

Creating Foliage.

For This tutorial you'll need to download the following Materials:

Fir Tree Trunk from **Megascans/Quixel**

Pine Branches from **Megascans/Quixel**

The Pine Branches is a Material set and will come with the following Textures: Albedo (Base Colour) Normal, Roughness, Opacity, Translucency, Ambient Occlusion and any other maps that you select.

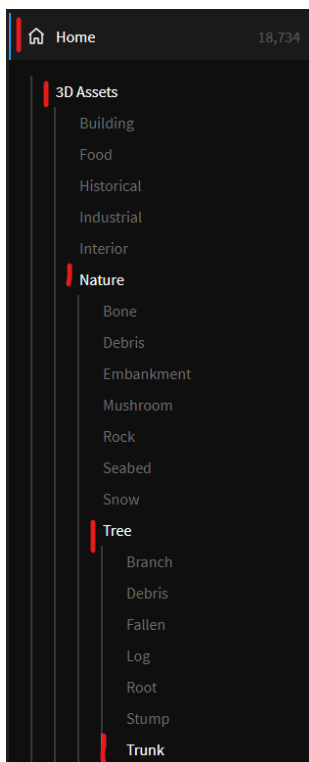
using **Megascans/Quixel** Assets as a base for us to Improve/add.

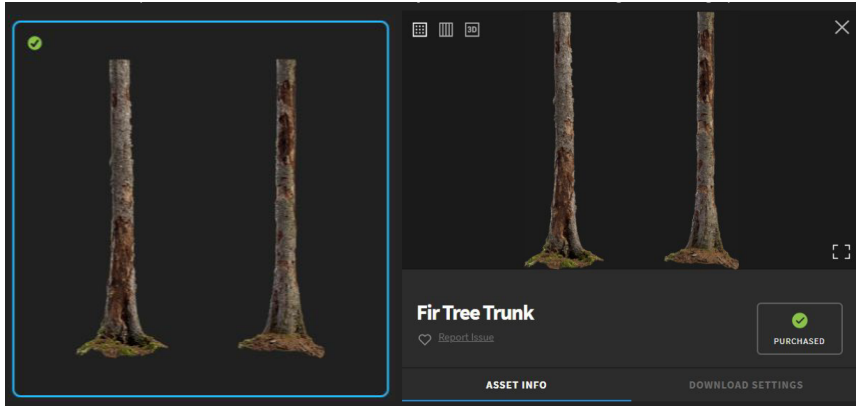
Open up **Quixel Bridge™**

(It's worth noting if you have Unreal Engine 4™ Installed, you will have access to the entire library for free)

In the Navigation menu on the left hand side of Bridge Interface

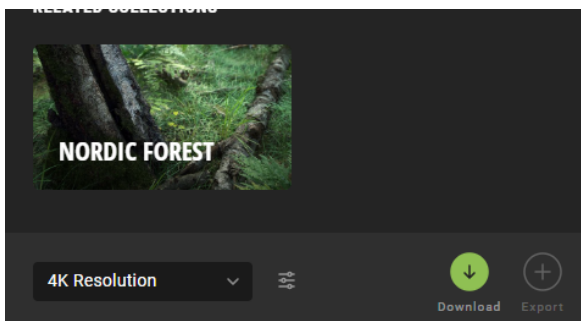
Select: *Home > 3D Assets > Nature > Tree > Trunk.* [Image Bellow]





For this lesson we're going to use Spruce Tree Trunk. (Names May Change)
 Use the Search bar at the top of Bridge and type in Fir Tree or Spruce Tree.
 It will show you the Latest assets with that name/tag.

Click on the Tree you want and *it'll turn blue and be highlighted*. In the
 bottom right corner you'll see a Download button.
Click on the download button.



Once we've downloaded you can **Right Click** on the item and **Click**
Go to Files... this will open a new window to that location.

Let's start by opening **Maya™**

We need to import our base into maya so let's start easy.

In the top left of the screen **Left Click** on: File and choose Import

Choose the LOD0 Mesh from the file location:

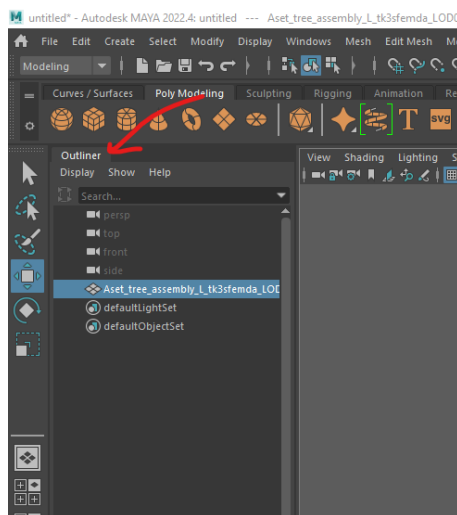
tk3sfemda_LOD0.fbx

Yours may be named something different but this is what mine is named.

Now we should have our base model in.

Let's make sure the UV's are good by applying a texture to the Tree.

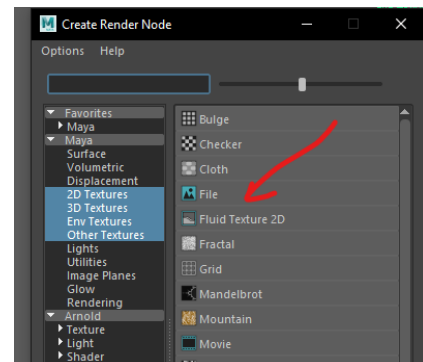
Left click on the Tree in the **outliner**



In the Attribute Editor on the right side of the screen, Scroll to the right until you find lambert1 (or what your material name is)

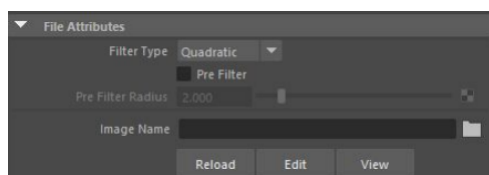
Left Click on the checked box next to Color and a prompt window will pop up, Click on file

(You can see this on the image to the right)



Once you've chosen the File the window will disappear and you'll now see a File Attributes

window in the **Attribute editor**, now you need to **Left Click** on the folder Icon that says Image Name (*Image Below*) and a window will pop up so you can select the texture. **Select** the texture file to add here.



Seeing our Texture

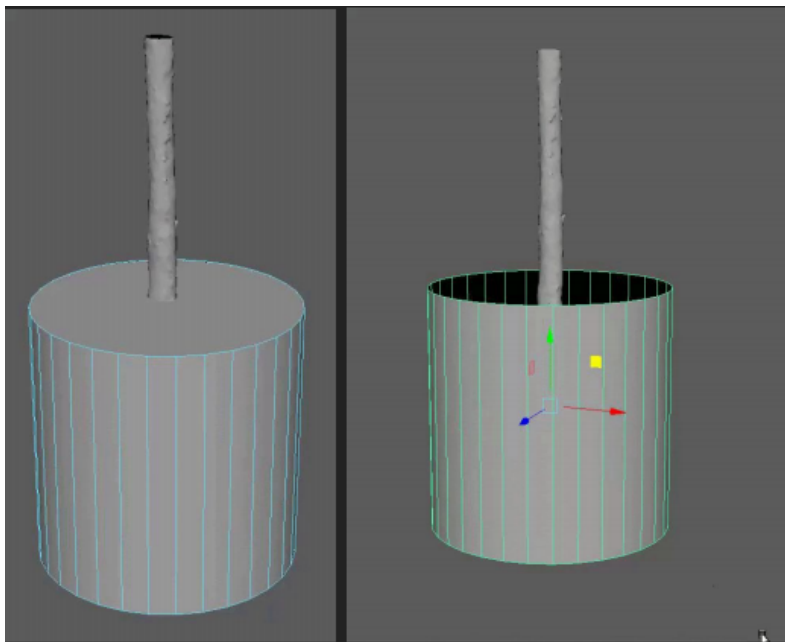
Once you've done the previous steps, you can now **Press number 6** on the keyboard whilst in the maya viewport and we should be able to see the trunk with a texture on.

Exporting the Bark

Add a cylinder to the scene; Under Poly Modeling you can find pCylinder
Now, In the Attribute Editor find polyCylinder1.

Here we can change settings for our Cylinder, we want to make sure that Subdivisions Caps is set from 1 to 0 & let's also change Subdivisions Axis from 20 to 32. Select the Top and Bottom face of the Cylinder and Delete.

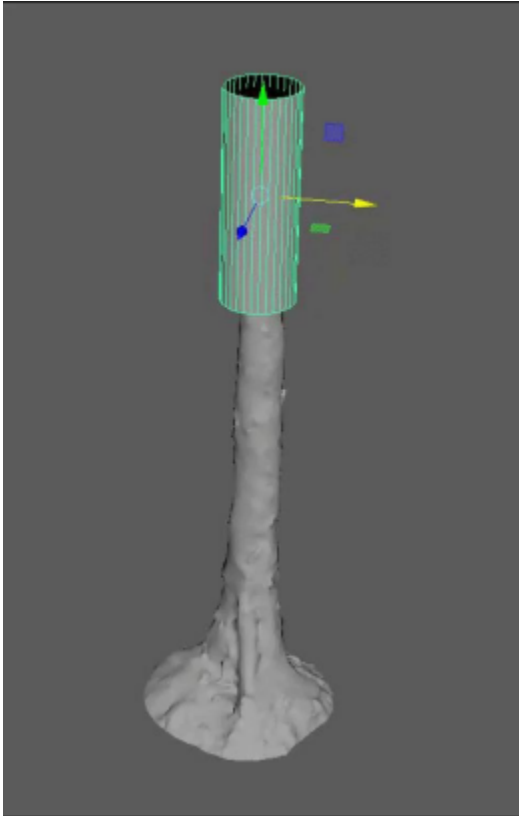
Once that's done we're going to Shape our Cylinder Similarly to our Bark Upper Part



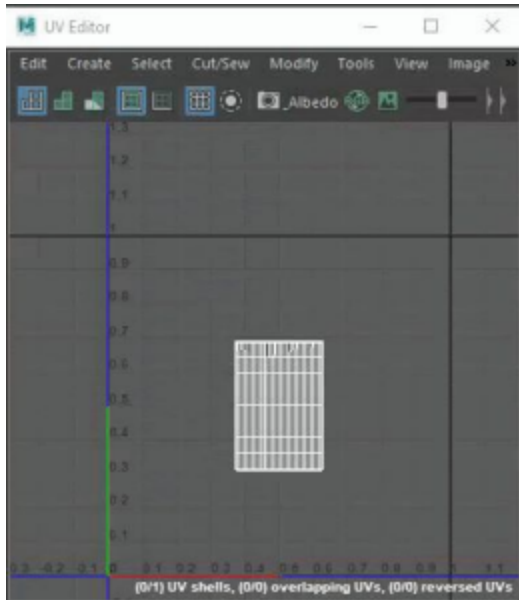
Now we're going to make sure that our Object is a Live Surface
To do this Select your asset and then Click on the Magnet Icon (Image Above) Now that our Object is a live surface we're going to want to add some extra edge loops to our Cylinder (Whilst Live surface is enabled our

Cylinder Surface will snap to the tree stumps surface) To add loop Cuts
Open your Modeling Toolkit and Select Multi-Cut when in the Multi cut tool
your cursor will turn into a Knife Icon:

If you Hold Ctrl you can use an entire edge loop instead of the knife cutting tool, then instead of using left click we're going to use the middle mouse button and this will add loop cuts to the center of our surface.

