

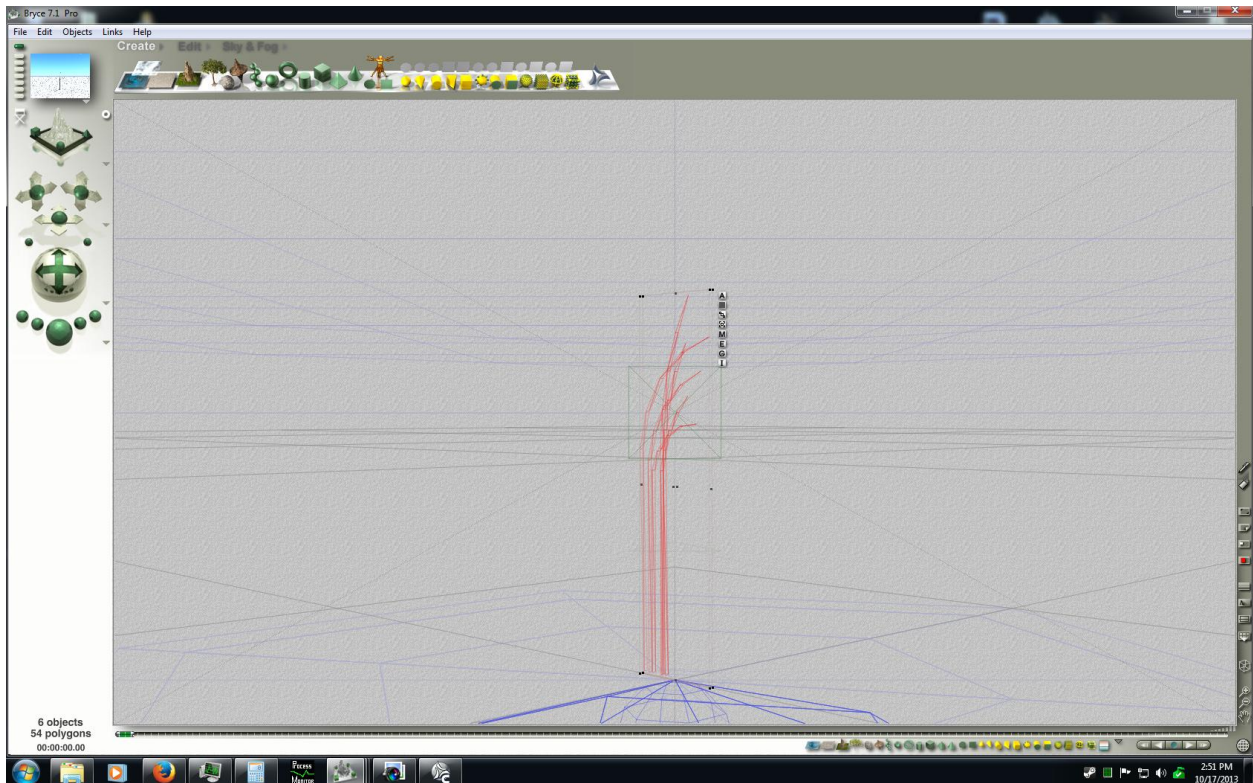
## How to Build Grass and Vegetation Tiles for Large Landscapes

Purpose: The Instancing Lab in Bryce 7.1 Pro is amazing. However, to maximize its ability to add natural levels of visual complexity, one needs to adopt certain approaches to produce the desired look on a truly large scale. Each instance requires a certain amount of memory to exist, so it turns out that one cannot take a single blade of grass, instance it 3 million times and cover a large landscape, as doing so will cause an out of memory error. It turns out that working with clumps of grass as tiles is the only way to cover adequate amount of ground. Clumps and Tiles allow us to work around this memory limitation and to indeed produce incredible levels of visual complexity in the final render.

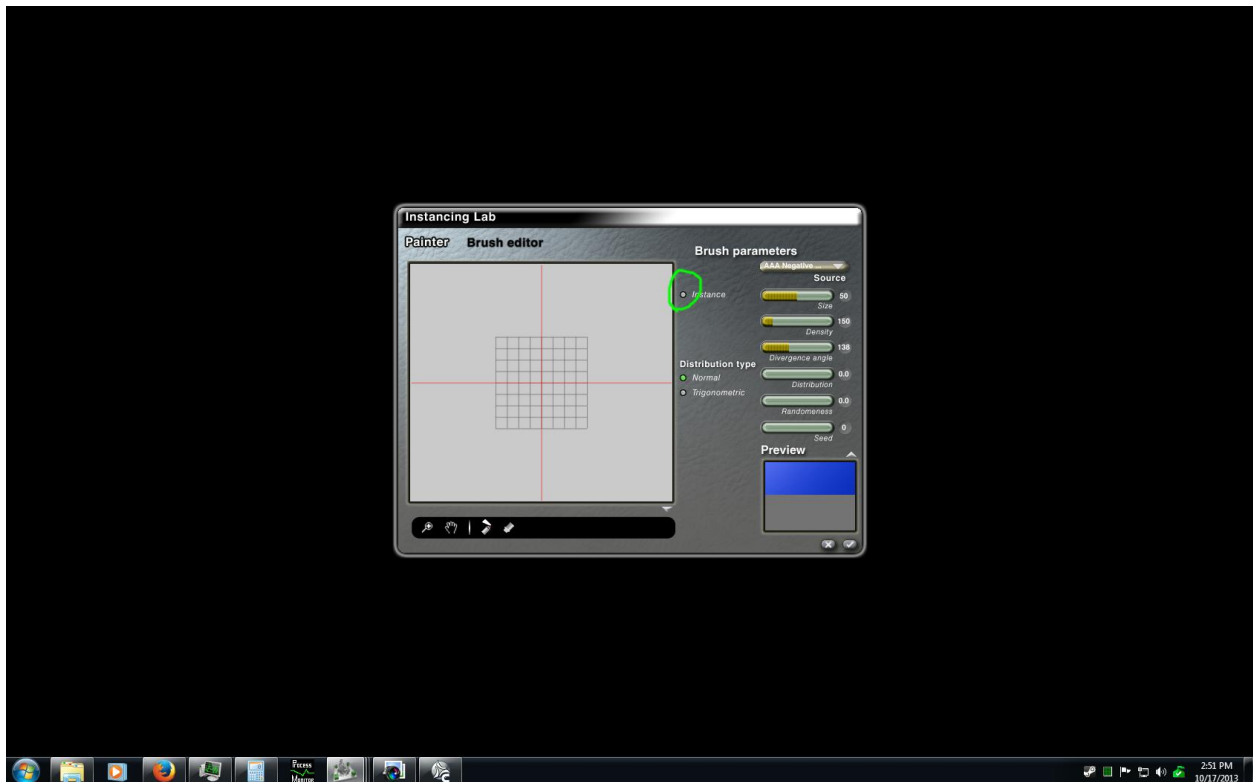
As follows:

