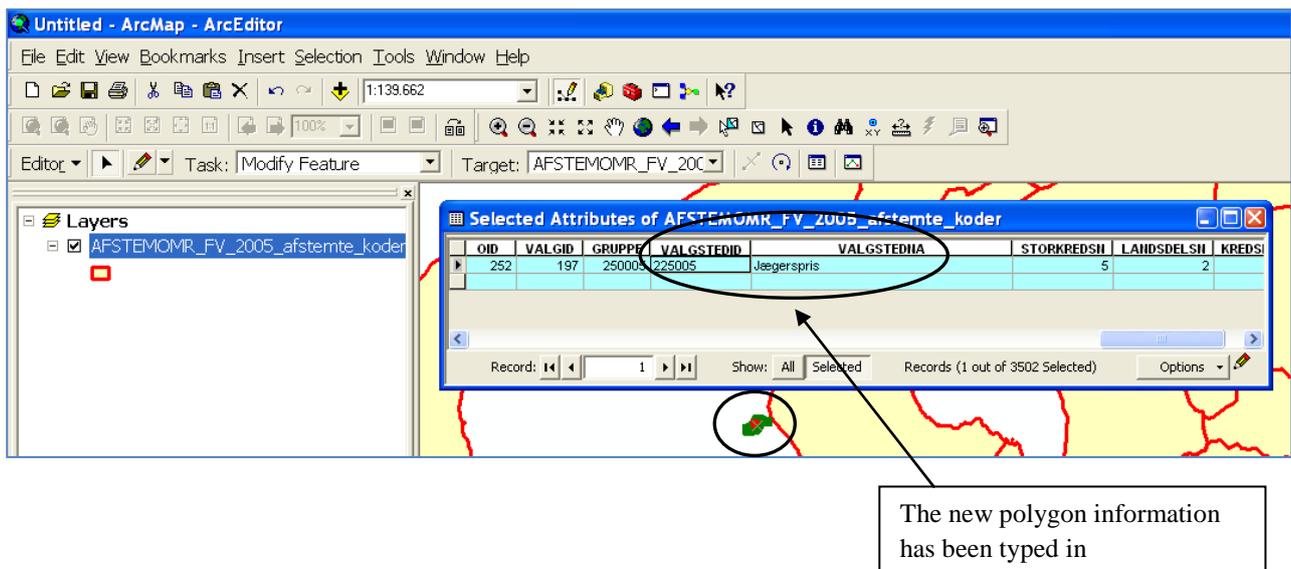


Figure 11: Changing the 2005 election information of the highlighted polygon to make it correspond to the 2007 election information