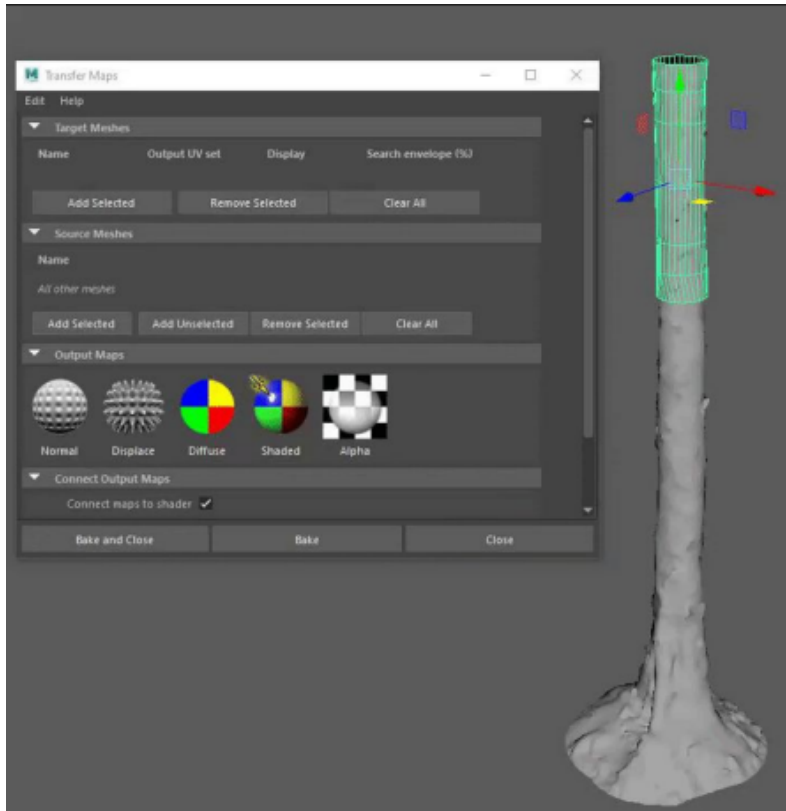


Now we need to ensure our UV's of our Trunk (low) are lined up properly.
Open the UV Editor You can find this in the Topbar > UV > UV Editor. Now
Select the UV Shell (Hold Right Click and Find UV Shells) Then Scale to the
same Size as the UV Grid 1 (UDIM 1)

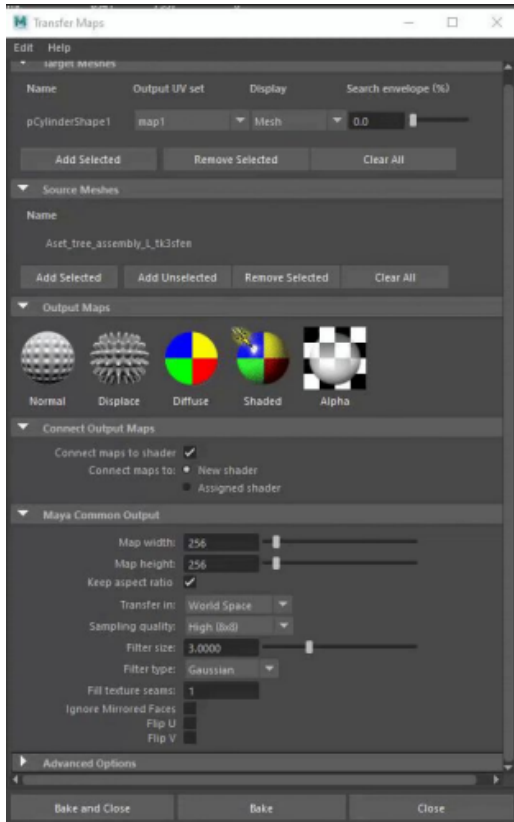


With our Trunk (low) Select it and Hold: Spacebar > Lighting & Shading > Transfer Maps

Next we need to add our Trunk to the Target Mesh and the Megascans Trunk to the Source Mesh.



Next, we're going to Select Diffuse under Output maps. Change the Format to TGA from DDS And under Maya Common Output we're going to change the map width and height to 4096 (It's best to work 4K or higher and downscale afterward).



Make sure to choose an output folder and click Bake. Once you've baked the Diffuse/Albedo you can now view it.

Repeat this step by placing the Normal map in the Colour texture and Bake the Texture map Then repeat with Roughness and Displacement (as any normal or displacement we bake from the normal will only be topology not the texture map, we just want to flatten the texture)

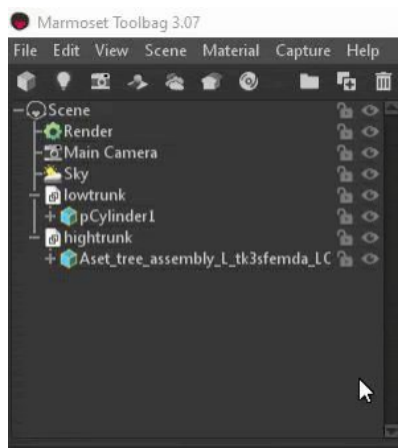
There is also another Alternative method to baking
(Which I prefer if You have the tools.)

For this Method you'll need Marmoset Toolbag™

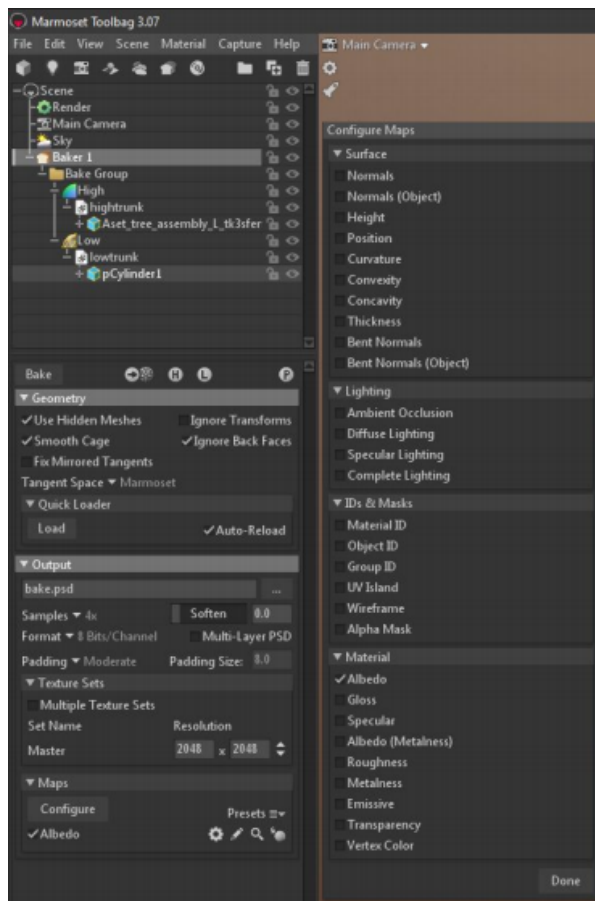
Export the Megascans Our Trunk as Separate FBX Files.

To do this in Maya: File > Export Selected (Make sure only one trunk is selected) Now, In Marmoset Toolbag™ : File > Import Model > Import Megascans Trunk First.

Now Let's do the Same with our Low Poly Transfer Trunk Next we need to Setup the Baking Process. Left Click on the Loaf of Bread, Add the High Trunk to the High and the Low poly to the Low



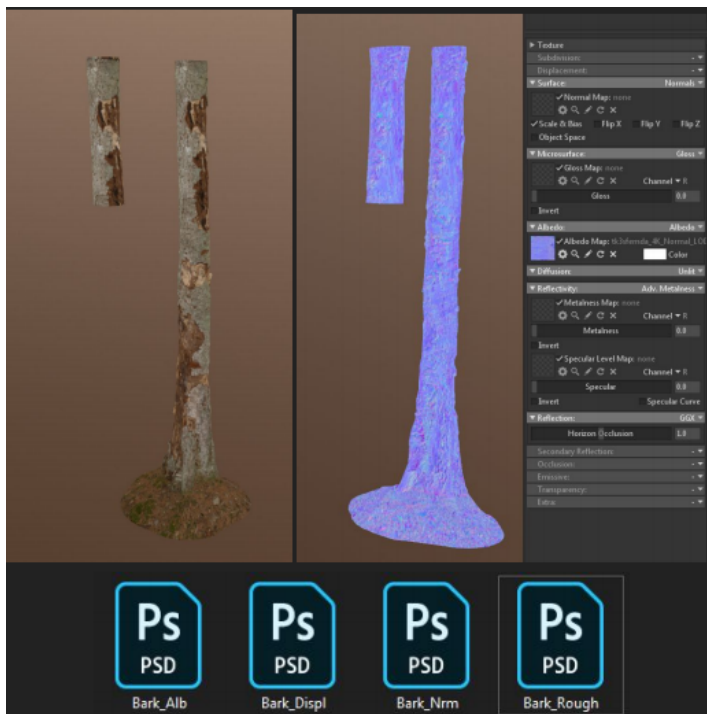
This process is the same as Maya, we need to bake all texture maps using our Albedo. So let's start with the Diffuse. Select: Configure under Maps and only Check the Albedo.



