

Bio Visualisation with Blender and MembraneEditor Part 1.5

Black Bird Tutorial

Konstanz Research School Chemical Biology (KoRS-CB) Workshop
Björn Sommer, University of Konstanz & Mehmood Ghaffar, IPK Gatersleben
Version 24.02.2019

Forum:

<http://www.cellmicrocosmos.org/Cmforum/viewforum.php?f=63>

Actual Version of Blender:

<http://www.blender.org>

Here, Blender 2.79 is used.

Remarks

Some images were taken from the first version of this tutorial with 2.67b. So do not be confused, the explanation works also with the new version and where required, the images were updated. This tutorial is based on those from WS2013-14 and WS2014-15 where a small is modeled which is much more complex.

Target

Starting from the standard cube which every Blender user knows from the first time starting Blender, we create a simple swan model. In the next tutorial we will use this model to add textures and movement.

Abbreviation

RMB Right Mouse Button

LMB Left Mouse Button

! For using most of the shortcuts discussed in this tutorial, you have to be sure that the mouse cursor is WITHIN the view port of the 3D View !

Base

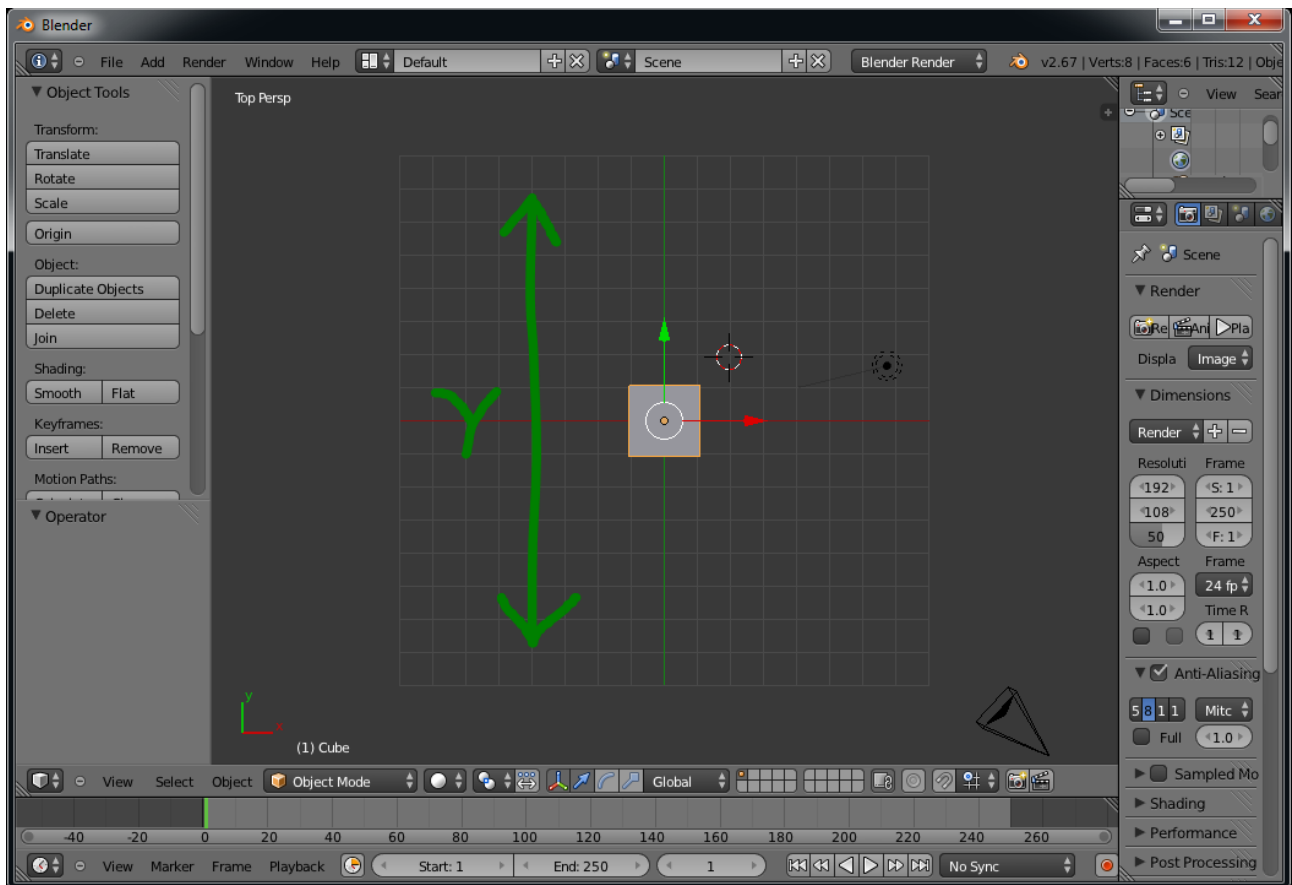
Create a new project (standard project with one camera, one lamp and a cube)

Baseline

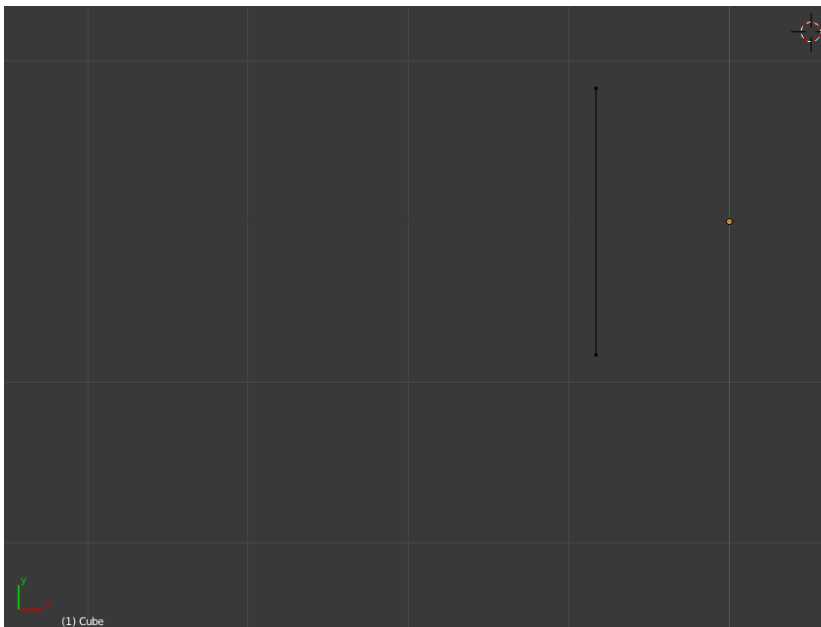
First, we have to create a simple line. We start with the standard cube of Blender. If you do not have the standard cube in your new scene, just add it by using

Add → Mesh → Cube

Your scene should look like this from the top (NUM 7):

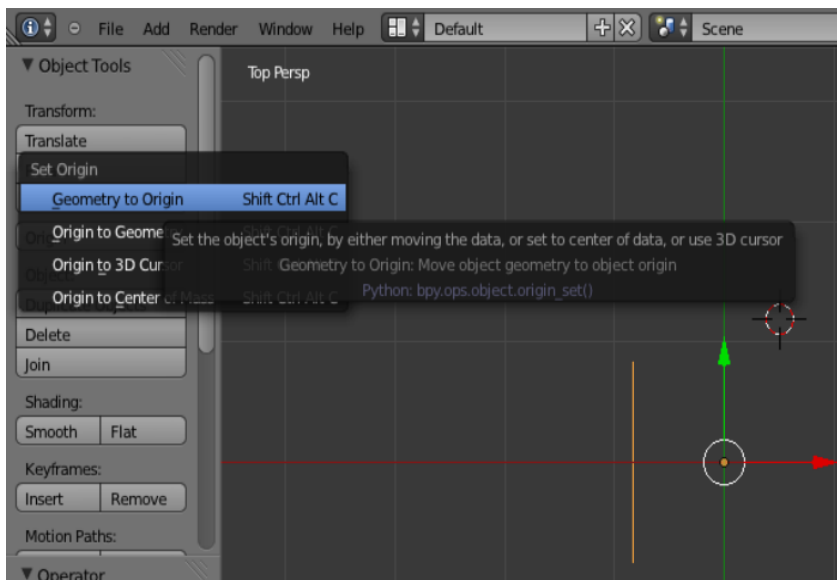


The green Y marks the Y axis. Go to Edit Mode. Delete now all vertices except 2 nodes like this:

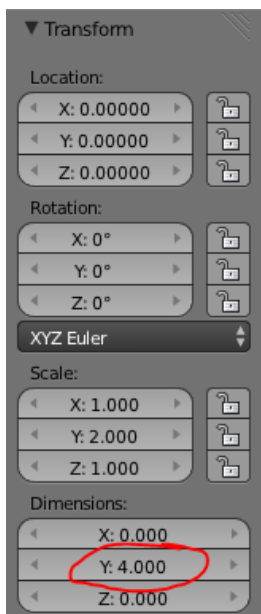


Be sure that the line is aligned along the Y axis (this will be important later)!

Now leave the Edit Mode (go to Object Mode) and shift the geometry to the origin like this:

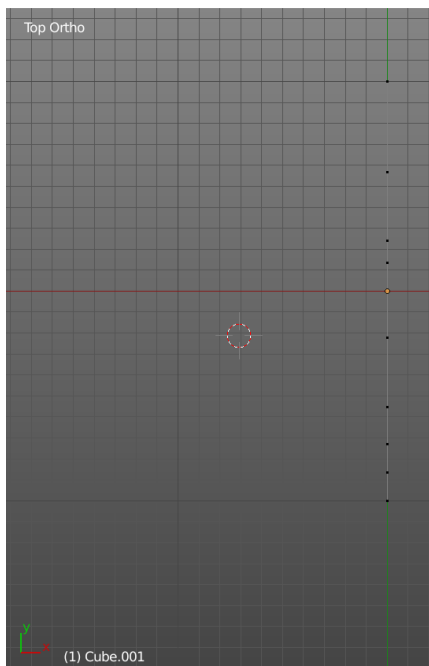


Increase the line size now to 4.