1. Here are a series of grass blades I have created in Truespace. The blades are only 14 polygons each. It is best to use low poly grass meshes at this stage. The blades are already UV mapped. All six blades share the exact same UV mapping. Make sure that in the attributes for each blade that it is set as neutral or positive, not negative or intersect. The material applied is default gray and must remain that way for many good reasons I will explain below.

(You will notice that the grass blades I am using have extremely long stalks. This is because when painting tiles over a dynamic terrain some parts of the grass tile will touch the ground while other parts will appear to float above the ground. I have found that one might need to slightly submerge the tiles into the soil, and for that to happen one needs to have the added length at the base of the grass blades. More on this a little later)



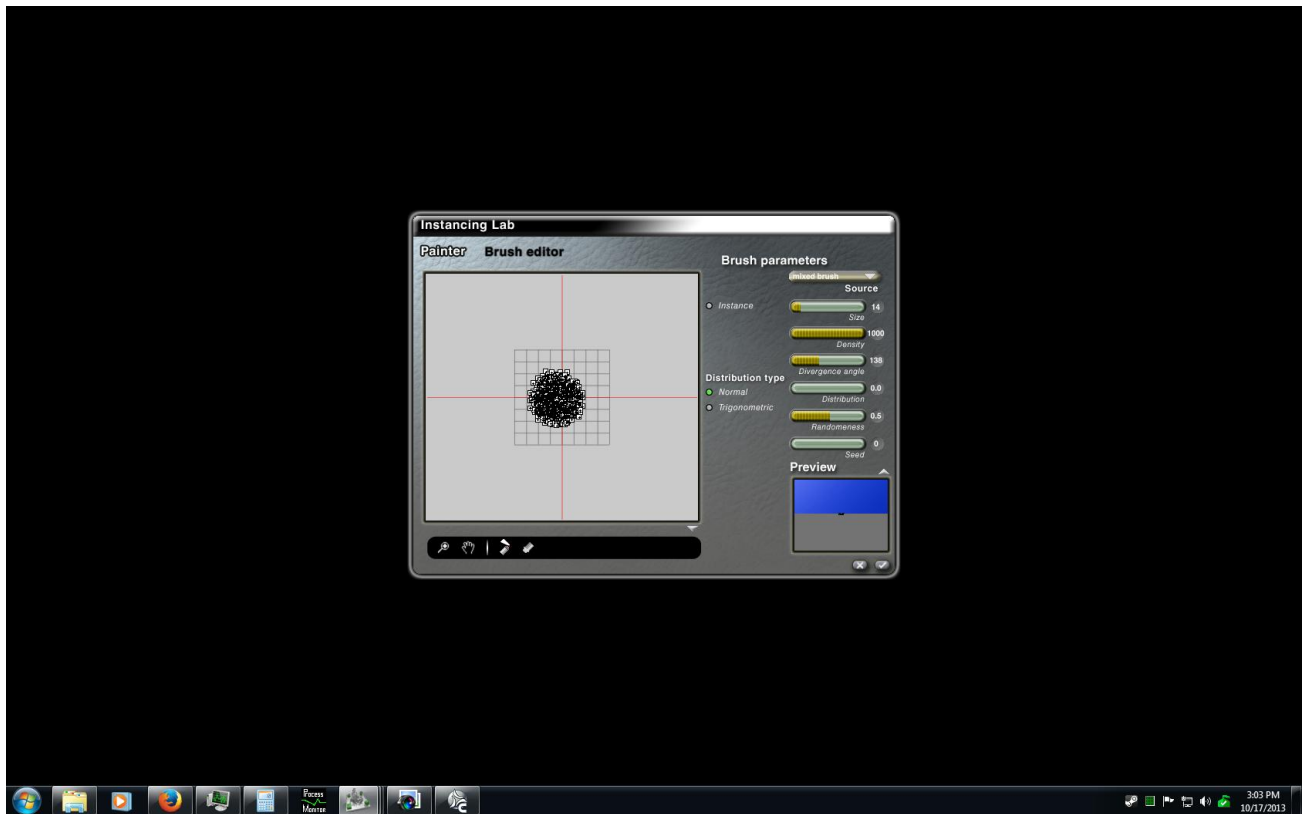
2. I select the ground plane to paint upon. I go into the IL (Instance Lab) and I then disable Instancing by clicking on the icon indicated in the image below. I don't want to paint instances; I want to paint real geometry. Trying to export a group that has instances in it will CRASH Bryce. More on that in a second.