Let's also change our Resolution to 4096x4096 & turn our samples down to x1 (this will give us a sharper bake.) Once we're done just hit Bake!

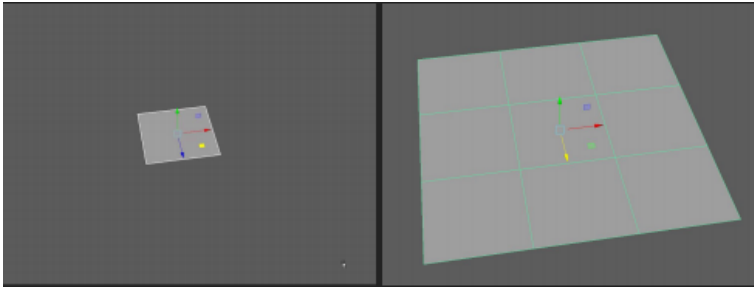


Don't forget to Add the Normal map into the Albedo map of the High poly and transfer only the Albedo
(Rename the baked version and bake again until you have all maps.)



Now we Need another Program. Let's use Substance Painter™ First Let's Create a Special Plane in Maya. Create an Image plane and then set the Subdivisions to 1. This will give us a Uniform UV, Duplicate repeatedly and

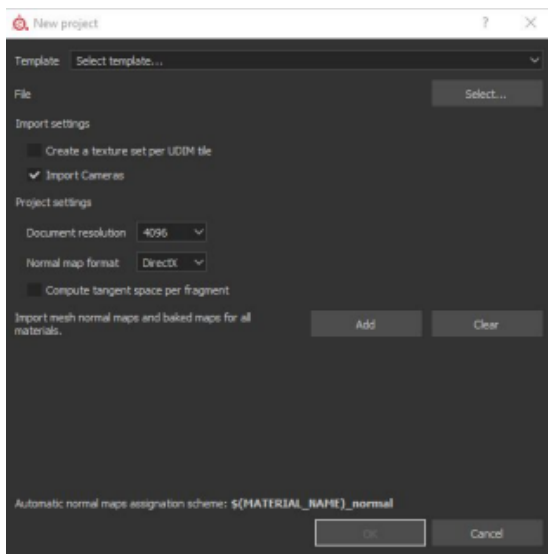
move into position next to each other (That way we can use the middle as our Tile area.)



Now we're Ready for Substance Painter™

The reason we're using Substance Painter™ is because it's great for clone painting and controlling how our bark tiles.

Import our Tile Plane; File > New >



Click on Select... and choose our Plane then Click OK.

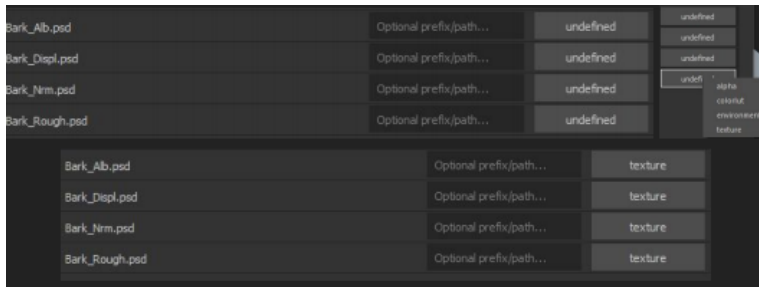
At first you may not see anything in the viewport.

That is only because our plane is flat, so Hold ALT+Left Mouse Button to rotate around, the controls are similar to maya.

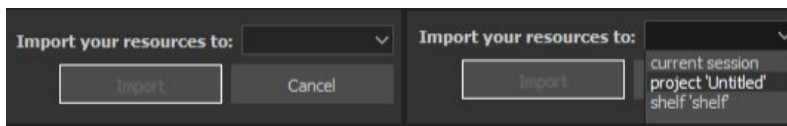
Now Let's Import our Textures.

Import Resources > Add resources > Navigate to your Folder and choose all texture maps.

Left Click on Undefined and change Undefined to Texture.

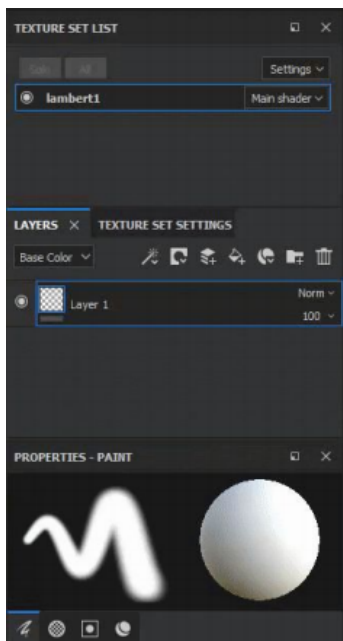


Select the Drop down and Choose Project, Then Select Import



Now Let's set up our base material.

On the Right Side of the Viewport you can see LAYERS (This is Similar to Photoshop) Delete the Layer 1 and Add a Fill Layer



Now Drag all of the Textures to the matching area I.E: Albo to Base Colour, Normal To Normal etc.

Now we're going to create an Empty Layer above our Fill Layer.

Next; Change all of our Settings [Base Colour, Normal, Roughness, Height etc] from norm to passthrough

Now on the Left Side you'll see the Clone Stamp Tool

All we need to do now is clean up the tiling and try to make it look less repetitive Remember some barks are very hard to save.

In this situation half of the bark has been eaten by mites, so we can only save one half.

Luckily fir's are very full so it won't be fully noticeable, but that doesn't mean we shouldn't try.

Press V on an area to start copying and then just Draw as you would in Photoshop. This will be a long and tedious process but well worth it.



Our Goal is to Minimise the amount of repetition on the tileable texture. With that done go to File > Export Textures

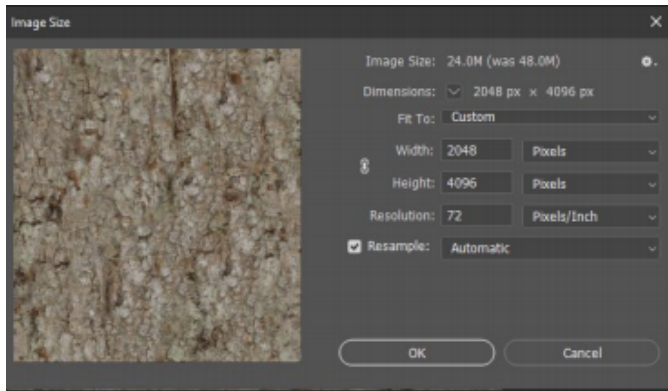
Click on this Button to Choose your Destination folder for Export.

Keep it as a PNG to start, PNG holds lossless information so we won't lose any.

We don't need to change the config because we're exporting just the textures,

Just Select Export.

Now I'm going to Open Photoshop™ and Change the resolution to 4096x2048 Image > Image Size



Make sure to Invert the textures.

The top of our Texture is the bottom of the Megascans Trunk.

Image > Image Rotation > Flip Canvas Vertical Then Save the Images.



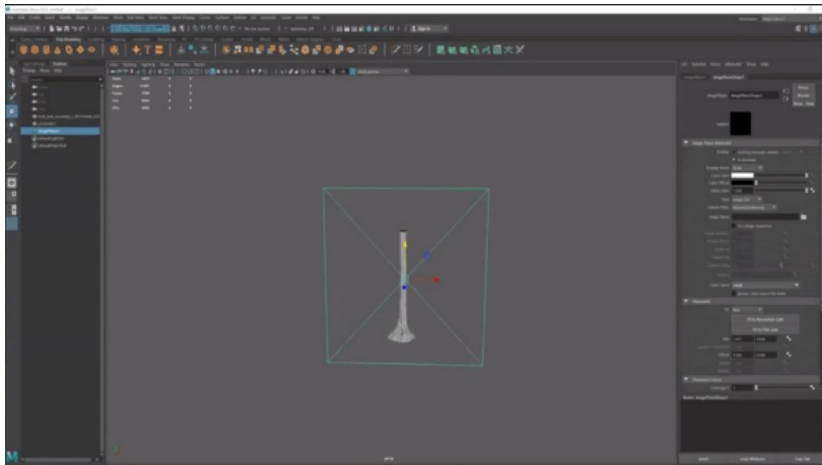
Back in Maya™ we're going to finish the Trunk now.

The Cylinder we used is a great shape to start with.