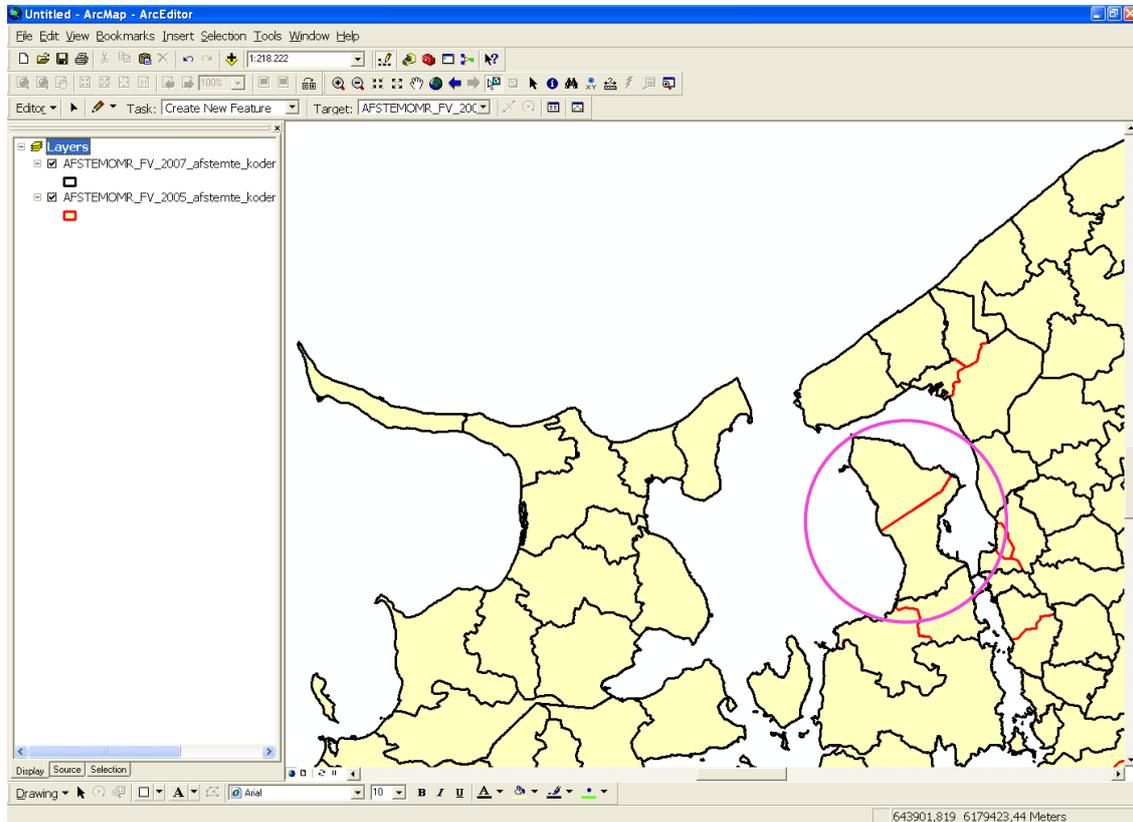
The whole procedure for modifying polygons (i.e. the polling districts) illustrated above should then be repeated for every other change that was made between the 2005 and 2007 elections<sup>2</sup>. By doing so, we will eventually end up having a shapefile commensurate with the geographic location of every polling district at the 2007 Danish National Parliamentary Election. To save this edited shapefile for future use, click twice on the name of the original shapefile “AFSTEMOMR\_FV\_2005\_afstemte\_koder” and rename it in a sensible manner, e.g. by calling it “AFSTEMOMR\_FV\_2007\_afstemte\_koder”. To make this change permanent, it is important to do the following: after having renamed the edited shapefile, right-click it, navigate to “Data” in the drop bar and choose the option “Export Data”. When the “Export Data”-window pops up on your screen, browse to the folder where you want to save the edited shapefile and click the “OK”-button. Now, close ArcMap, open it again and add both the original shapefile, “AFSTEMOMR\_FV\_2005\_afstemte\_koder”, and the newly edited shapefile “AFSTEMOMR\_FV\_2007\_afstemte\_koder” to a new empty map. For illustrative purposes our edited shapefile should lie on top in the “Table of Contents”, since it contains a much smaller number of polling districts compared to the original 2005 shapefile (1645 compared to 1855). Furthermore, it should be made transparent so that the two shapefiles can be compared right away, see figure 12 below (on how to make a shapefile transparent consult the paper “How To: Colour geographic feature locations and different types of attributes using ArcMap 9.3”).

By following these guidelines, one can clearly see (figure 12) where polling districts have changed their geographic extent between the two elections. Especially, it is easy to see where polling districts have been merged or otherwise changed shape, since the black lines show the new borders compared to the old red ones. To be able to see the (rather few) instances, where polling districts were actually split up between the 2005 to 2007 elections, the 2005 shapefile should be placed on top and made transparent instead.

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<sup>2</sup> According to the ”VSKONKORDANS”.xls or other relevant file

**Figure 12: Comparing the two shapefiles of polling districts from the 2005 and 2007 Danish National Parliamentary Election, respectively, by making the top layer (the 2007 shapefile) with black borders transparent**