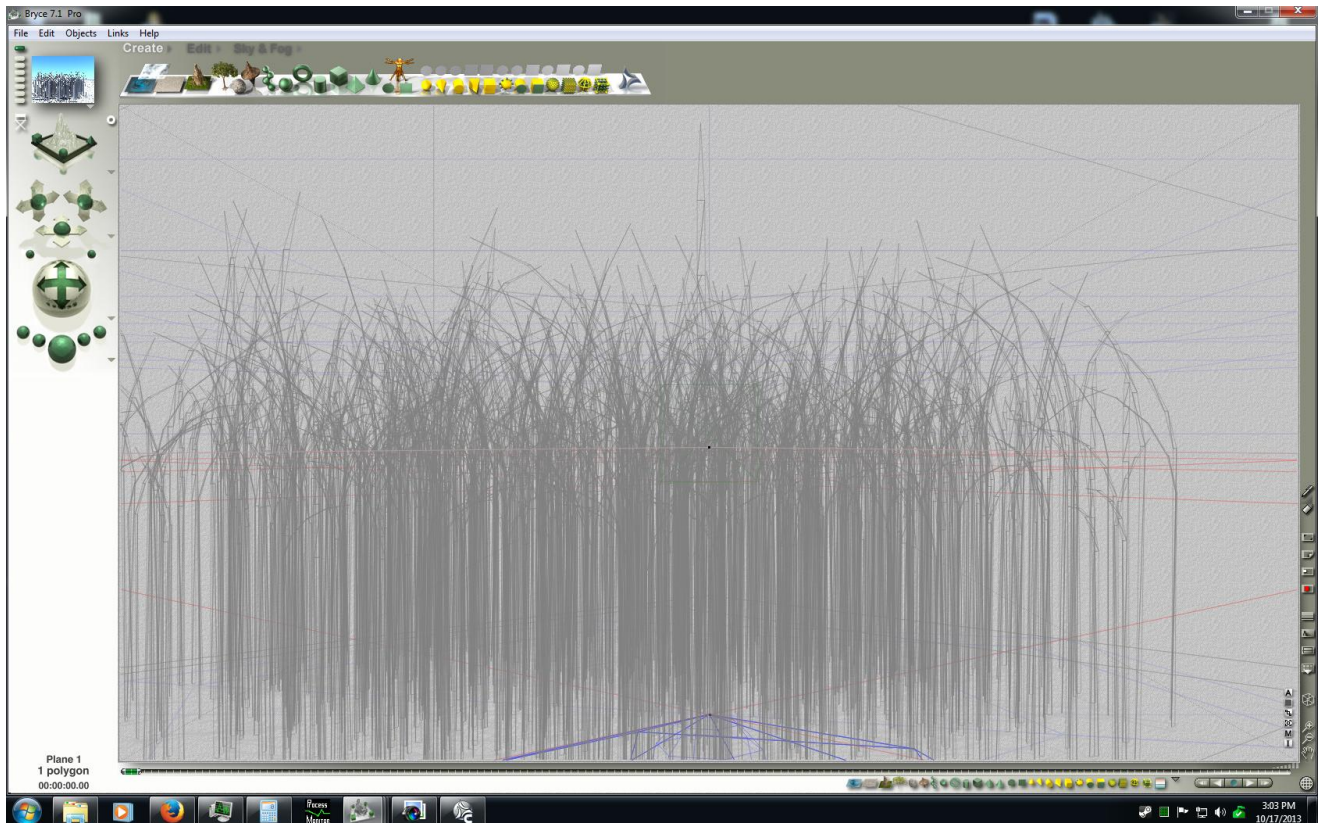
- I then go into the Brush Editor and I assign the six blades as sources. I also ensure that I have applied rotation and scaling variance for each blade. Most times if you set these parameters when loading the first source all of the subsequent sources will inherit the same scale and rotation settings. Click onto the pie chart to select which source you want to edit specifically.