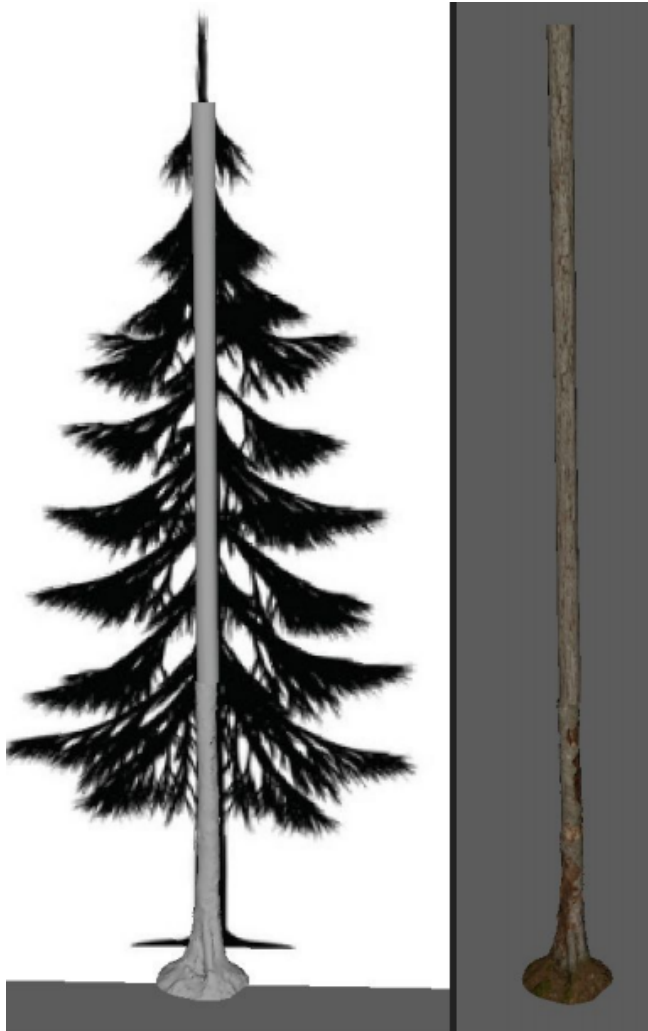
Create an Image plane; Create > Free Image Plane



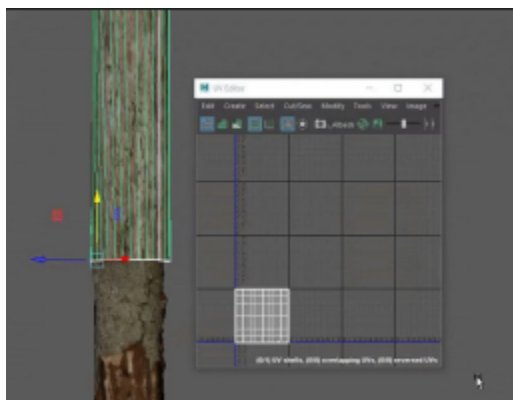
Now Let's add this above image.



Scale the Cylinder up so it's as tall as the silhouette.



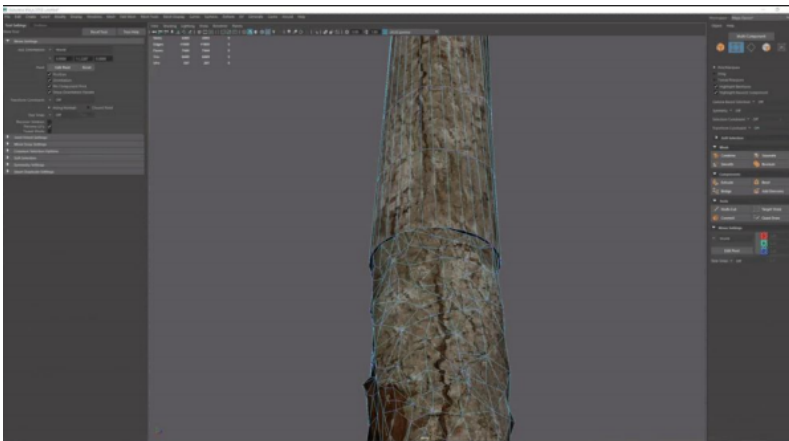
Start by adding the tileable bark texture so we can see how it looks. Good. Now, we need to tile our bark so it's not so stretched. In the UV Editor select our UV shell and Scale up on the Green Axis.



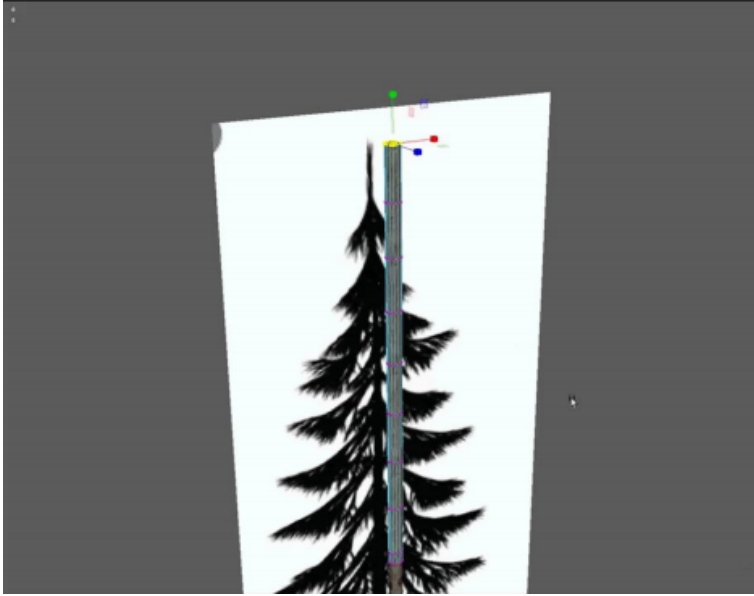
All we have to do now is attach the top trunk to the megascans trunk and add some more topology and shape the final trunk.
First, Select both Mesh elements and hold the Spacebar > Mesh > Combine



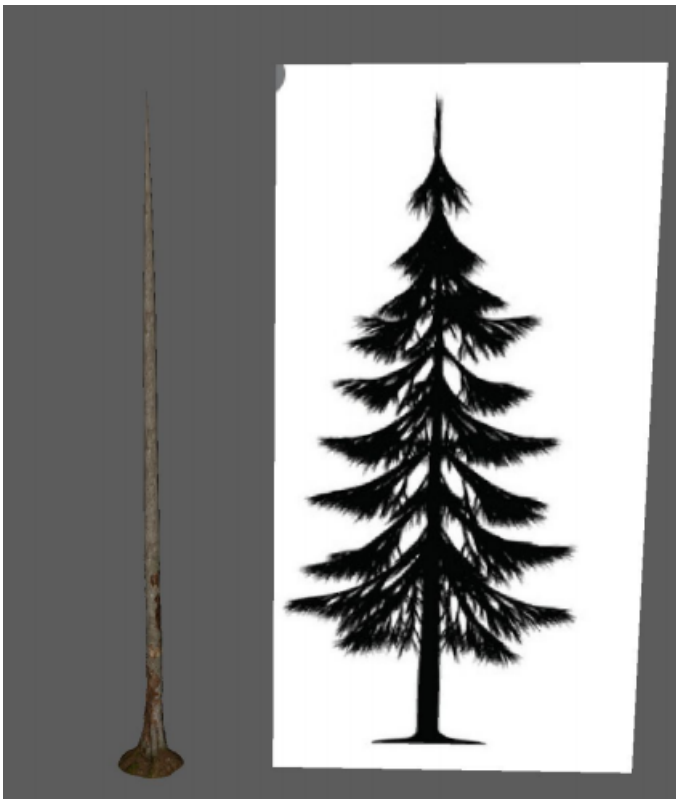
Now in the Modeling Toolkit There's a Tool called Target Weld, we're going to use this to weld the vertices of our low trunk to our high trunk.



Once it's attached let's go ahead and shape the top to match the image.
Select the top vertices and scale in on all axis simultaneously.



Scale all the way down until you have the silhouette correct.



Now that we're done with the Trunk,

we need to build our high poly branches however; we can't use these high poly branches in a Game.

So we're going to go ahead and bake them onto image planes and use lower polygonal mesh.

We're going to carry on using Quixel with Pine Branches and Pine Family Let's start with the Branches.

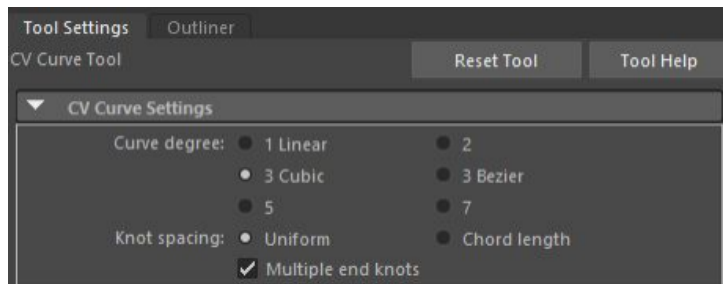
Create a Plane in Maya™ In the Attributes select the material Click on the Checkered box next to Color and Choose the Branch Albedo.

Now Click on Transparency and choose the Opacity.

Now with our Plane, we're going to use it as a starting point.

Click and Select , we want to use Click on next to.

This will open a Tool-bar Make sure we're using 3 Cubic

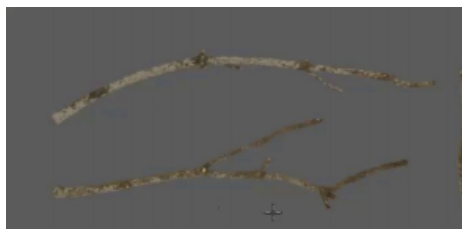


Now the rest is pretty simple.

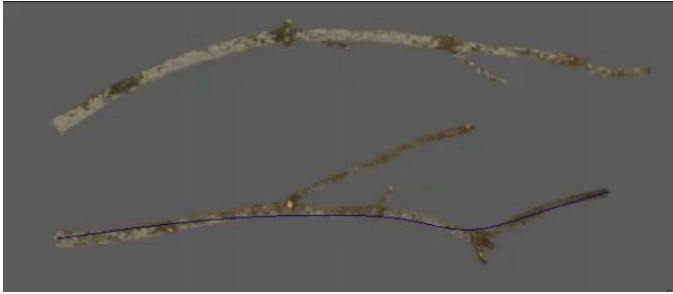
Using the we're going to trace the shape of our branches one by one.

Make sure each curve has at least 4 points in order for it to become usable.

When you've finished your Curve Press W or Enter to Finalize.



Now we do the same on any extra branches, Follow from the Branch Spine to create a new spine.

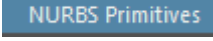
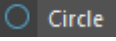


Continue until all Branches are built.

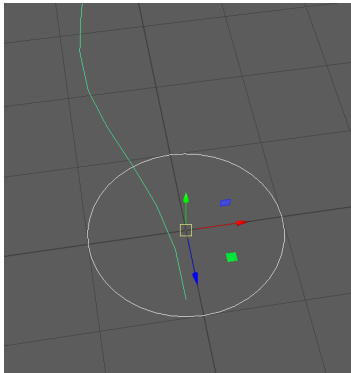


Now click on Transparency and choose the Opacity

Creating the Branch Geometry

Create  a NURBS  Circle .