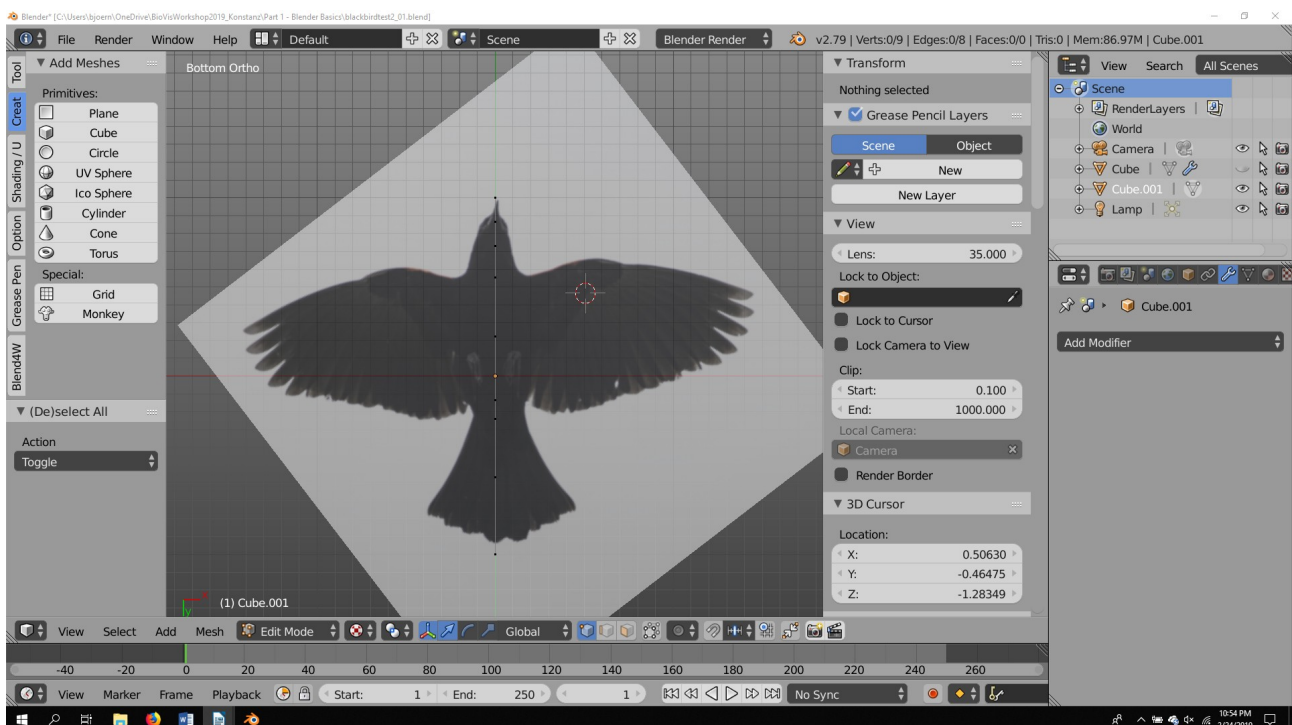
Baseline to Base Shape

This line will be the base for the body of the swan. But it consists now only of one line and two points. Let us increase the resolution of the line. Select the line, go to Edit Mode, press *A* until the complete line is selected, press *W* and select “Subdivide”. Now you have 3 points. Repeat this process 2 times (do not forget to always select all nodes). In the end you will have 9 points.

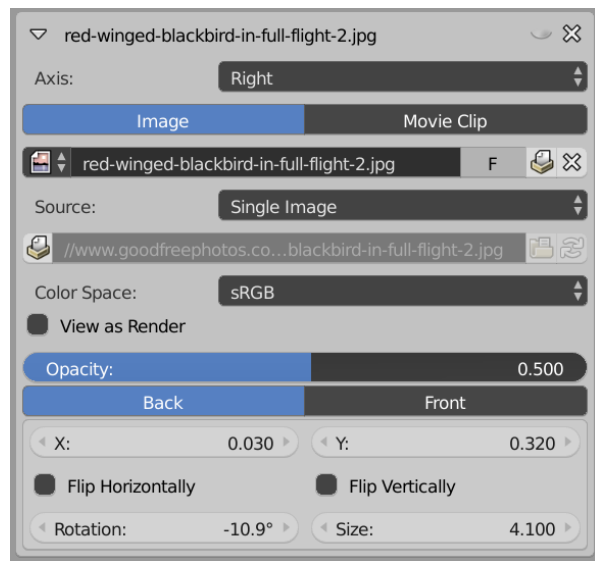
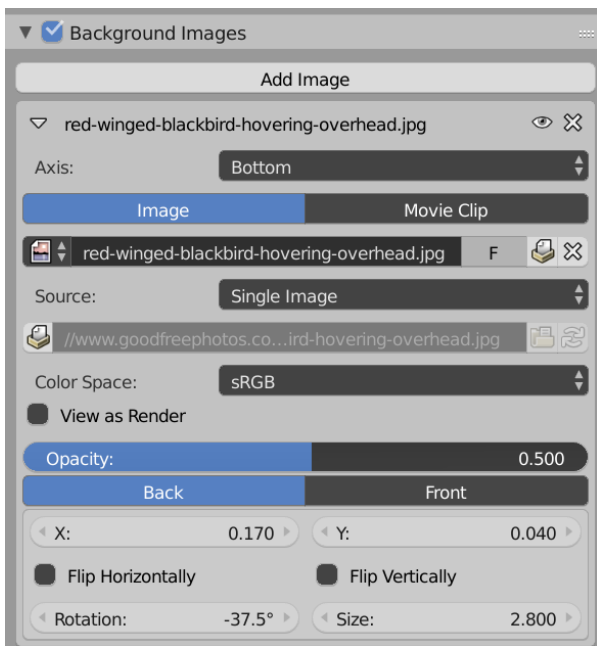


Now the question is where to place the points shown here in the image. For this purpose, we have to import images as background. Make sure to be in ortho mode while using background images (NUM+5).

Open the side Properties panel (by pressing N). Then scroll down to find the images and add the following two images: 1) for Bottom and 2) for Right view:



Scroll down in the Properties Panel and import the following images:



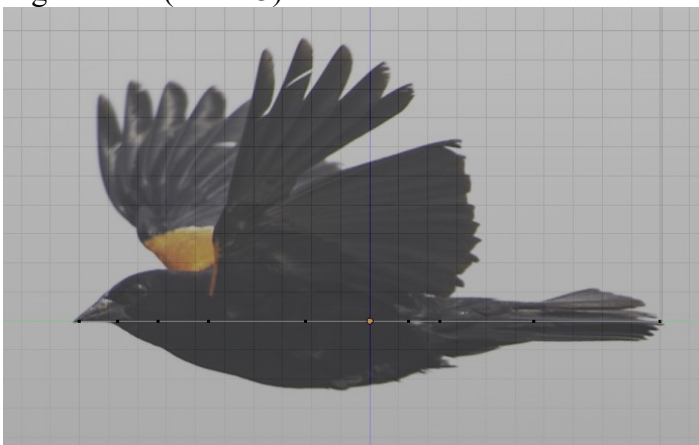
These images have to be rotated and transformed like shown in the images before.

Now, please align the nodes/vertices to the bird as shown here:

Bottom Ortho (CTRL NUM 7)



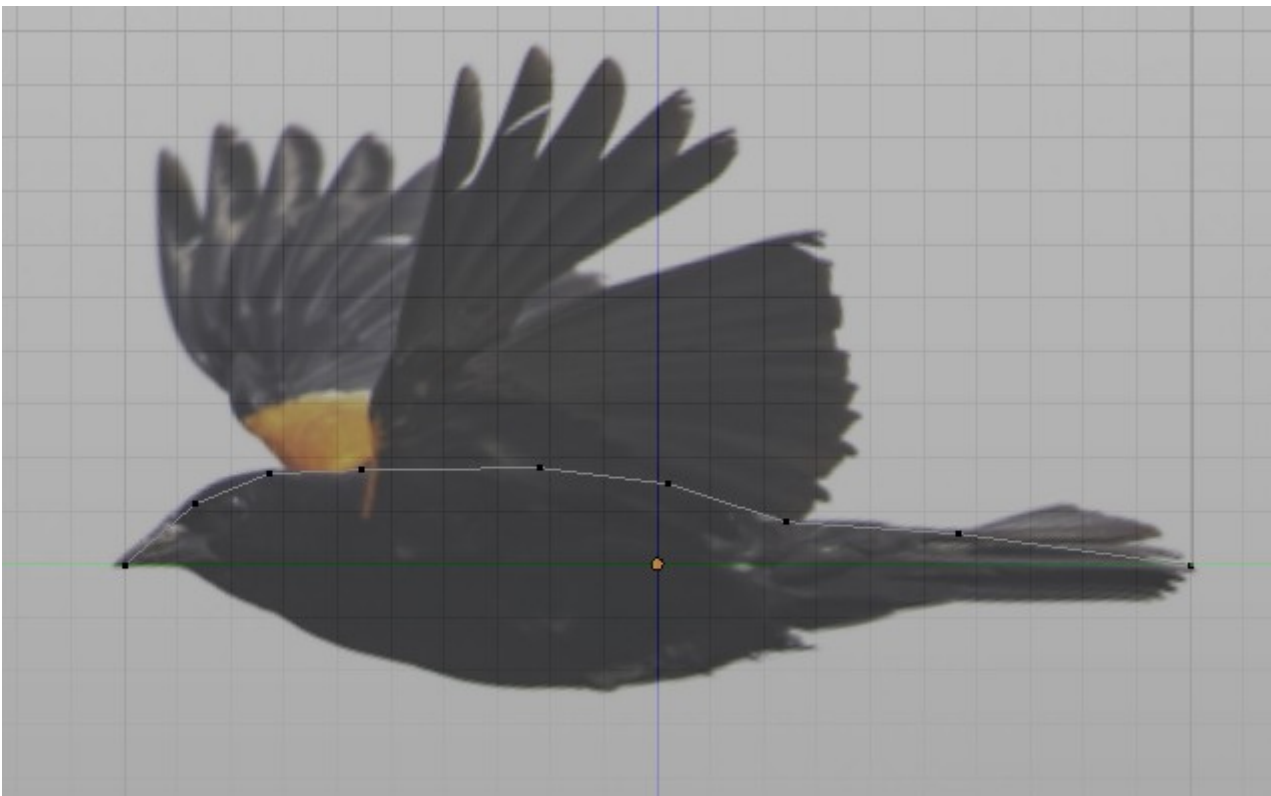
Right Ortho (NUM 3)



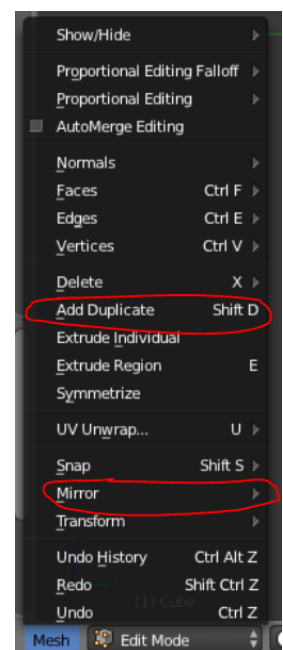
If these images are not placed correctly, just adjust the background image, until it is at the correct position. Compare the image of the right side with the one from the top side, and after both position and sizes match, continue with the modeling.