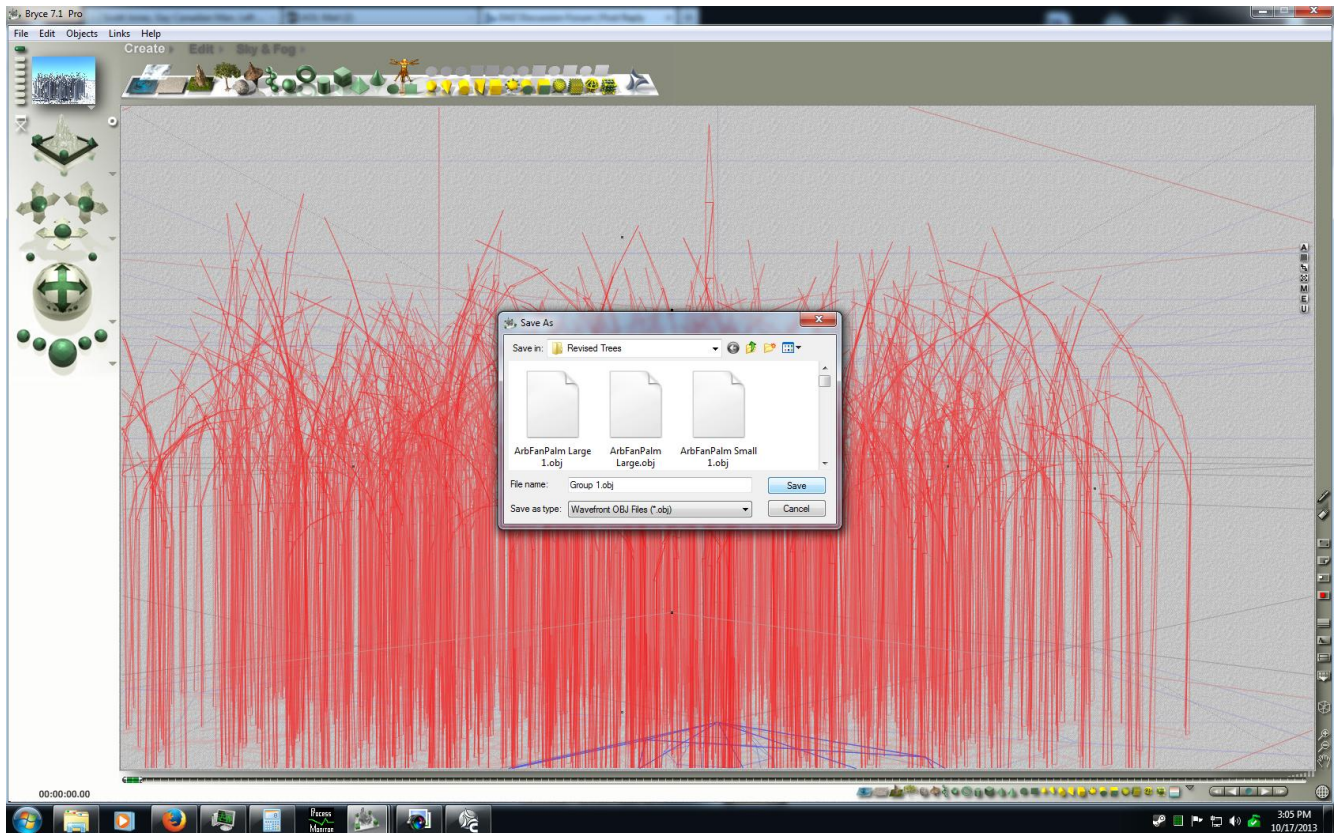
- Now back to the Painter Screen. Paint a small clump of grass, then exit the IL.



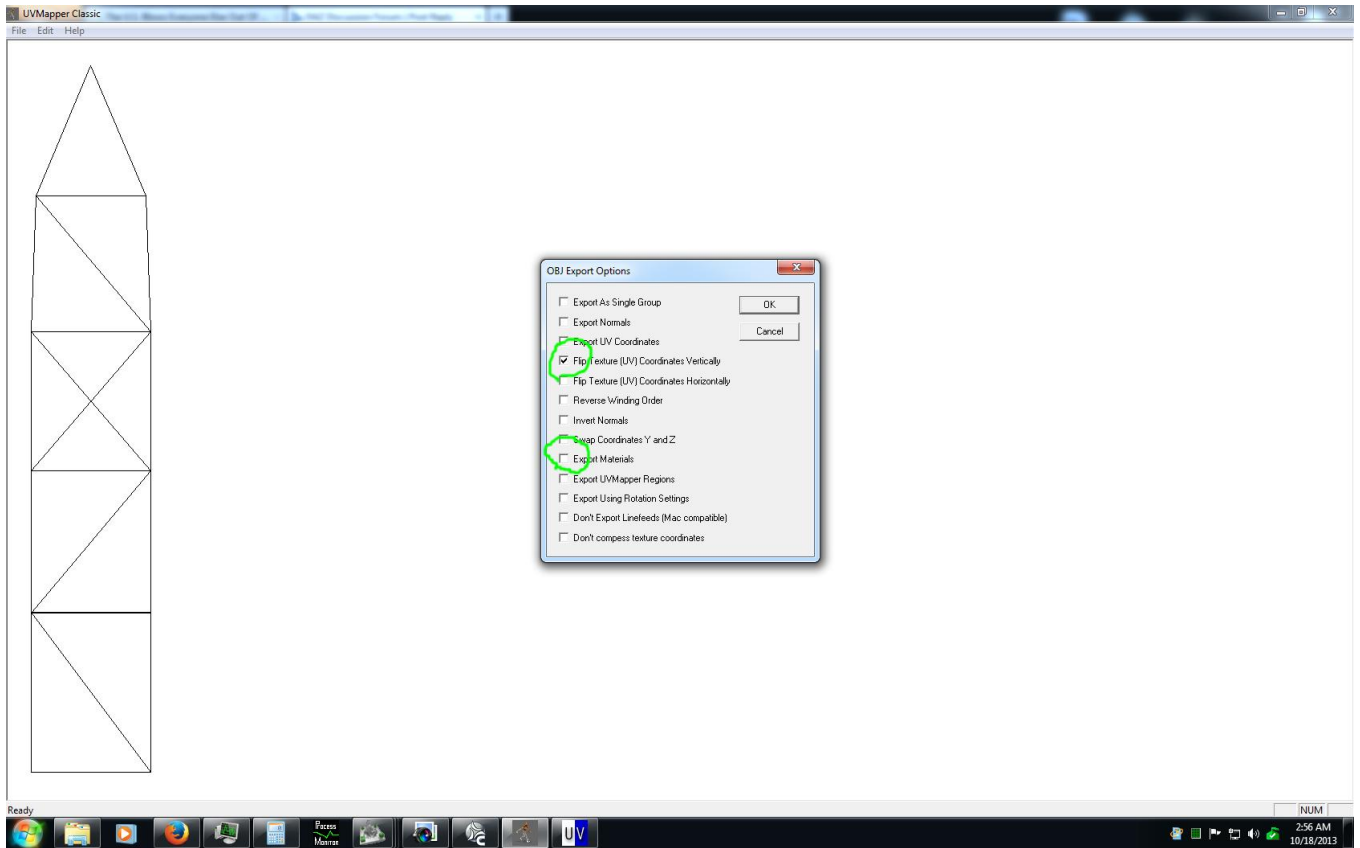
5. Now you have the group Unnamed. You need to Un-group it, and then re-group it. Its new name is now Group 1.