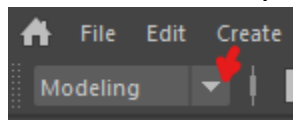
Once the circle is in your Viewport left click on the circle so you can select it *(in object mode)*



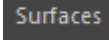
Next **Hold Shift** and **Left Click** on the Curve... Now you should have both the Curve and the Line Selected

If done right, your circle should be white and your curve should be green, if it's the opposite way around, try again.

Next, Make sure you have the modeling viewport work mode selected



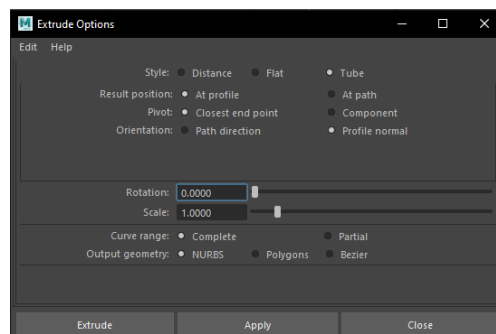
Underneath File you can see a drop down, if it's set to animation or something else, change it *(This will give you different feature tabs to select from)*.

Along the top of the screen you'll see a tab that says Surfaces 
Click on that for a drop down and select Extrude

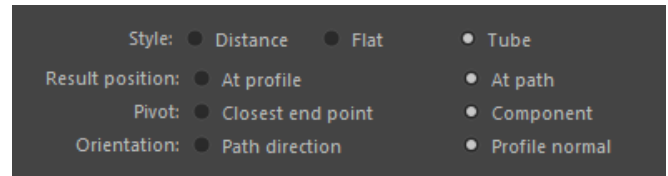
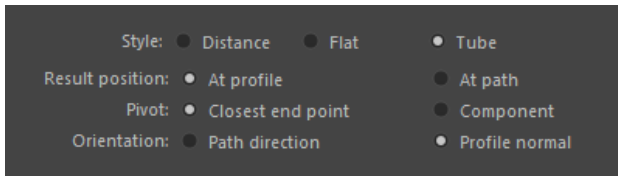


Be sure to left click on the check box to open additional options.

*****By default the settings may be different so the first thing I always recommend is go to Edit and then Press Reset Settings*****



With that done, Let's go ahead and change the settings.

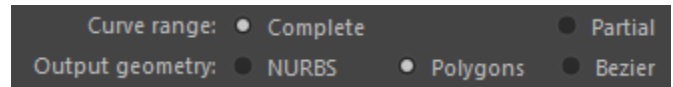
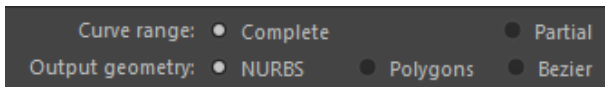


By we need to change the **Style, Position, Pivot & Orientation** Make sure that;

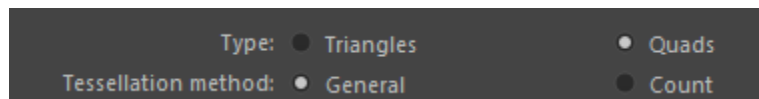
Style	Tube
Result Position	At Path
Pivot	Component
Orientation	Profile Normal

With these settings the Nurbs will be created at the base of the path and follow along in the shape of a tube.

We also want to change the output geometry because it'll give us NURBS right now and we want Polygonal.

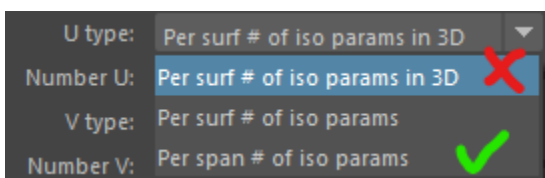


Next we'll change the Type to Quads and Tessellation method to General.



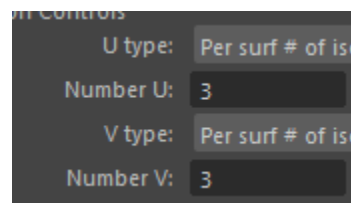
This final step is the most important step of all.

The Initial Tessellation Controls by default use **Per surf # of iso params in 3D** however this will **NOT** work, so we need to use **Per span # of iso params in 3D**



Be sure to Select per Span

The additional Numbers on the Number U & V Will control the amount of tessellation the tube has.



With all that configured all you need to do is **Left Click** on **Apply**

Apply

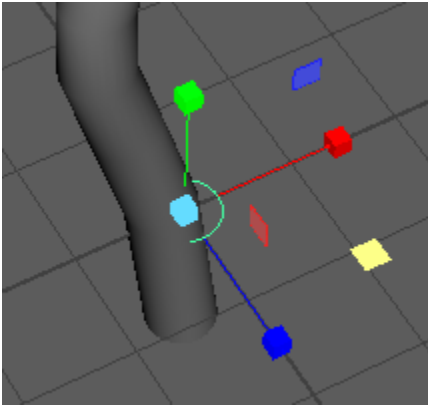
If you click **Extrude**

Extrude

it will close the box...

If you're not happy with the results you will have to re-work the entire process unless you keep it open

(which is why I always use Apply).



Be sure to Scale your NURBS Circle down to the size you want the branches to be otherwise they'll be huge, don't worry about the tips being shorter, we can do that in Zbrush when we Dynamesh.

To Scale, Select the Nurbs Circle, Press R and then Scale on the Cyan (Middle Cube) To scale in all directions.

Repeat this step until all branches are done.

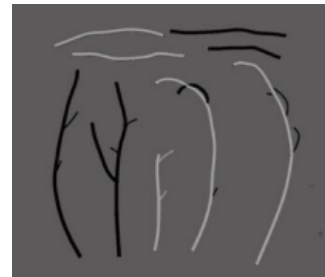
****NOTE****

you can make multiple different sized nurbs circles for different parts of the branches. If you have any black geometry like I do, don't be alarmed...

All we need to do is **Reverse the Normals** or the **Curve**.

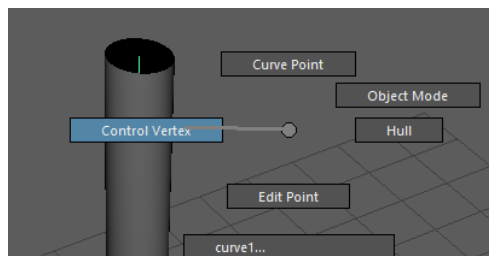
Select the curves and go to > Curves > Reverse Direction

You can also adjust the Branch's through the curve to get some additional shape, that way we have some volume to our branches and not just flat twigs.



To adjust simply select the curve and hold your right mouse button:

Choose: control Vertex and then select a vertex point to move around.



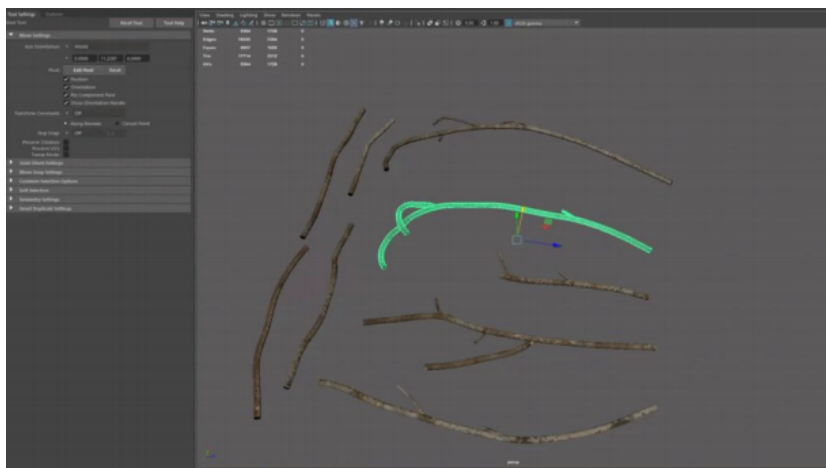
Once we've Finished shaping, Select each branch and Combine them all together.



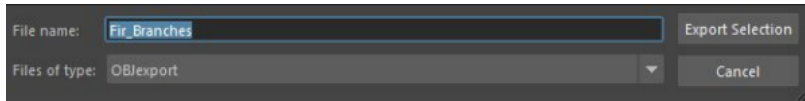
With the Branches merged we can do one last quick Edit before moving out of Maya™ Let's turn on in the.

You can either Change the Falloff Radius in the settings or Hold B and Hold Left Mouse Button + Drag to change size.

Add some Extra Volume to the Branches and we're ready to go.



Export the Objects as OBJ using > File > Export Selection



Make Sure They're OBJ as our next Program is Zbrush™ First in Zbrush we're going to Import our Branches using the Import tab on the right of the Viewer.



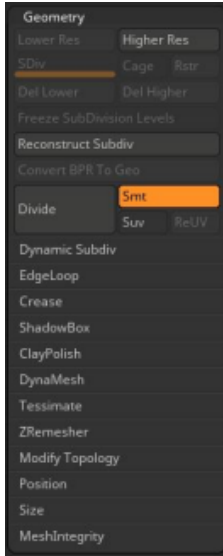
Left Click and Drag when we First bring in our Mesh as nothing will be visible.

Then we're going to make sure to Enable EDIT quickly so we don't mess up our Viewport.

Now we're going to use a Tool called Dynamesh.

This will Retopologize our Current Mesh whilst keeping the shape it will close any holes and give us a higher polycount.

On the Right in the Subtools Tab you'll Find Click on that to see the Sub Options.



We want to use DYNAMESH.

In Resolution we want to change that to 256 (this will give us a standard base amount to work with.

Once we've changed the Resolution Click on the DynaMesh Button and Watch the Magic.



Now our holes should be closed and the branches are joined up to one another.

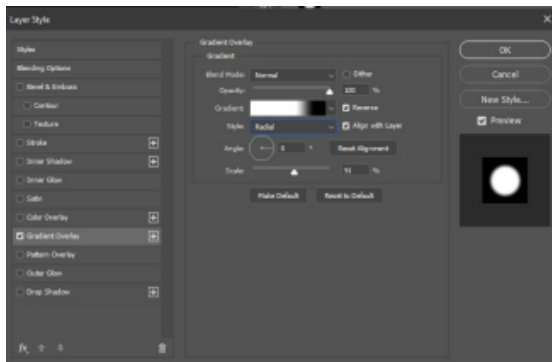
We're going to Sculpt our Mesh now but before we Do we need to Create a Brush. Open Up Photoshop™ and create a 2048x2048 Image Place your Height into it.