But this line is still a one-dimensional object. So let us change this. In Edit Mode, go to the right perspective (*NUM 3*). Try to generate now a half segment of an ellipse by changing the Z position of the nodes. Then, try to adjust the shape to the one of the bird.

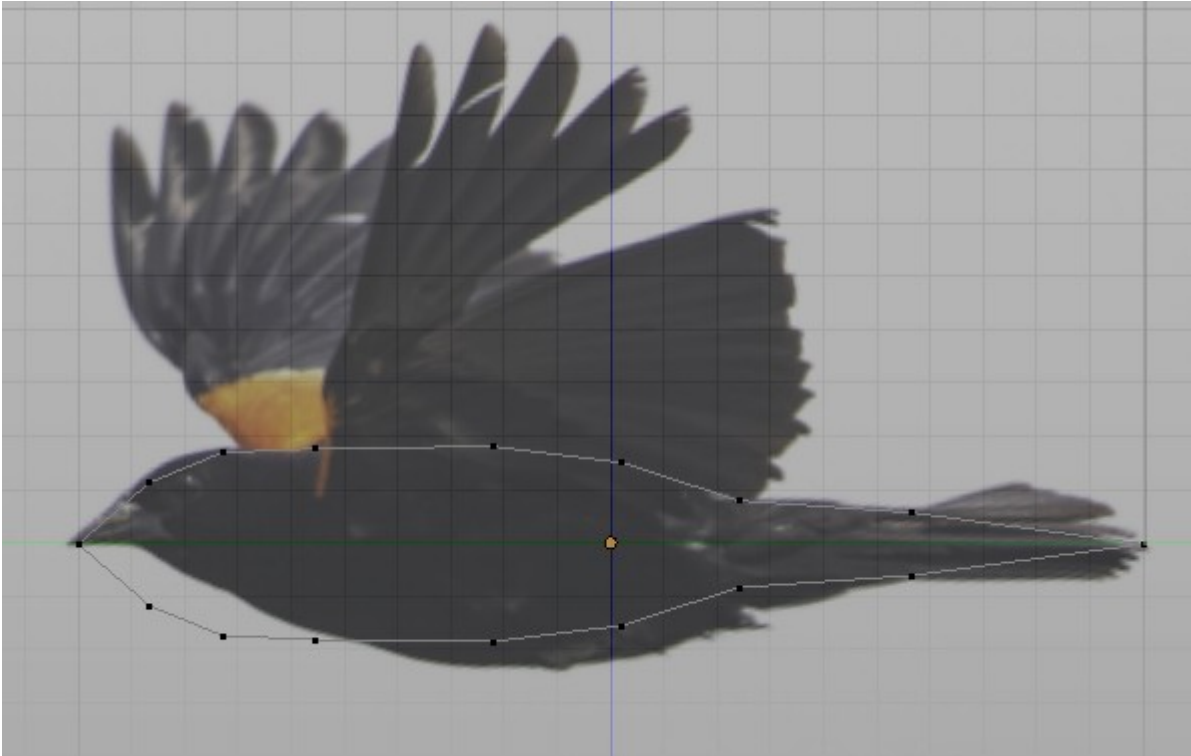
In the end, it should look similar to this:



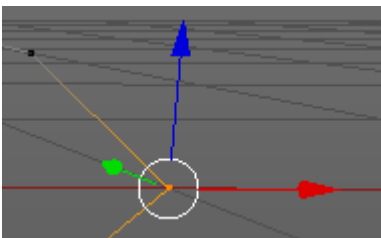
But we want to have a complete ellipse. For this purpose, select the complete segment with *A* and press *SHIFT+D*. The generated duplicate has now to be mirrored. Press *CTRL+M* and then *Z* and accept with *LM*. You can find these options also in the Mesh Menu, see right image:



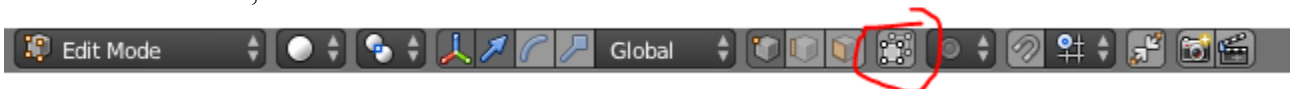
Now move the new ellipse segment downwards along the Z axis until an ellipse is visible:



Now, these two lines have to be combined. Make sure that nothing is selected (also with *A*) and select the two nodes at the edge of the ellipse.



Be sure that both nodes are selected. Do this e.g. by using *CTRL+LM*. If only a single node is selected afterwards, deactivate “limit selection to visible”.

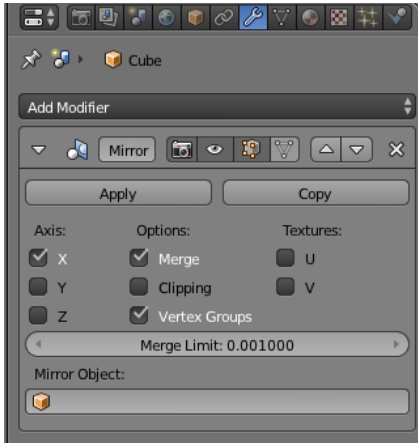


Now, press *W* and select “Merge ...” and “Merge at center”. Do the same for the other two nodes of the other ellipse edge. The first part is finished now, we have an ellipse.

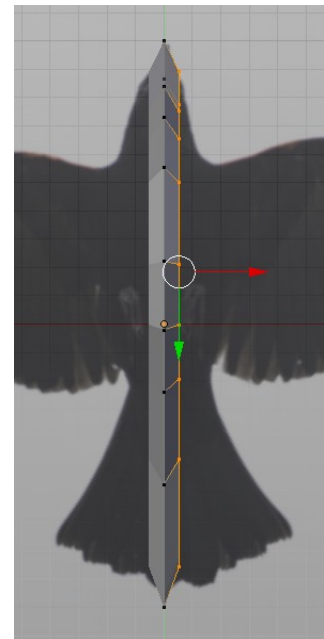
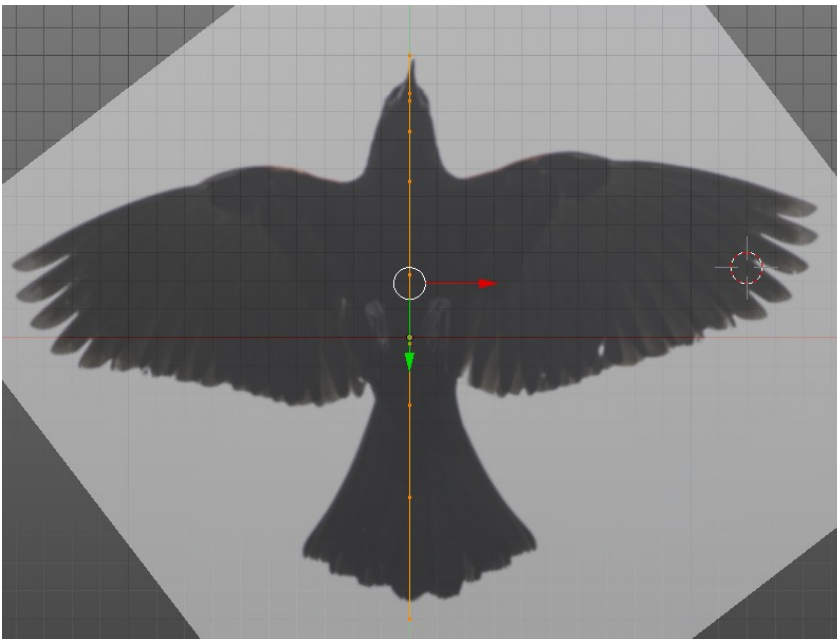
! Attention: be sure that all nodes are located in $X=0$. If the X position has changed, shift it back to $X=0$. In the next section, this will be important !