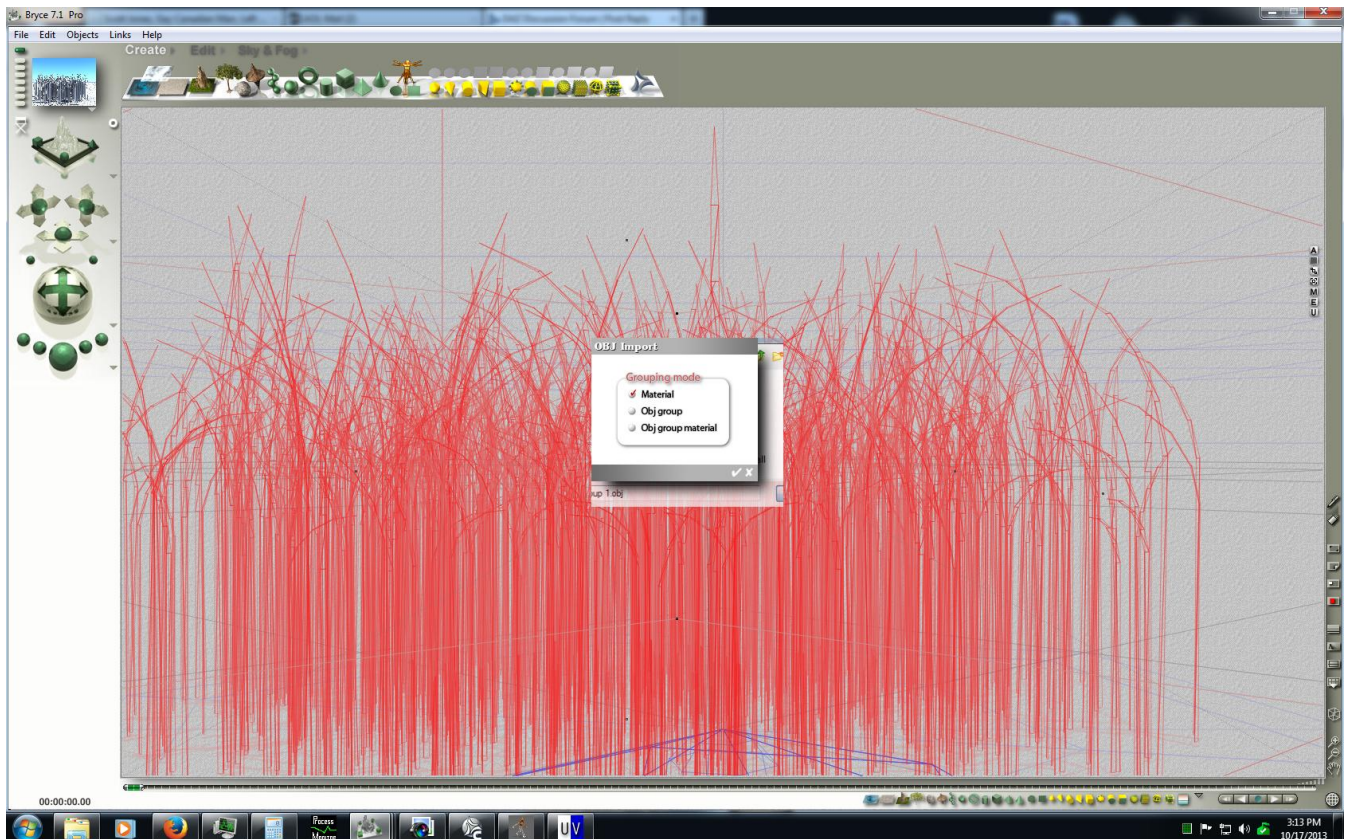
6. Export Group 1 as an .OBJ. Because the blades all share the same default gray material the export is lightning fast.