Now we're going to change the levels so it's darker.

Now we're going to create a copy by selecting the layer and pressing CTRL+J



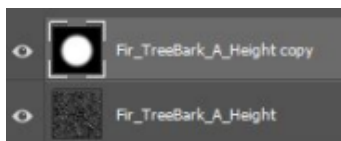
Double click on the copy and a Layer Style will open up, Choose Gradient Overlay & use the settings as bellow:



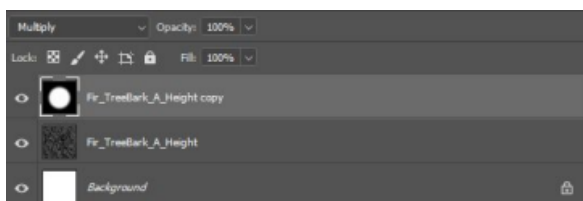
Scale is set to 96%

Move the White Part of the Gradient farther over to the darker area giving us a white circle in the preview.

Right Click and Rasterize the Image to have a gradient like so:

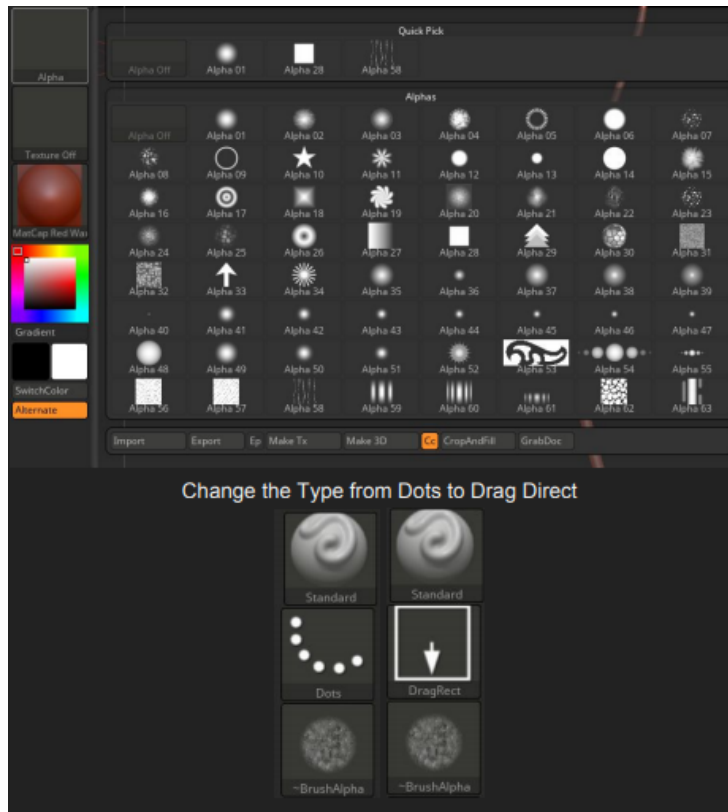


Make sure the Image is set to Multiply

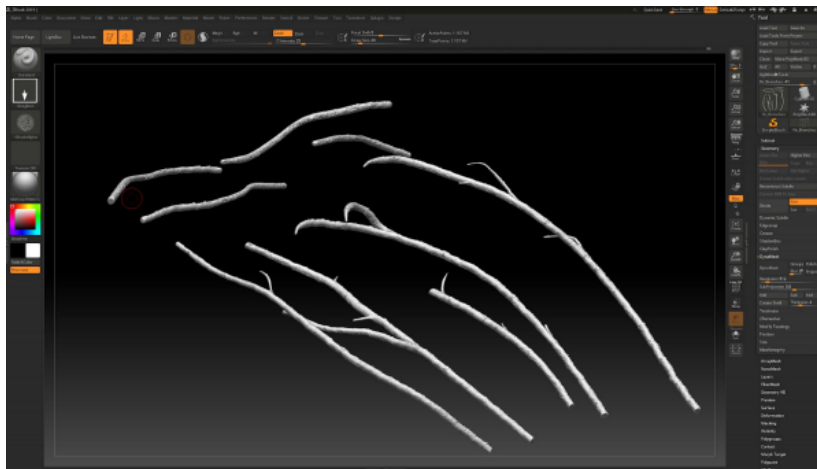


And Save this Image as a .BMP

Now inside of Zbrush™ using the Standard Brush Import the Alpha: Click on Import



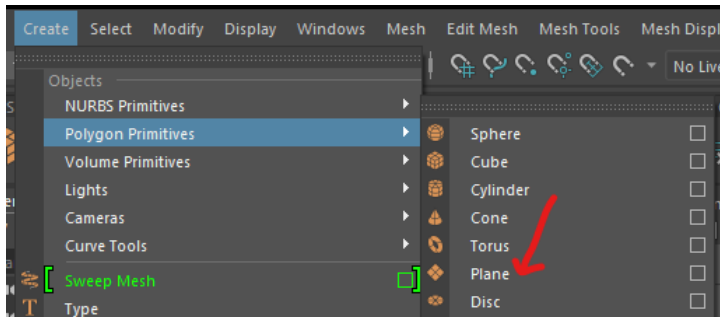
Now Just Left Click on the Branch and Drag and I'll start adding more detail (if it looks Blurry press Ctrl+D) To add more resolution.



When you're finished Click Export and save out a high poly.

Let's create the Needles.

Create a **plane** (Create > Polygon Primitives > Plane)

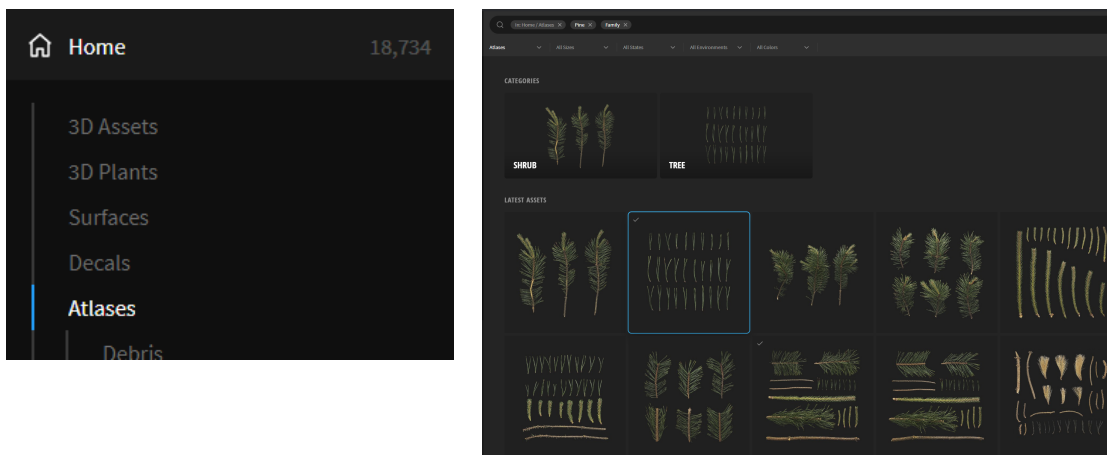


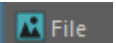
You can also hold **Right click** in the viewport and choose **Create > Polygon Primitives** and **Plane** and it'll create a blank plane for you.

In the Attributes Editor on the right side of the viewport, scroll through the different names (*polySurface2*, *polySurfaceShape2 etc...*) Until you come to lambert1:

Let's do what we learnt earlier and apply our needles texture.

First let's make sure we have the right texture, In Quixel, in the Atlases Section, search Pine Family.



To Apply the Texture select the checkered box next to Colour  and when you're prompt window pops up choose File  and in the file2 window

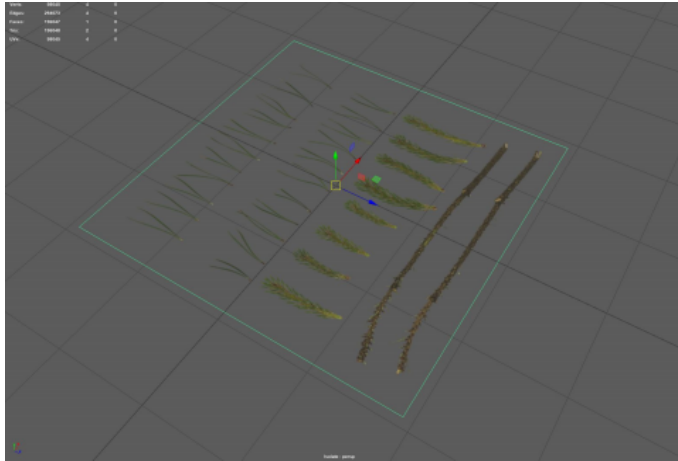
on the Attributes Editor you can Click on the Folder  next to Image Name.

This will give you a new prompt window where you can choose your Albedo (Base Colour) **Repeat this step** in the Transparency Attribute and choose the opacity/alpha mask.

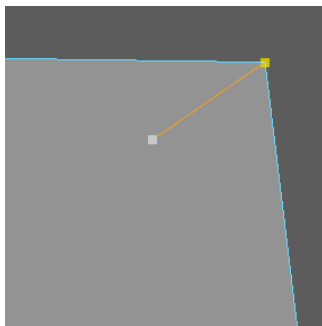
Using the Multi-Cut Tool

Now we can use the **Multi-Cut tool**  **Multi-Cut** to trace the needles and cut them out...

Don't worry about polycount here.