Modeling the Body (2D to 3D)

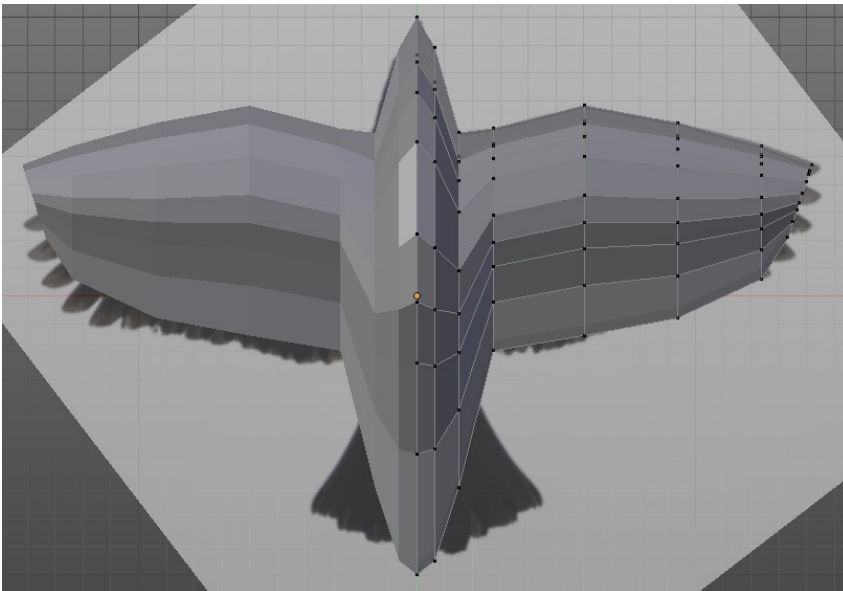
Now, we want to model the body of the swan. We could do this for the left and the right side, but we are lazy, and so we use the “Mirror Modifier”. So select the shape in Object Mode and add the “Mirror Modifier” like this:



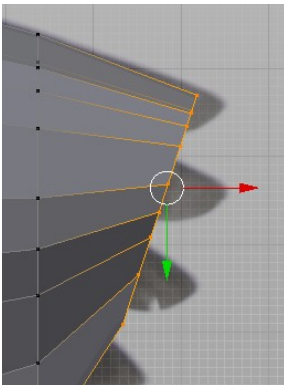
Now, go to edit mode, select the bottom view (CTRL NUM 7), select the complete shape and press *E* for extrude, finish the extrusion at each step by *LM*. And now you should see something like this:



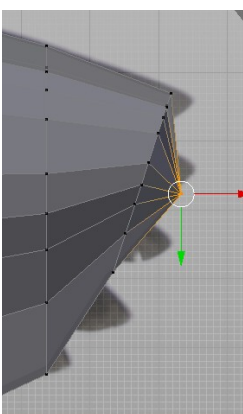
Use now the extrusion in combination with the methods which you already know (*S* for scaling, and drag the extruded shapes with the translate operator:  Global) until the mesh looks like this:



In the last step, we close the shape. For this purpose, you see here this small part at the edge of the wing:

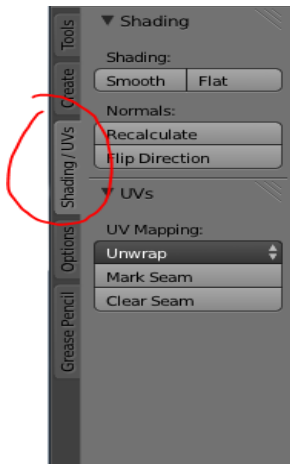


Press now *S* for scale and then press 0. All vertices are scaled to the center of the selection. To merge now all vertices at this position, press *W* and select “Remove doubles”. Result:



The shape is closed now.

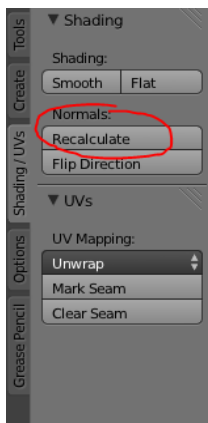
Now, optimize the mesh. Keep in mind, the luxury of the Mirror Modifier will be gone soon. So try to make an organic shape and you may also want to look at the swan in smooth shape. Change to Object Mode, select the “Shading/Uvs” tab on the right side and select “Smooth” in the Object Tools section.



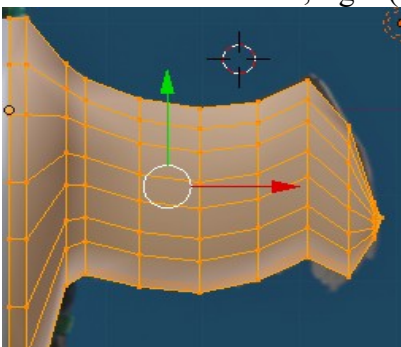
You will see that the surface might look strange (image from swan tutorial):



Do not worry, the normals have to be recomputed. Change to Edit Mode, select all vertices and in Mesh Tools, select “Recalculate” in the “Normals” section.

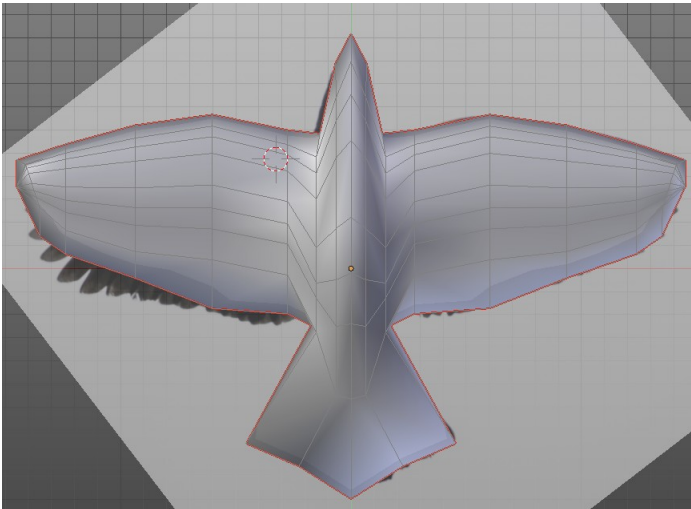


Looks much better now, right (image from swan tutorial)?

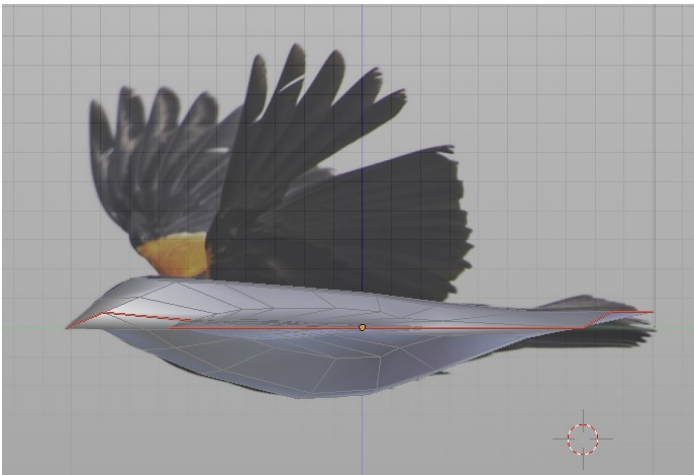


Now it's time for optimizing the mesh until it looks similar to the photos:

Bottom Ortho (CTRL NUM 7)

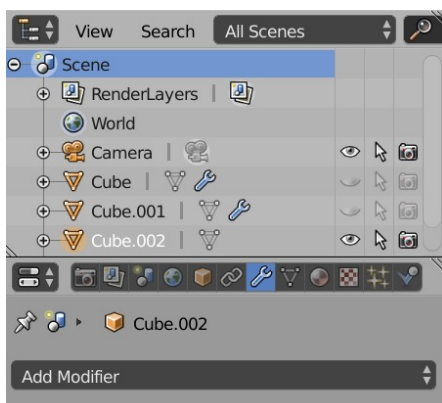


Right Ortho (NUM 3)

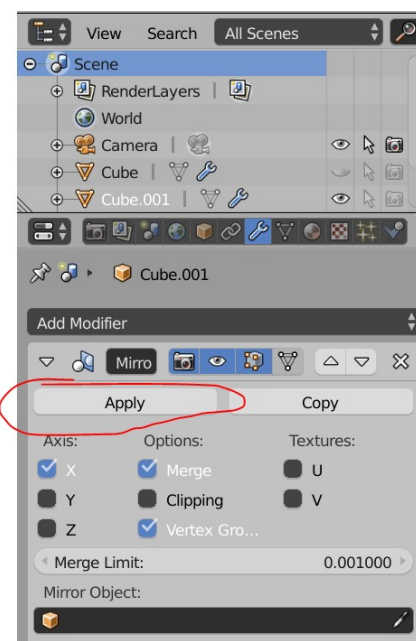


Note that we model the wings fully stretched and use the side view only to model the body.

A final thing to be done is now to apply the “Mirror Modifier”. Afterwards it cannot be manipulated anymore. Therefore, it might be a good idea to just make a copy of the actual object and continue to work with the new object, hiding the old one (here: “Apply” to Cube.002):



Use CTRL C and CTRL V to copy.



Texturing the Blackbird

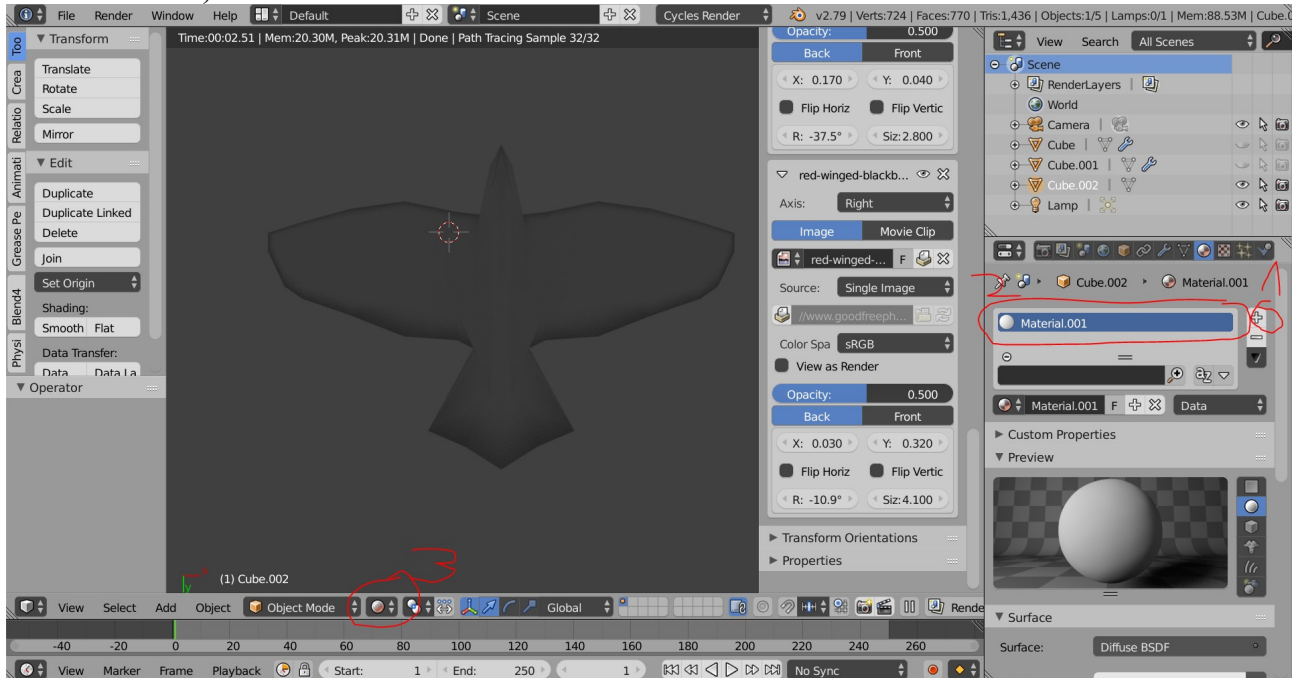
The shape of the body might be okay, but the blackbird is naked, he will not like this a lot! So let's do something against it!