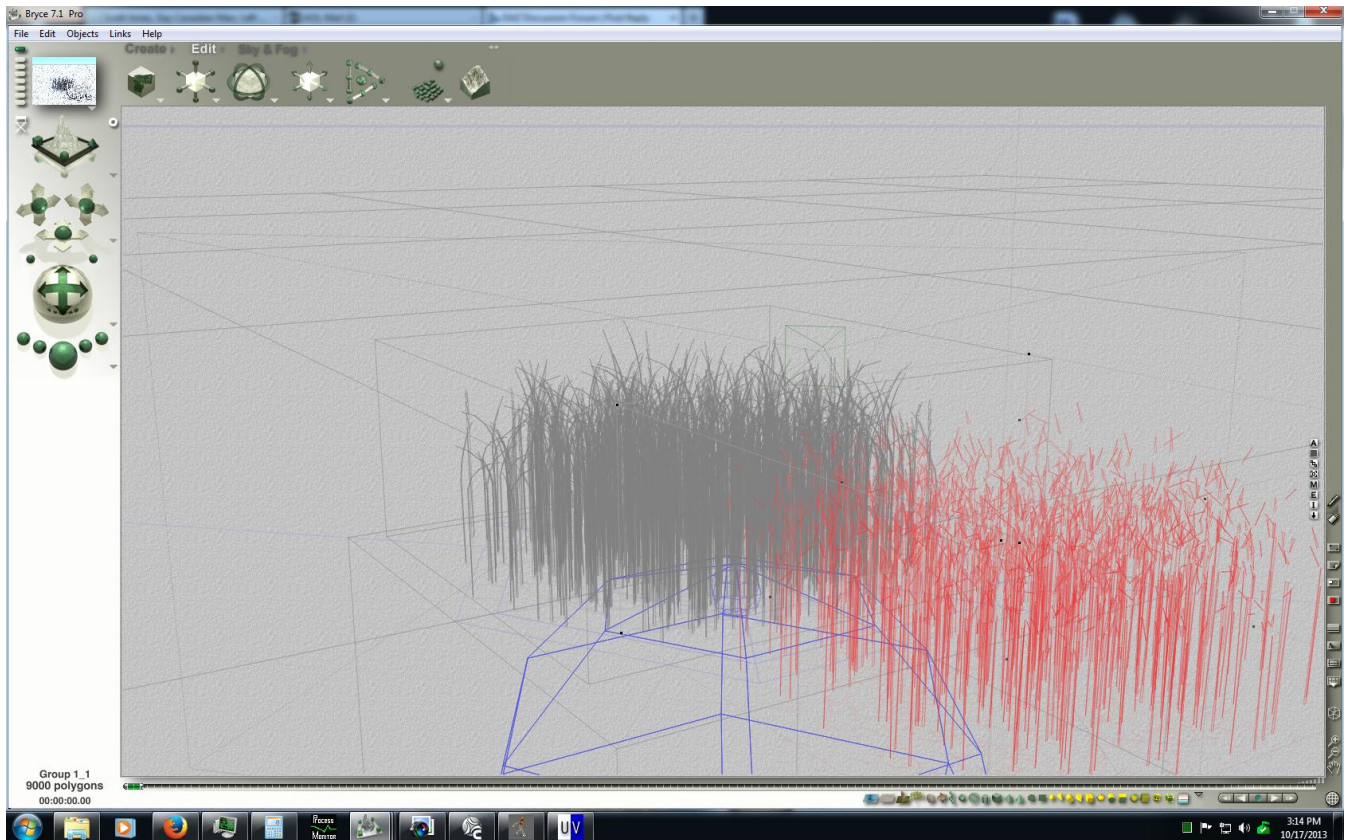
7. Open Free UV Mapper. <http://www.uvmapper.com> Load Group 1. Ignore the notification about an error loading materials, it is irrelevant. Ensure that the blades UV mapping hasn't gone screwy which I doubt that it would have. You will notice that the UV map is upside down, because there is a bug with Bryce where it flips UV Maps vertically when it is exporting and OBJ. Keep this flipping bug in mind.
8. Export Group 1 using the settings indicated below. Keep the same name Group 1. What you want to make certain of is that the option to export materials is disabled. If your UV map has been flipped by Bryce during the export then you might want to enable Vertical flipping as you export from UV Mapper so that it aligns properly once back in Bryce.