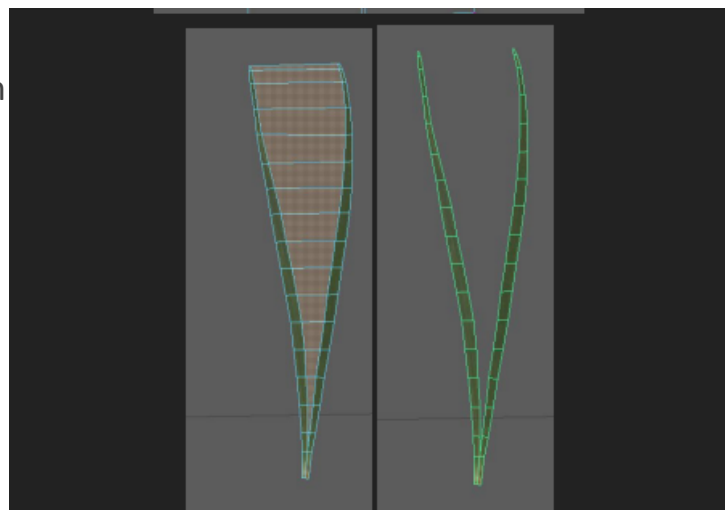


To use the **Multi-Cut Tool**  **Multi-Cut** ; Simple Press **Ctrl + Shift + X** (DEFAULT)



You will see your tool change to a knife and see something like this image on the left, all you need to do is simply left click around the shape of the needles repeatedly until you have traced the shape with the multi-cut tool...

You can see on the image on the right here that I've now traced the shape of the Needle and also selected the faces that aren't being used and deleting them.

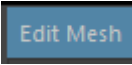


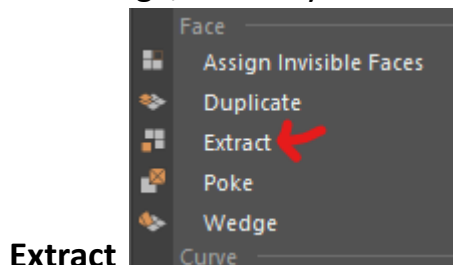
Extracting Needles

Once you've got the shape... cut off any Extra Geometry so we're left with just the Needle.

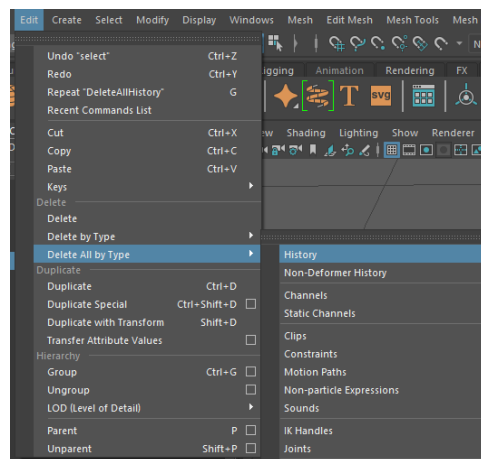
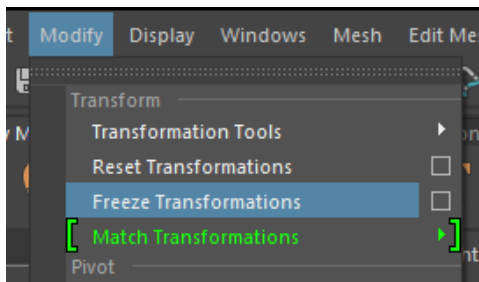
You can do this by selecting the empty faces that aren't filled with Albedo, then press delete on your keyboard.

Repeat this step with the other Needles.

Select the faces of the needle you want to extract and ensure all the faces are orange, then in your Viewer go to Edit Mesh  and **choose**



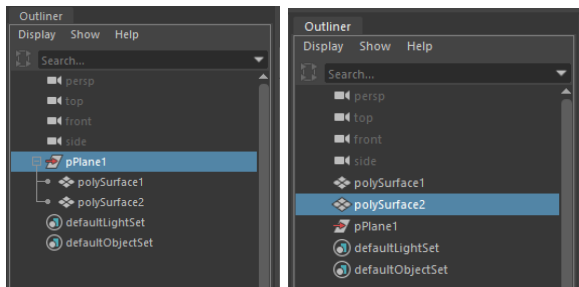
We need to do a few more things to clean up the outliner so first we need to select everything and go to > Modify - Freeze all Transformations



Then we need to go to > Edit - Delete all by type
And ensure that we select History.

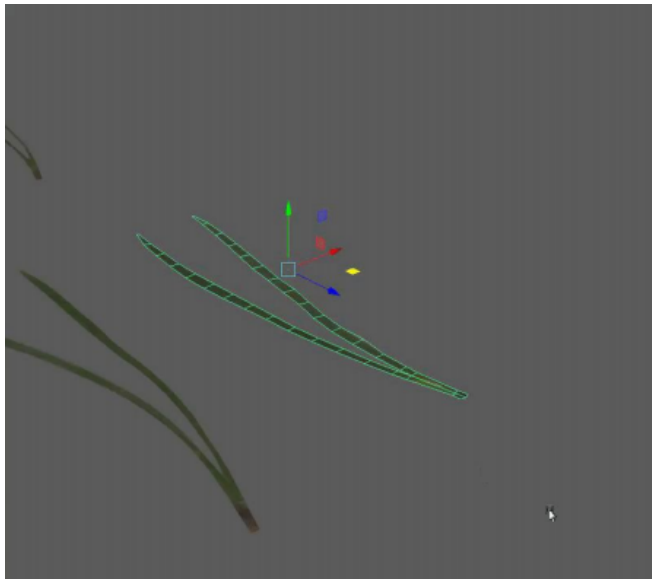
Deleting the object history makes sure that we don't end up with weird transformations or unwanted results.

The last Step is to **use your middle mouse button to drag the mesh out of the holder and into the outliner** like so: now you'll have to separate Meshes (Before Left - After Right)

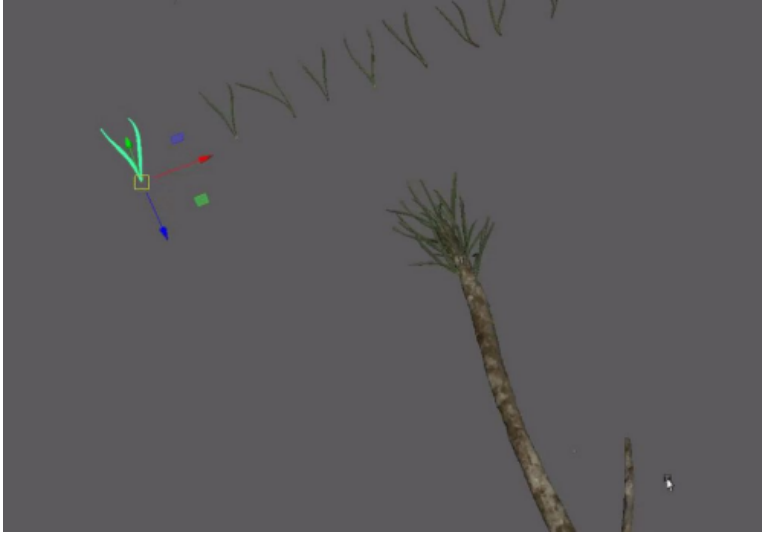


Creating Thickness

Once you've done this with all of the needles on an Atlas, extrude the selected faces on the needle to create thickness like so.

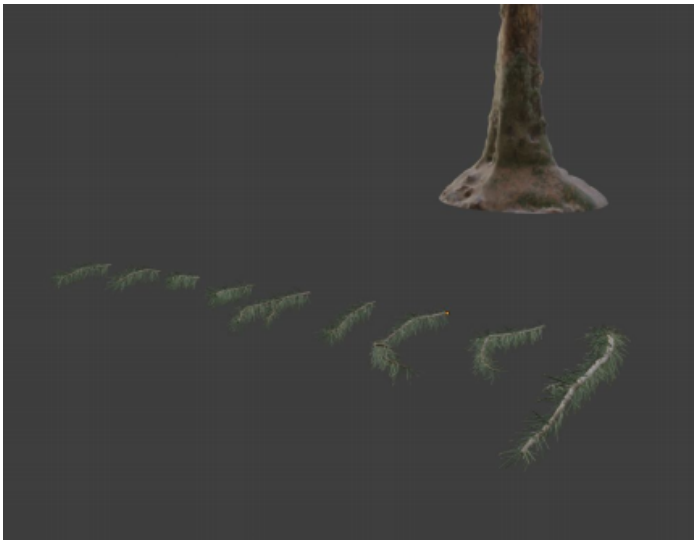


Once you've smoothed all of your Pine Needles out, the next step is to place them all over your branch, you can either manually place these for maximum result Or procedurally place them.

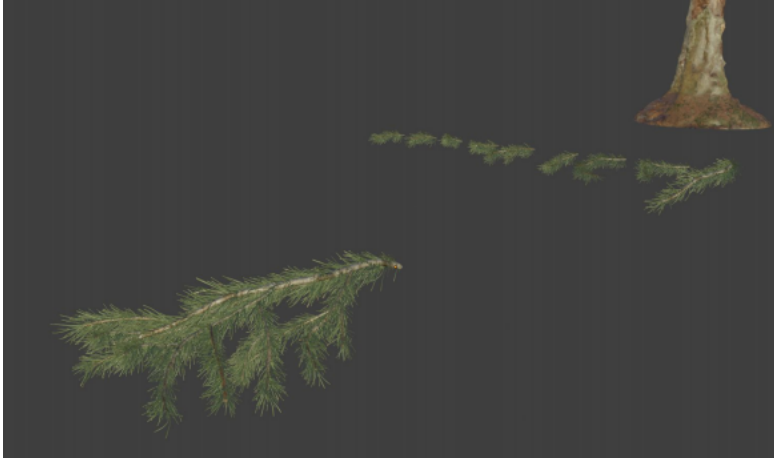


Once you've finished building the branches you'll have something that looks a lot more realistic.

You'll also quickly understand why we have to make our tree's low poly when you see the polycounts range between 15000 to 2000000.



Now that we have our Main branches We can start to build full branches: Copy the branches and start placing them together to create one Large branch.