!In case you did not do so by now: make sure to use the Cycles renderer!



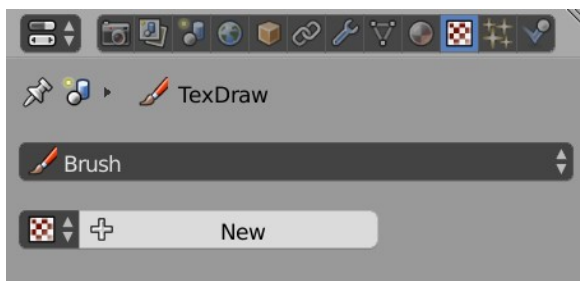
What we want to do: we want to paint a texture onto the surface of the blackbird. For this purpose, first we have to load an image into Blender like this:

In Object mode, open the Material Tab on the right side. Add a new material by pressing the + sign, like shown in 1):

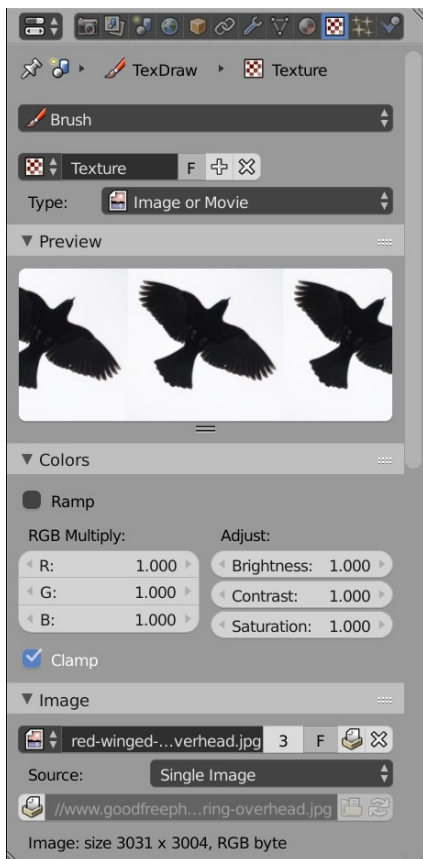


We have now an empty material with a gray color, see 2). If you switch now to “Rendered Mode”, see 3), you will see that the color slightly changed to gray.

Now open the texture tab and press “New”:



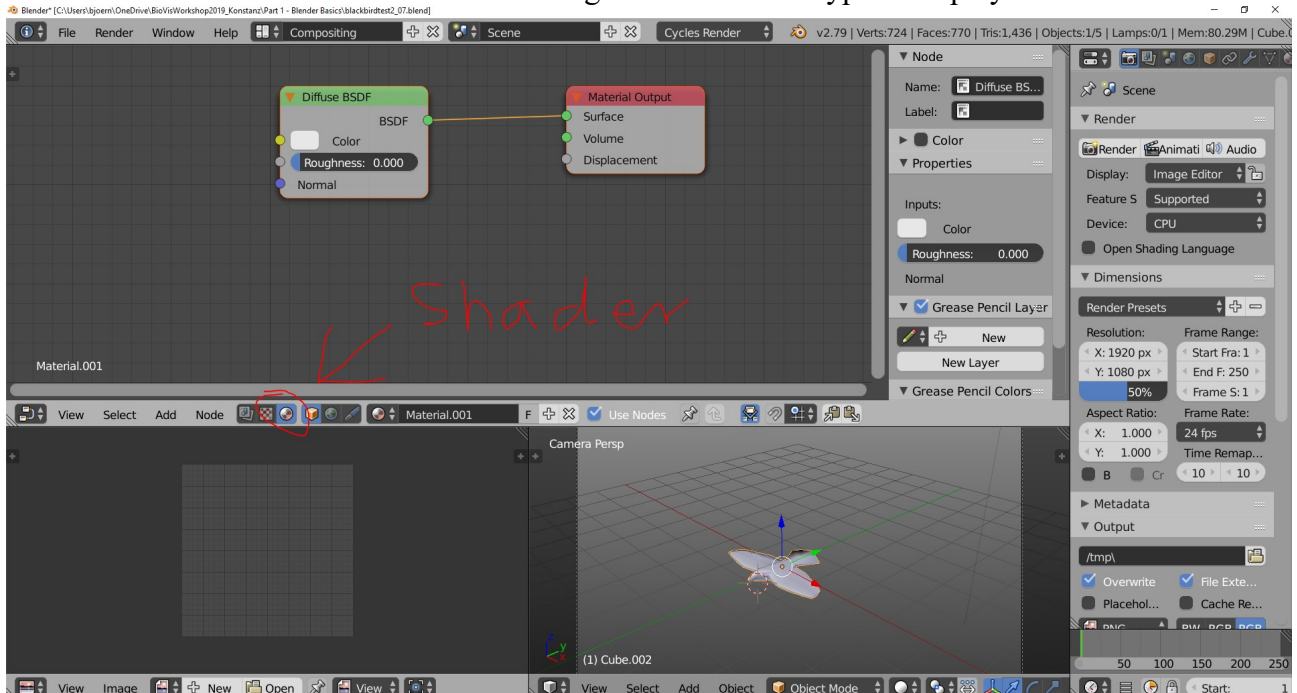
Select as type “Image or Movie” and then select below in the file path the image: “red-winged-blackbird-hovering-overhead.jpg”:



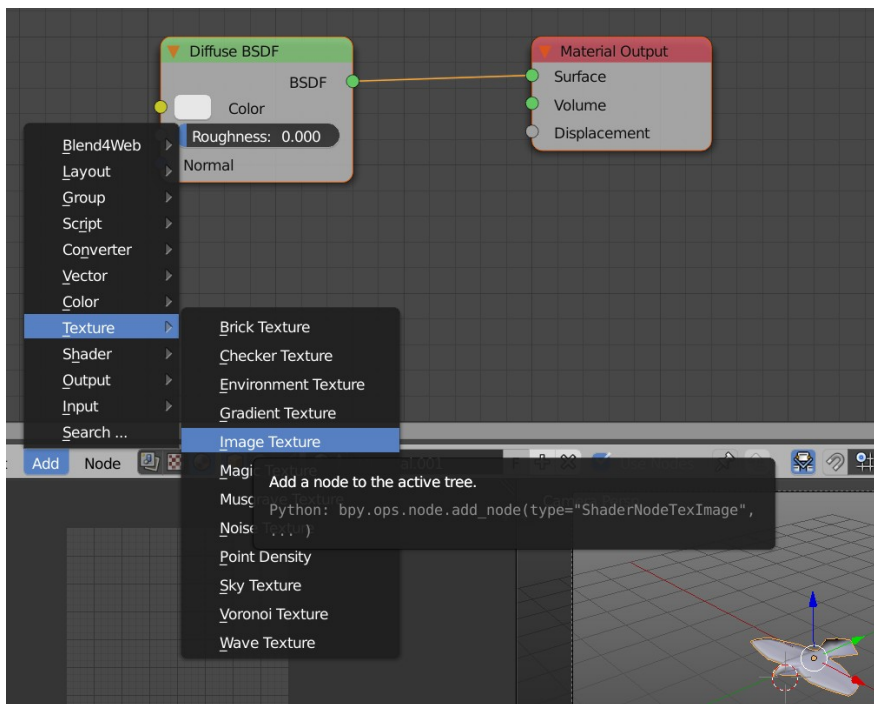
Now we have to make sure that the texture is rendered by the Cycles renderer. Please change the screen layout from “Default” to “Compositing”:



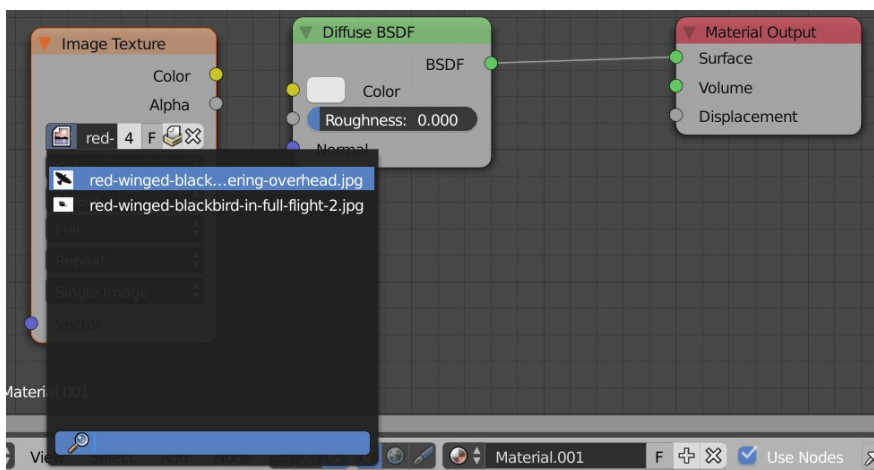
Make sure the Blackbird is selected and change the “Node tree type to display” to “Shader”