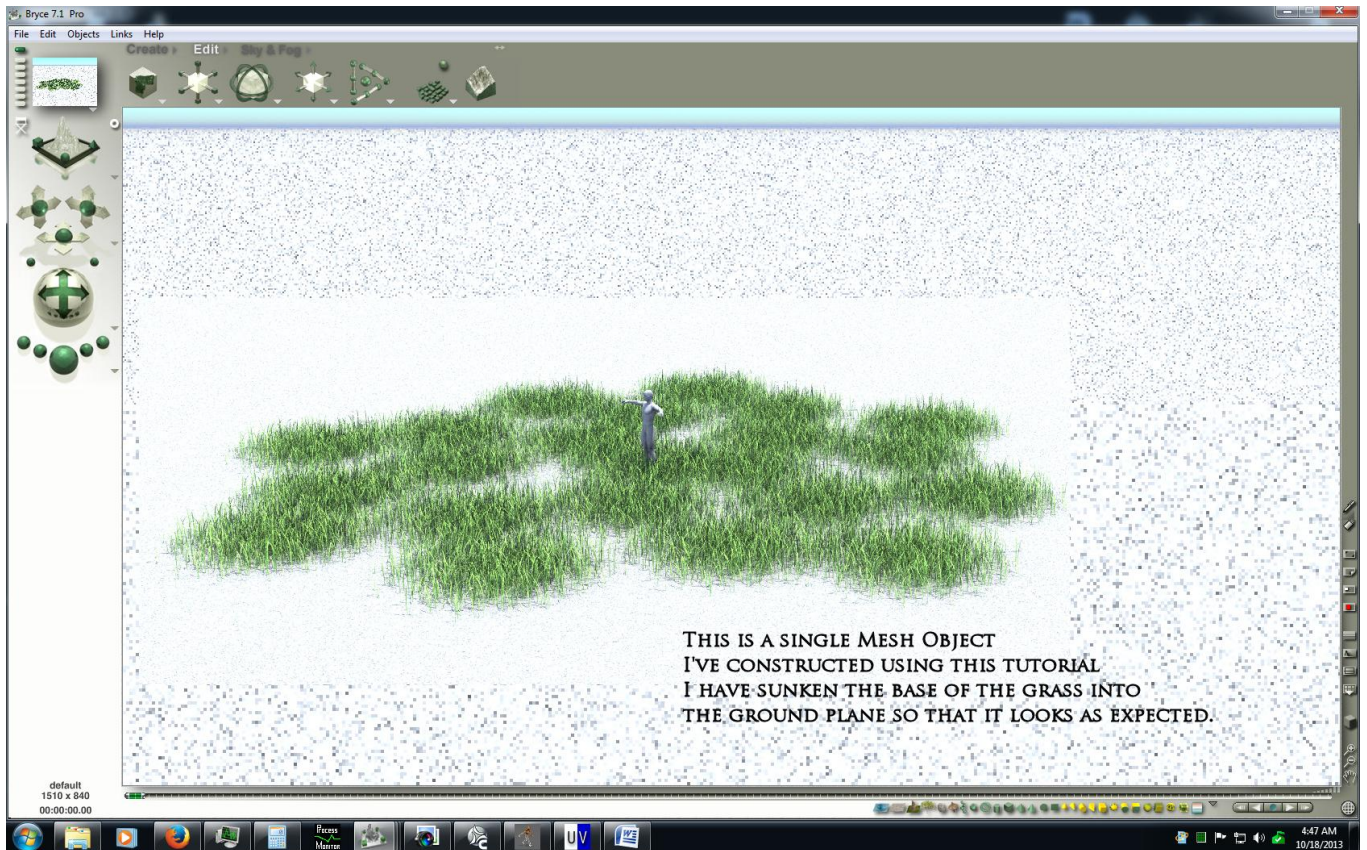
9. Now back to Bryce. Import the Group 1 you just exported from UV Mapper. When loading an OBJ, Bryce gives certain options. You want to use the Materials only option.



10. This is where the magic happens. Bryce needs a few seconds to import the mesh. But you will notice that indeed the multiple blades has re-imported as a single mesh. Name this mesh Clump 1.