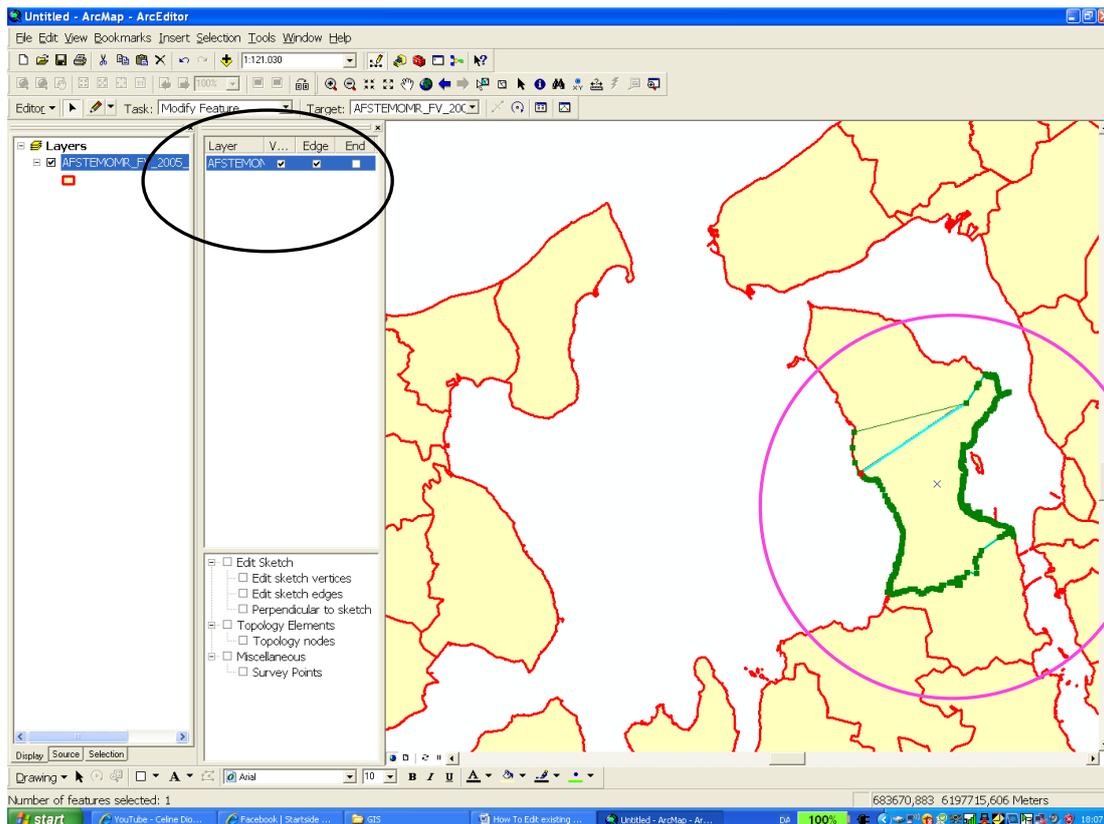


## **2) Using the snapping tool to avoid problems of creating slivers and overlapping polygons during the editing process**

When you have edited one or more features in ArcMap it is not uncommon to observe that you have created some unintended sliver polygons (i.e. small polygon features commonly occurring along the borders of a polygon following either the modification of a polygon (as in our case), an overlay of two or more polygon shapefiles or as a result of inaccurate digitizing). In the case of inaccurately modifying a polygon to the borders of its neighboring polygons, overlapping polygons might also be created unintentionally. To avoid sliver polygons and overlapping polygons to be made during the modification process it is helpful to make use of a tool in ArcMap's "Editor"-toolbar called "Snapping". By "snapping" is meant that if the pointer of the "Edit"-tool (cf. p. 5) is within a preset or default set distance from e.g. an edge of a neighboring polygon to which you want to align you

green vertex, the vertex will automatically “snap” to this edge and will therefore exactly align to it inducing that no overlapping or slivering of polygons will take place. Try it out for yourself to get a better feeling of this really valuable “Snapping”-tool that works either well for aligning polygon, line and point features! (NB: you need be in the editing mode to be able to use the “Snapping”-function). By clicking the “Snapping”-tool, a new table will appear just to the left of the “Table of Contents” on your screen. Here you can choose either to “snap” the green vertices you are working with to the vertex, edge and/or end of the neighboring features in one or more shapefiles of interest. In our case where we are still working with one shapefile only, namely “AFSTEMOMR\_FV\_2005\_afstemte\_koder”, we can only choose to “snap” our green vertices to the vertices, edges or ends of the neighboring polygons of this shapefile

**Figure 13: The “Snapping”-tool table from where you can choose to snap to the vertices, edges and/or ends of neighboring features when editing**



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*Malene Rode Larsen, January 2010*

## References:

- Larsen, Malene Rode: “How To: Create your own shapefiles using ArcCatalog 9.3 and ArcMap 9.3”.doc (O:\PEDA\GIS\Introductory papers to ArcMap 9.3)
- Larsen, Malene Rode: “How To: Color geographic features and different types of attributes using ArcMap 9.3”.doc (O:\PEDA\GIS\Introductory papers to ArcMap 9.3)
- Larsen, Malene Rode: “How To: Prepare for, carry out and display a cluster analysis in ArcMap using the Ward’s cluster analysis technique” (O:\PEDA\GIS\ Introductory papers to ArcMap 9.3)
- Larsen, Malene Rode. “How To: make a map displaying party support using ArcMap 9.3.”doc (O:\PEDA\GIS\Introductory papers to ArcMap 9.3)
- Pedersen, Kristian: “How To (2): Manipulate Existing Data to Produce a Display of Aggregated Features.doc” (O:\PEDA\GIS\ Introductory papers to ArcMap 9.3)
- Rosengreen, Bjørn: “VSKONKORDANS”.xls (O:\PEDA\GIS\Afstemningsområdekort i GIS\FV\_2005)