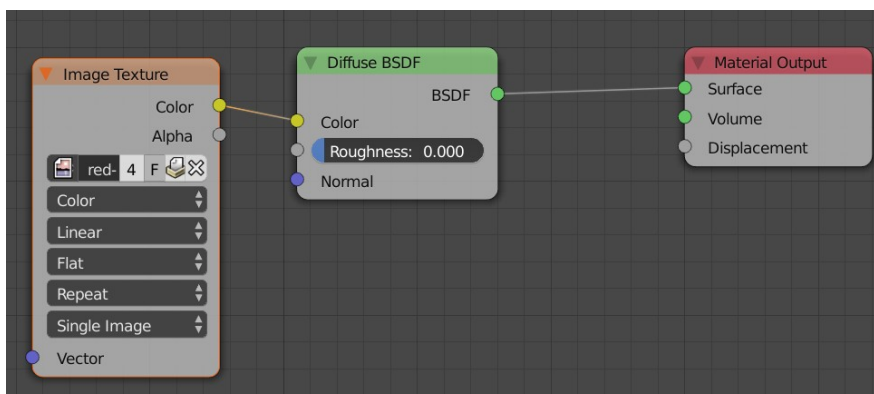
Now we have to add a new node: “Image Texture”, which you will find like this:



Select her again the previously selected image used for the texture:

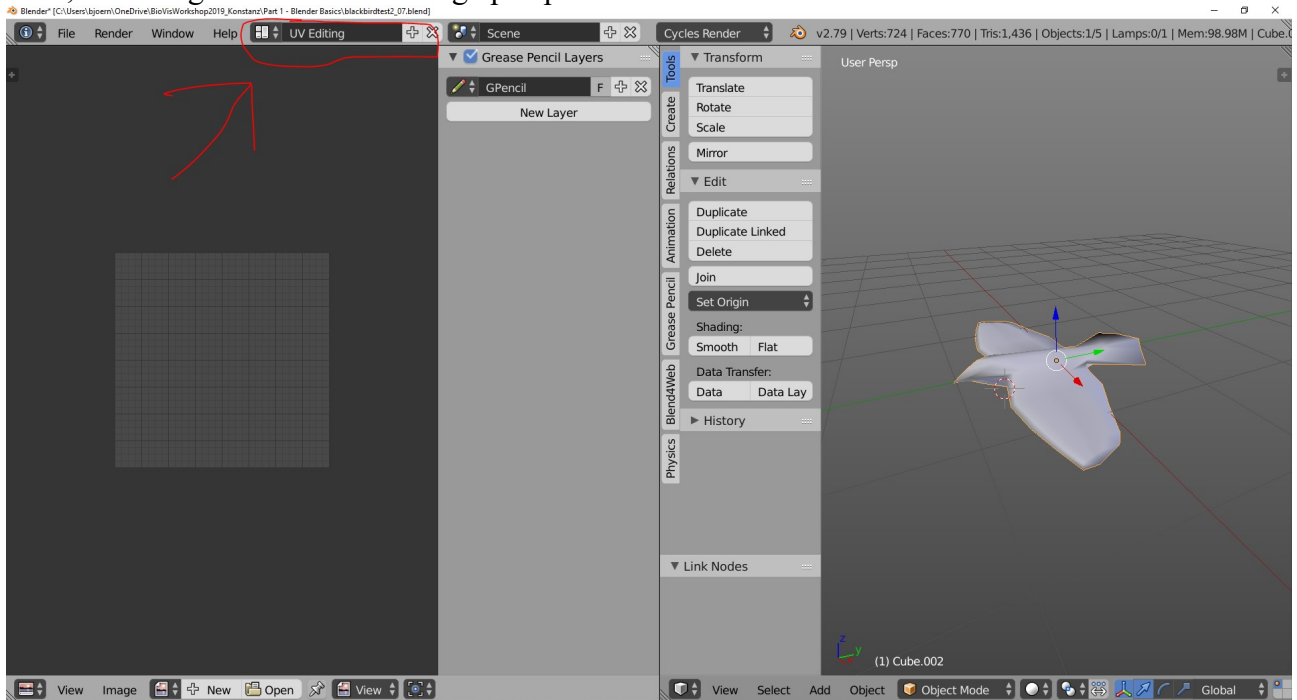


And then finally connect the color ports of the “Image Texture” and the “Diffuse BSDF”:

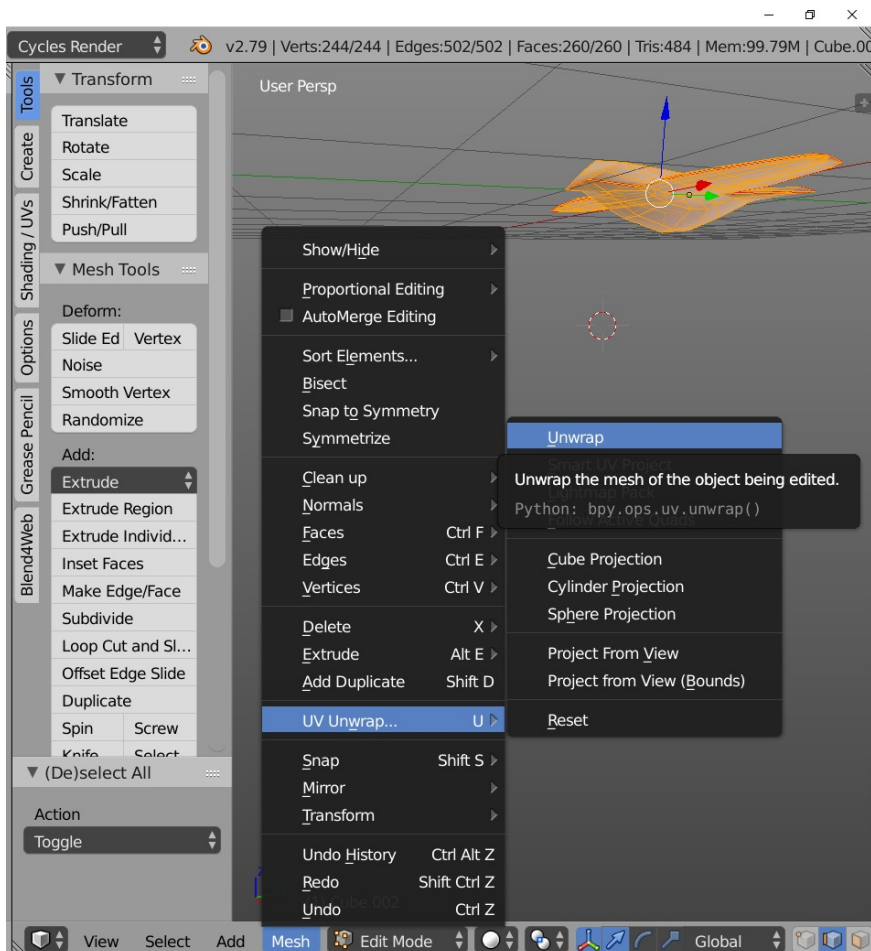


Still, we do not see a change in the rendered image, as the photo is not correctly assigned to the vertices.

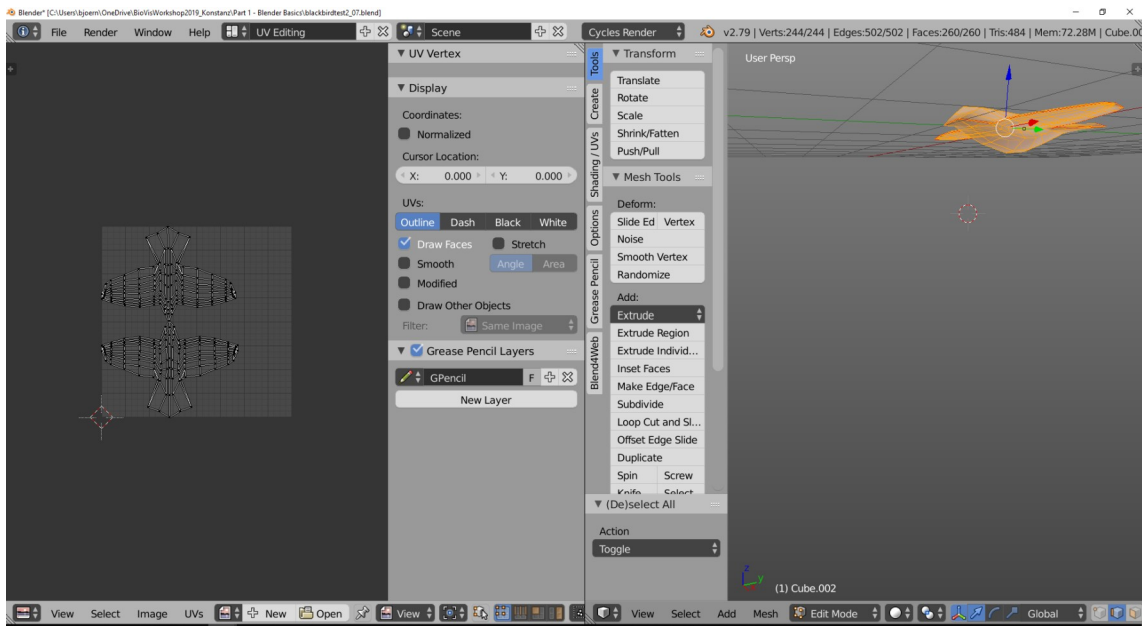
Now, we change to the “UV Editing” perspective:



On the right pane, select all vertices of the Blackbird in “Edit mode” and select then “Unwrap” from “UV Unwrap” in the Mesh menu:



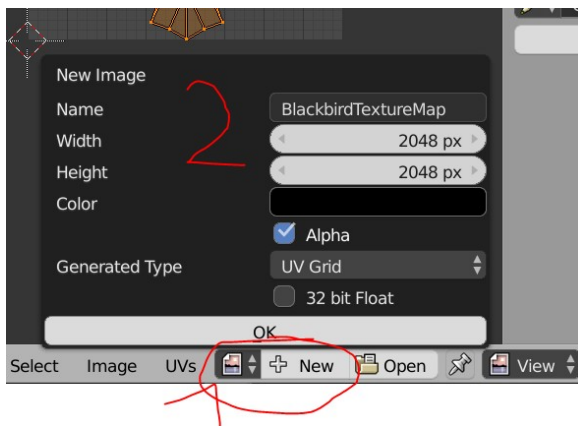
The result should look like this:



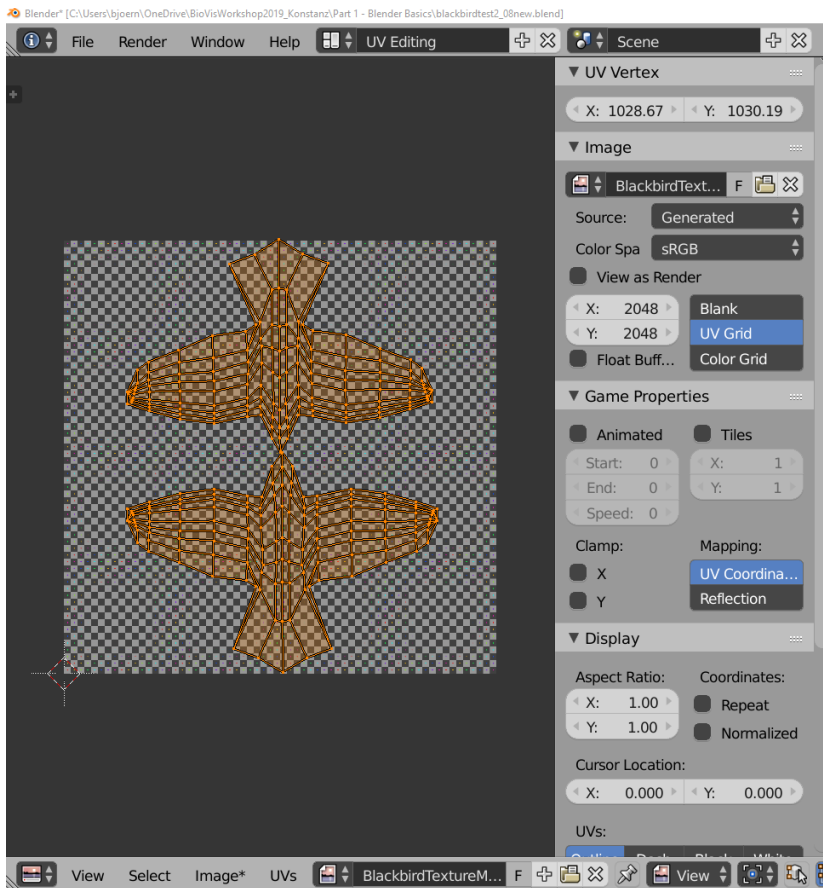
With the mapped texture space grid on the left side you can operate like with a normal mesh. Therefore, you can drag and drop the mesh where you want to by pressing “A” and the “G”.

Now we want to add the texture onto this texture space grid on the left side.

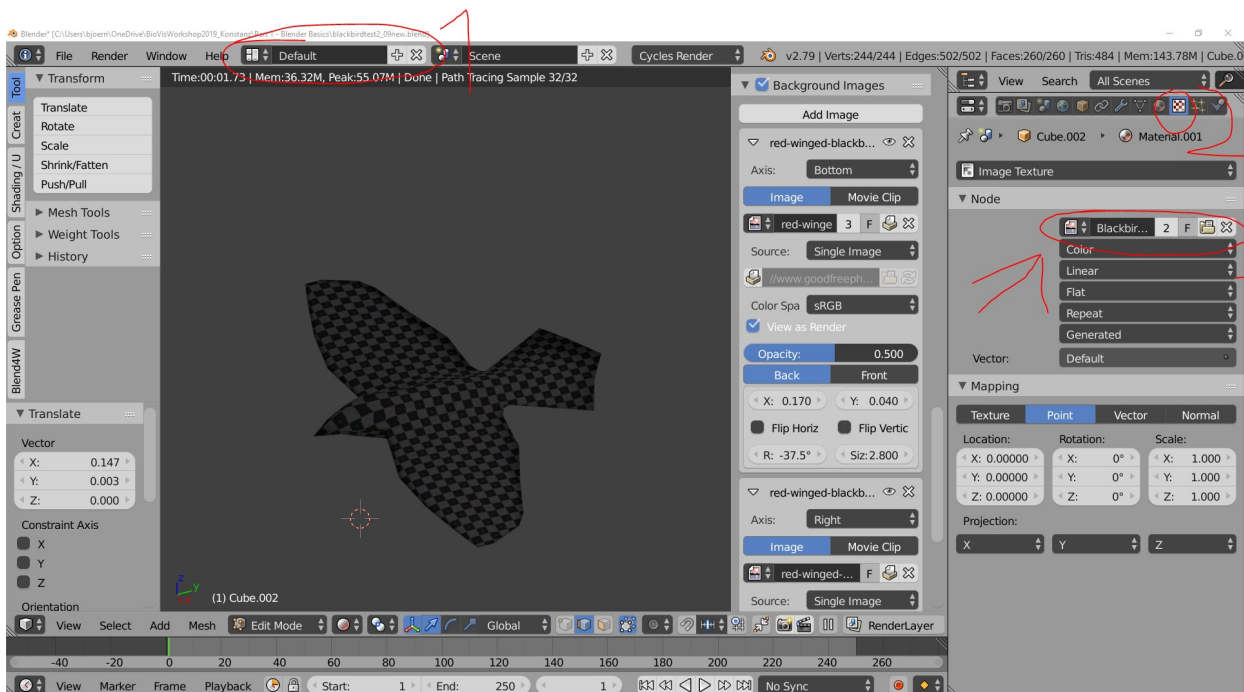
First, we need to create a new texture. Press “New” below the left pane, see 1). Please use these settings, 2):

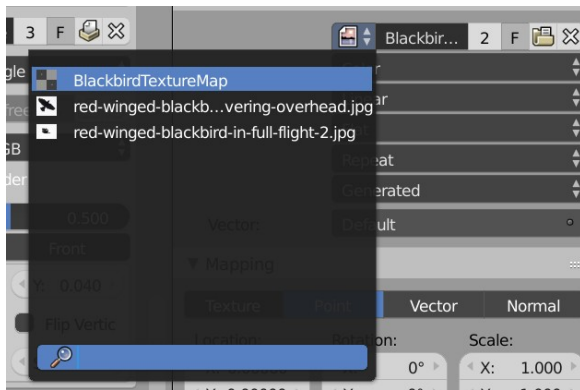


And the left pane looks now like this:

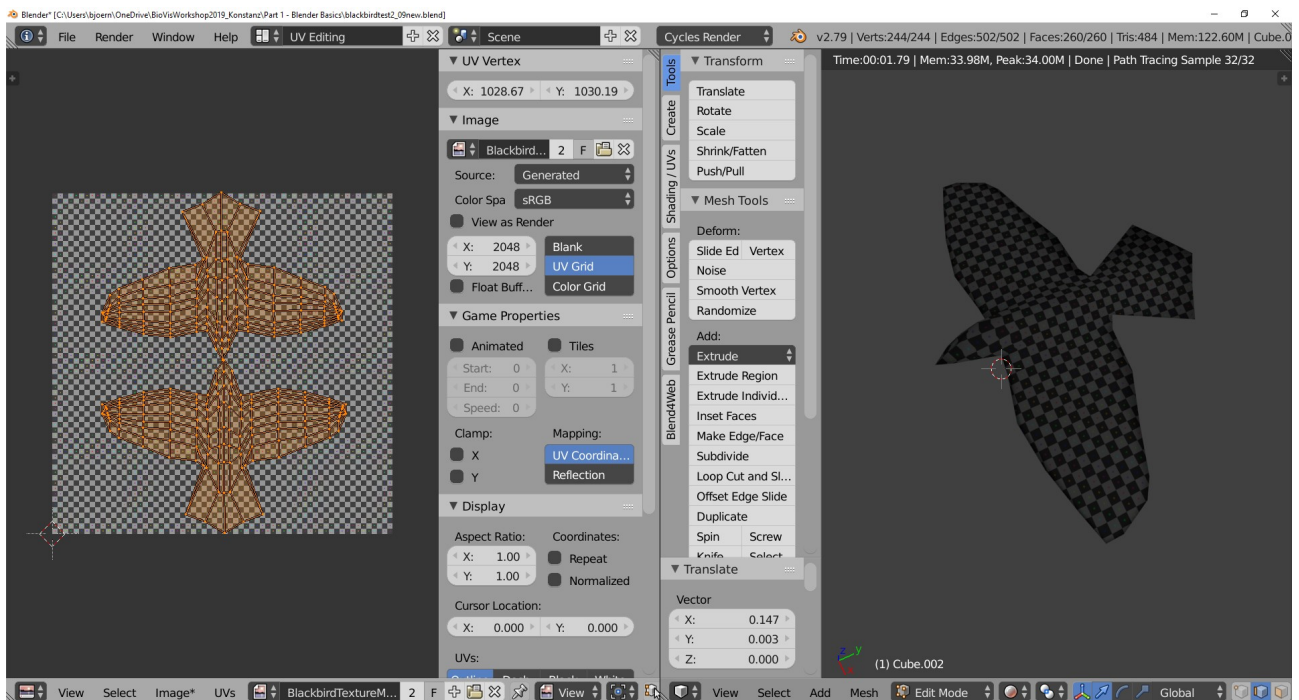


Now we only want to assign the new texture map to the Blackbird. For this purpose, we go back to “Default” mode in 1) and select the texture in the texture tab 2) like this 3) (and see below):