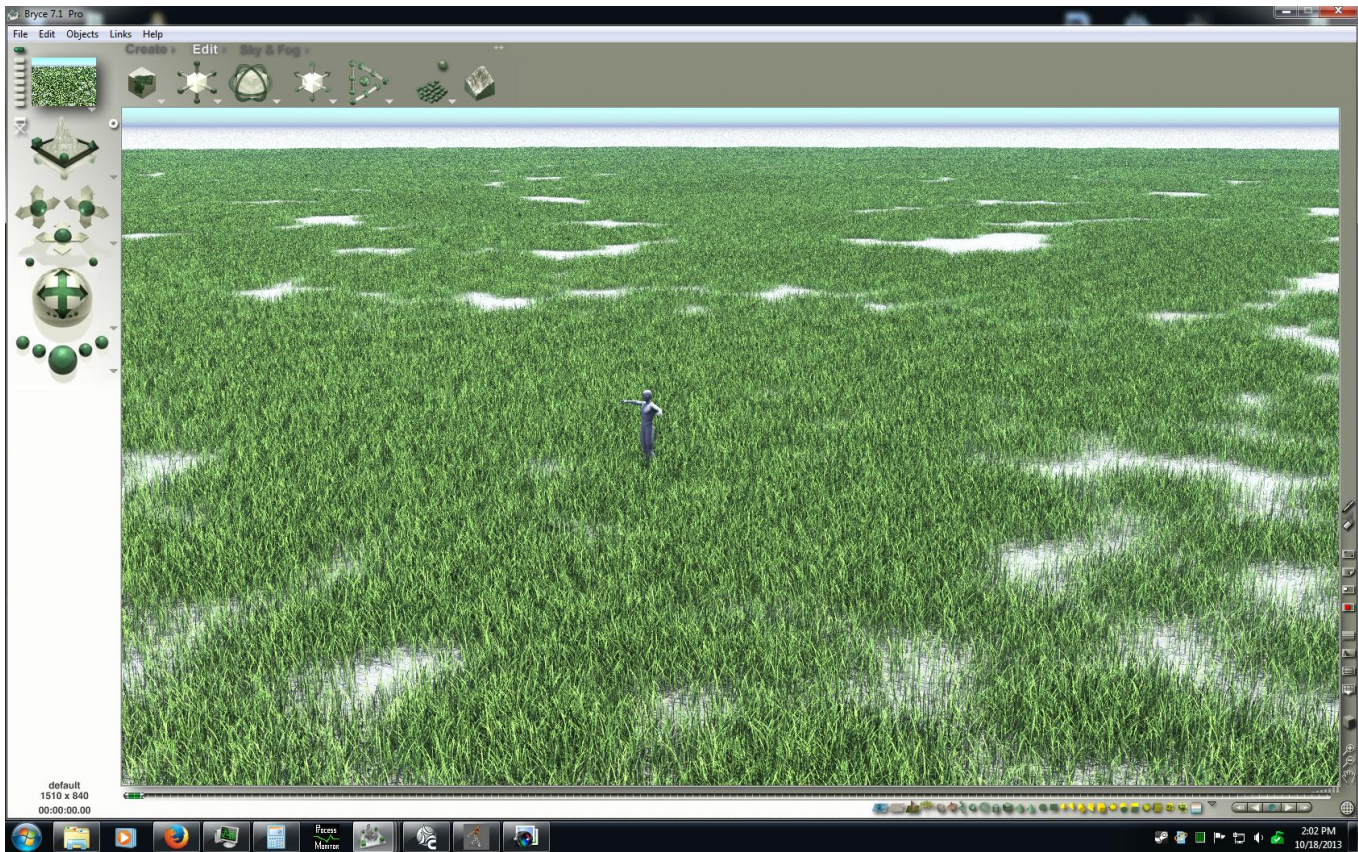


11. Congrats, you've made your first grass clump!! Now we rinse and repeat this process to create our first "Tile." Go back into the IL, but this time instead of loading the separate blades as the sources, you will instead load the Clump 1. You will paint Clump 1 onto an area and then you will exit the IL. (Remember that we already disabled instancing painting so you are painting copies of real geometry.)
12. Just like before, you are presented with a large group called Unnamed. Export it to UV Mapper. Then, export it out of UV Mapper again with materials disabled and with Vertical flipping enabled. In this way you should be able to create tiles of grass as large or as small as you'd like.
13. Once the Tile has been re-imported into Bryce, here is an example of what my resulting grass Tile's relative scaling compared to an imported M5 looks like. The grass you see in this current shot is a single mesh constructed as explained above with a few back and forths between Bryce and UV Mapper. I wanted a grass that was patchy and not 100% consistent. The good thing about this single mesh ideal is that it will rotate properly by the IL (the IL cannot truly rotate grouped objects due to a bug) Notice how much width the tile has compared to the scale of an M5. It costs around 400,000 polygons.



14. Congrats. You've now made your first Tile. Now you are ready to truly begin constructing your complex landscape.

Let's rinse and repeat once again. This time, I have now loaded that 400k polygon Tile from the previous shot as my new source. I have also gone back to the IL and **re-enabled instancing** since now I am ready to cover some ground. I also want to keep the 360 degree rotation I was using before, but I want to remove all scaling variation because at this late stage I don't want grass at all different scales all over the shot. As you can see from the example shot below, I have no problem covering huge areas with grass. (Keep in mind that there is just as much grass off to the sides and behind the camera as there is grass in front of the camera!!! This is a lot of grass and I could go on much further with memory to spare.)



15. There you have it! We've made real 3d grass that covers lots of ground without running out of memory. This same ideal can be extended to other types of ground level vegetation we well. For some perspective, I have also included one of the "Tiles" used for the Volcanic Archipelago project. This example features grass at the ground level, but flowers and smaller trees as well. Notice the M5 at the center to provide a sense of scaling.





#### NOTES:

1. SHOW AS BOX is your friend!!!!!! Use this to reduce the wireframe detail and it will keep things moving faster. There is a cost to working with high poly objects. Bryce reactions can get slow when editing an Unnamed that has millions of polygons, but once you have finished editing large groups the scene navigation speeds back up to normal. but only when Show as Box is enabled for all large groups.
2. You can paint instances along vertex normals by pressing ALT while painting. You can then alter the Navigation tool to Object, and then you can sink the grass clumps into the earth so that nothing floats above. So in my case I start with a single blade, I then create a couple of clumps and I export those clumps as objects. I then re-import those small clumps and repaint them to create larger clumps. Then, when ready, I export the clumps as a super clump or Tile. Once I get a clump of a reasonable size, I'm good to go. Almost forgot.
- 3.

#### MEMORY ISSUES TO KEEP IN MIND:

There is a bug, a nasty one. After a scene has been saved and reopened memory usage will soar. As Horo suggests always keep the Task Manager open while working. Watch the way memory usage increases each time you paint more instances. Know that if you paint what appears to be 100mb of instances in the original session, once closed and re-opened the memory usage jumps to about 500mb. There is a roughly 500% mark-up for instances. The reason is because the link between materials is broken after saving and reloading. For example, during the original session if you alter the materials of the source the child

instances would update automatically with no cost on memory. But after saving and reloading, you will find that altering the materials of the source does not affect the child instances as it should. Instead one must manually alter the materials for the instances. This results in much more memory overhead and is the equivalent of a memory leak. It's as if the whole idea of instancing becomes partially broken, the instances become partially "real" at least in terms of the way the material lab views them. Before you save again you must make certain that the source and their instances share the exact same material settings. Though the materials link is in some ways broken, if you don't ensure they share the same material before saving the internal logic of the scene will fail and the save will fail.

One last tip...

The Undo Buffer holds the last 15 actions. Large actions, such as painting instances use up more memory than small actions. The only way to truly clear the buffer is to close then re-open Bryce. But that isn't always what we want. You can reduce memory occupied by the buffer by replacing memory intensive actions for those which are easier. I tend to create a sphere, I then resize it about 15 times, then I delete it. I find that on the 15 re-size the memory usage for the scene will drop dramatically, often by hundreds of mb.

Thanks for reading all this. It is about 6 pages total of text so it's no surprise it is challenging to get it right. It took me a couple of years to figure this out on my own.