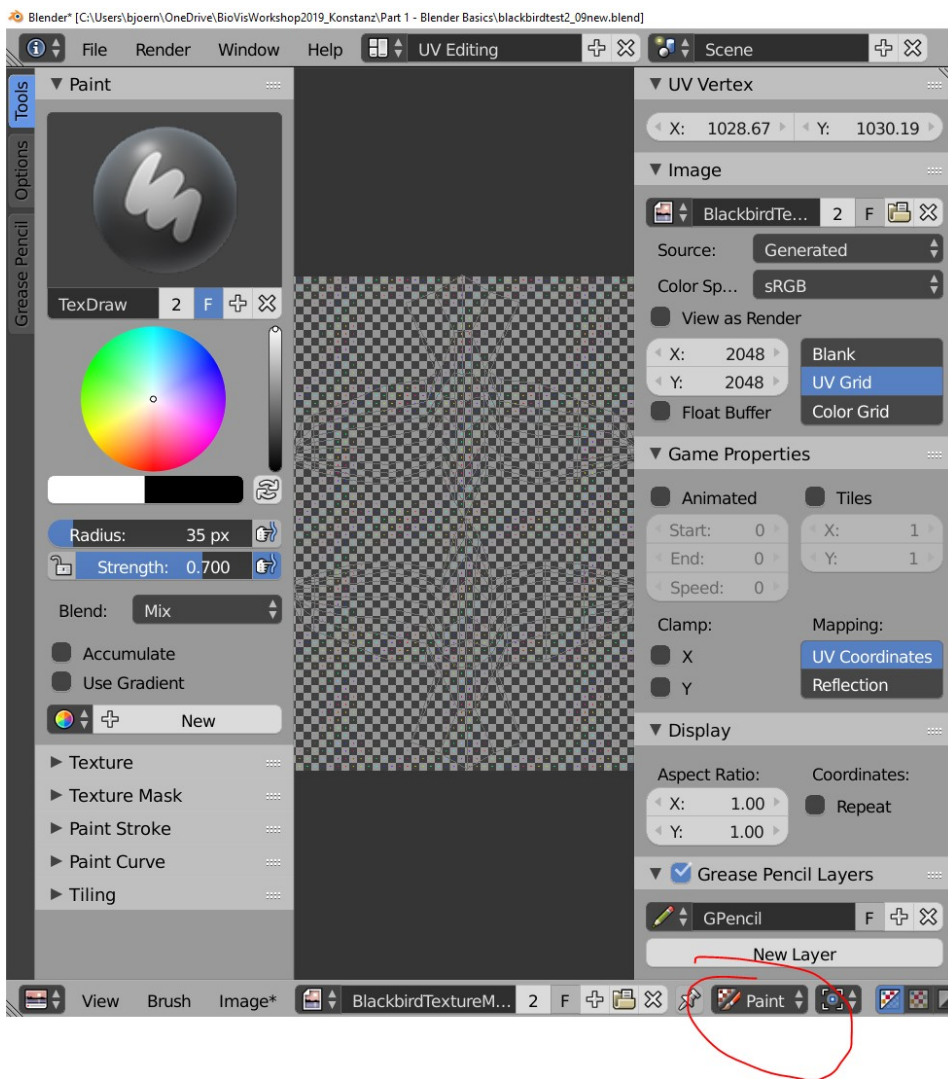




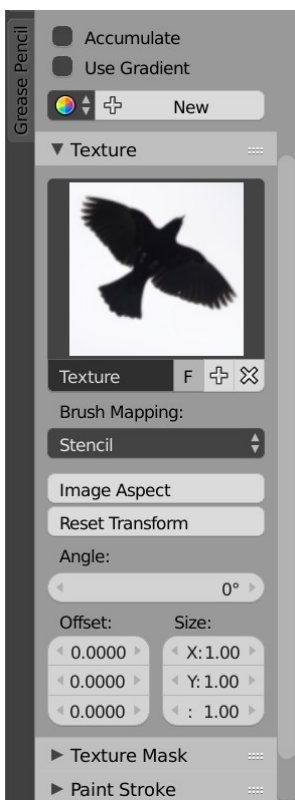
If we go back to “UV Editing” mode now, it looks like this:



Now it is time to switch to “Paint” mode:



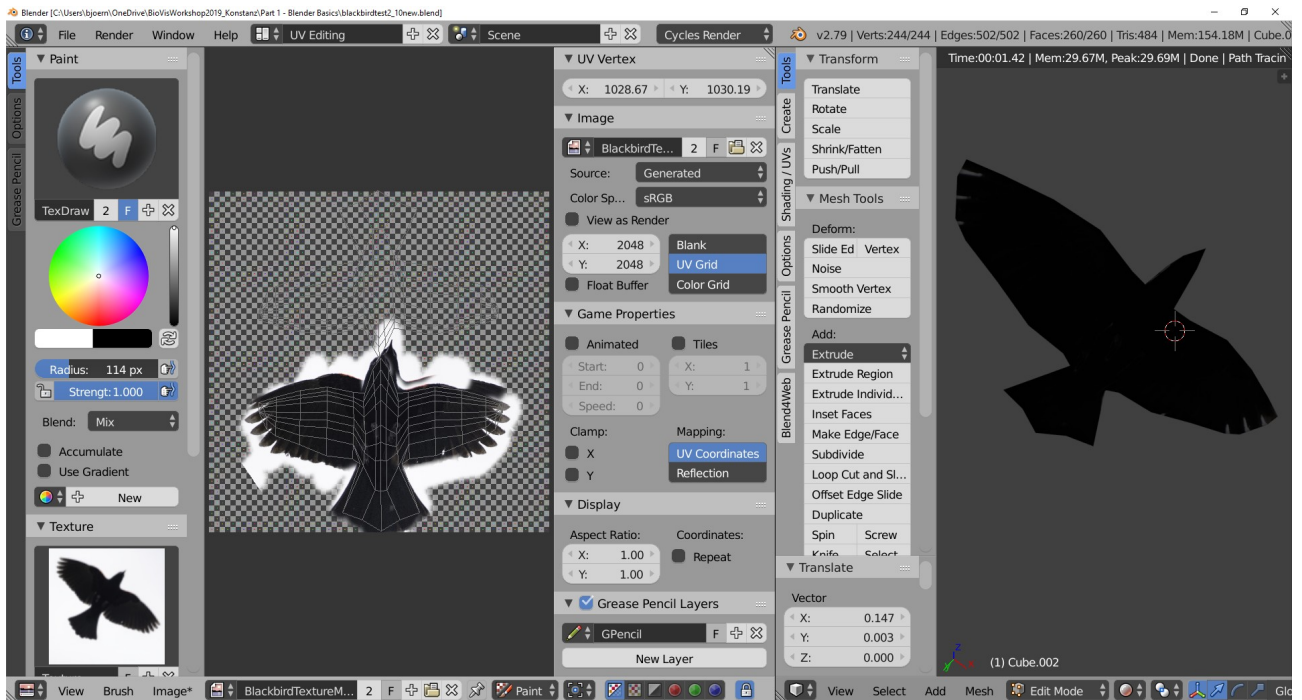
Now open the “Texture” category on the left hand side and set the “Brush Mapping” to “Stencil”:



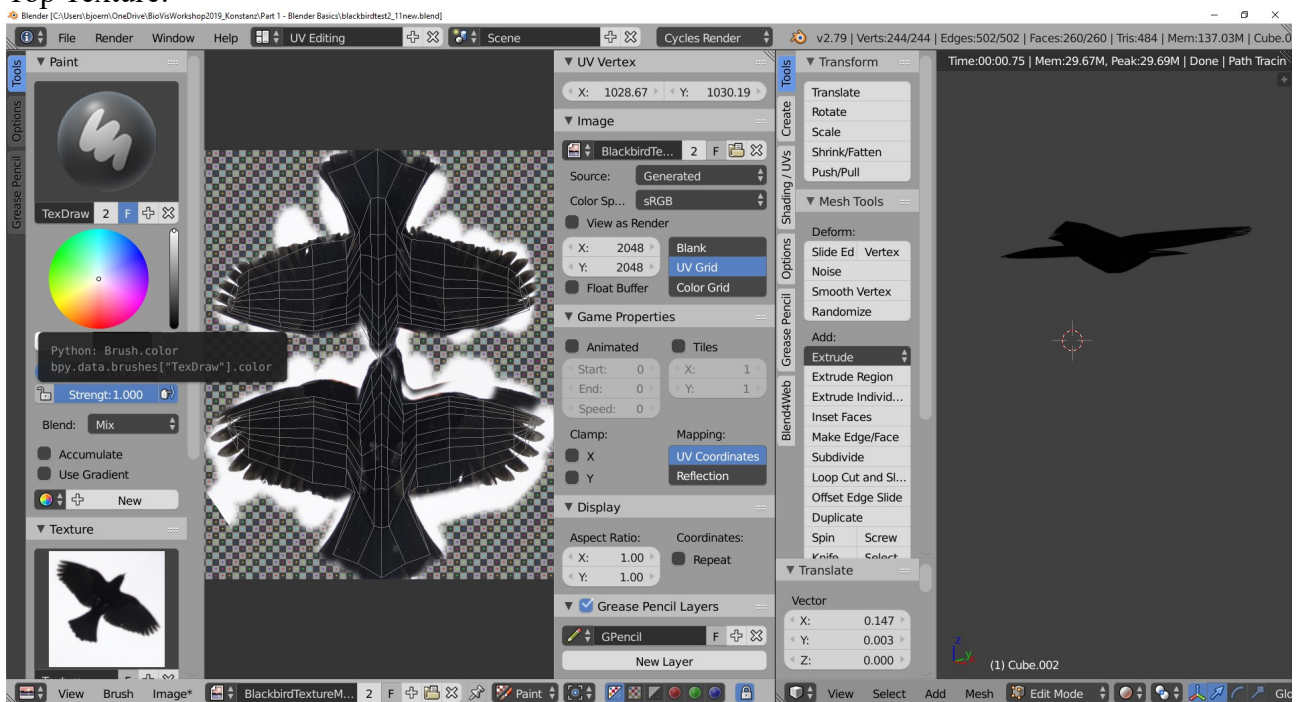
If you hover over the UV Editing pane in the center you will see a “stencil” of the image. Change the angle so that it is aligned with the texture grid, e.g. to around 35 degree for the bottom grid. With RM the image can be moved in all directions. Zooming in and out with the Mouse Wheel can be used to change the proportions. With LM the user can paint into the box. Setting the strength in 2) to 1.0 will directly paint into the texture with full strength, the size can be changed by setting the radius 1):



Bottom Texture:



Top Texture:



References/Images

Thanks go to the following image sources (photographer unknown):

Wisconsin, USA: Horicon National Wildlife Refuge is a Marsh located in Dodge and Fond Du Lac Counties in Wisconsin. It is the largest freshwater cattail marsh in the United States. Here are free public domain pictures of animals and scenery from the marsh:

Red Winged Blackbird hovering overhead

<https://www.goodfreephotos.com/united-states/wisconsin/horicon-national-wildlife-refuge/red-winged-blackbird-hovering-overhead.jpg.php>

License: <https://creativecommons.org/licenses/publicdomain/>

Red-winged blackbird in full flight

<https://www.goodfreephotos.com/united-states/wisconsin/horicon-national-wildlife-refuge/red-winged-blackbird-in-full-flight-2.jpg.php>

License: <https://creativecommons.org/licenses/publicdomain/>