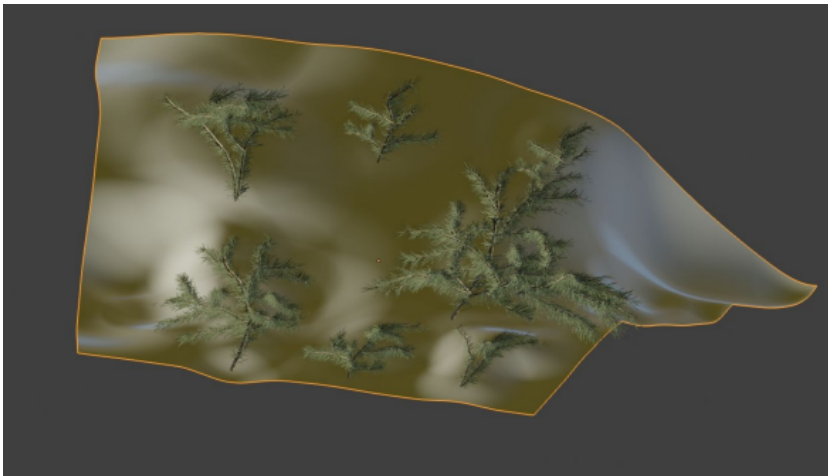


We now have one of our branches made, repeat this step as many times as you see fit, A Good variation is around 5 - 6 branches.
We're going to use four branches to build larger variations too.





Now, with all of our branches, we need to create a plane that will 'wrap' around the branches... This will allow us to create the bake.
Use an orthographic view to make sure your branches fit within the plane.
Then subdivide the plane several times allowing us to shape the plane.

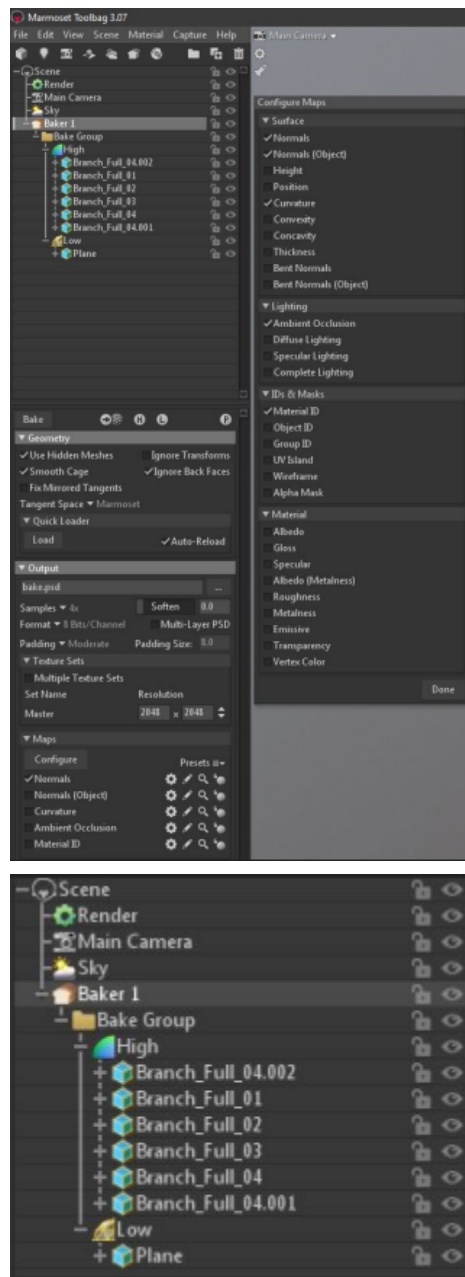


With our Branches Wrapped we can now go to our baking software, we can either do this in maya using Transfer maps or we can do this in Marmoset.



In Marmoset we're going to select the Bake Icon, this will allow us to organise our branches for the baking process.

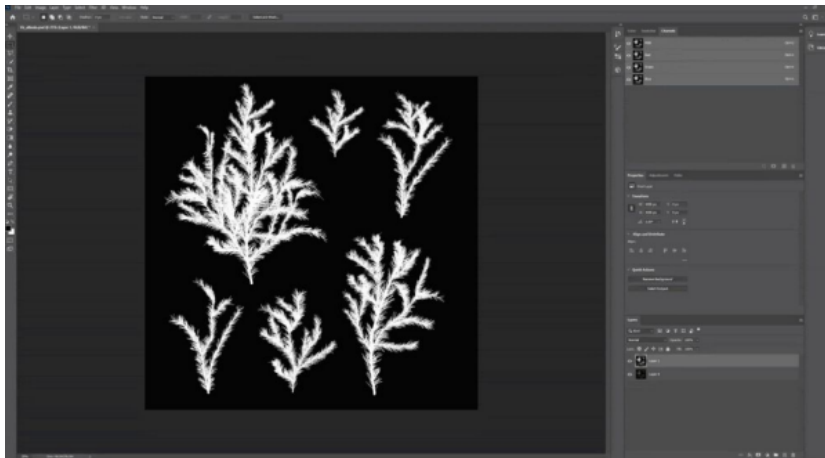
Place the high poly branches in the High group and the low Poly branches in the low. Select Baker and you will now have a list of output options, here we can configure what we want. I'm going to select Normals, Height & Albedo.



Choose your output path and Bake.

Once we have all of our bakes, we can go into photoshop and do some final touch ups. Let's start with the albedo.

First, we need to separate the Albedo from the background: Drag & Drop the Alpha With the alpha selected we want to make a Mask on our Original Albedo If we copy, paste our Alpha mask we can paste it into the Mask that was selected.



Now, Ctrl + Left click on the Alpha and this will highlight our Selection, Duplicate the selection so we no longer have a background. Now we can Create a new background through Gaussian Blur (This technique is called the Bleed method). Select your base layer and Duplicate x3 (Ctrl + J) , Merge the three duplicates together (Ctrl + E) (Keeping the original albedo at the top) Repeat this step and you'll soon notice the background bleeding in. After Each Duplicate, you should go to Filter > Blur > Gaussian Blur - start off at 5, then go up to 10, then 20, then 30 on each set.



Once you've finished you'll have something that looks like this.

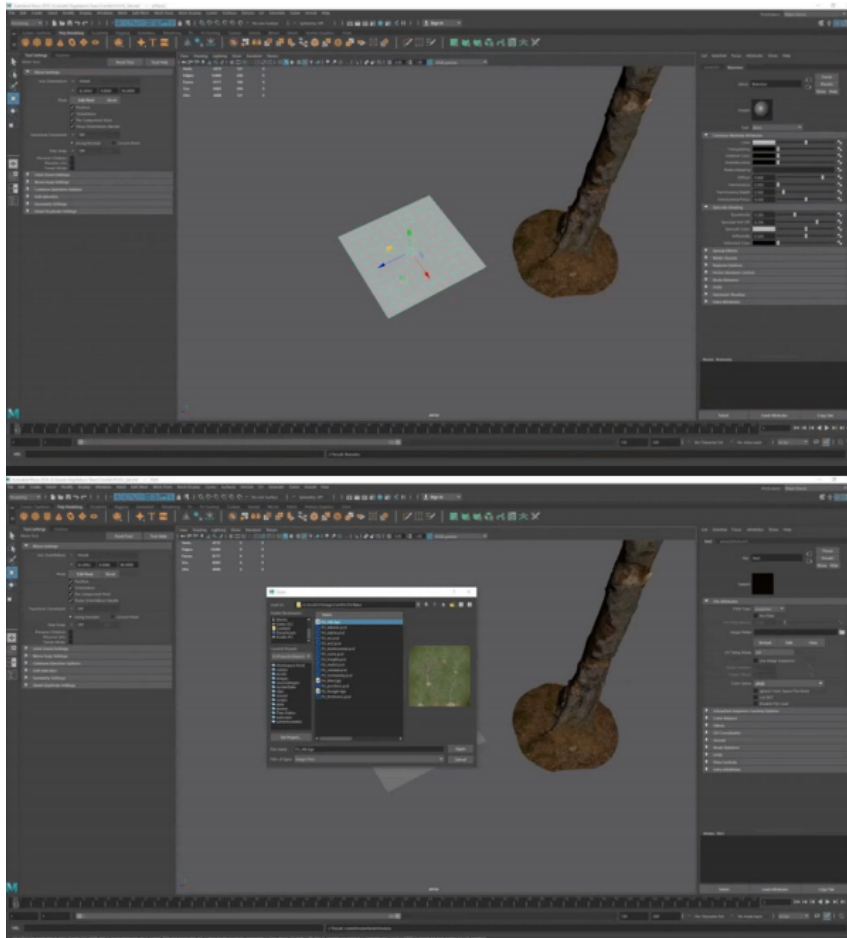


This will now allow for a good bleed on any mipping on the alpha. Adding additional information to the foliage will be helpful so here, we're going to add the AO and Curvature. Repeat this step with the Normal map and create the Roughness from the Albedo.

Now we should be good to go!

For our last step we need to finally create the branches that will act as our low poly branches and start dressing the tree.

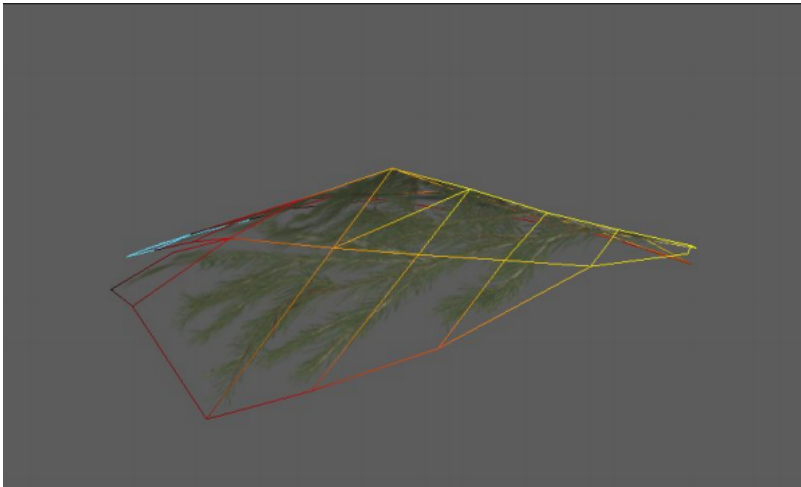
Create a plane in Maya now let's add the Colour and Alpha so we can see what we're doing!



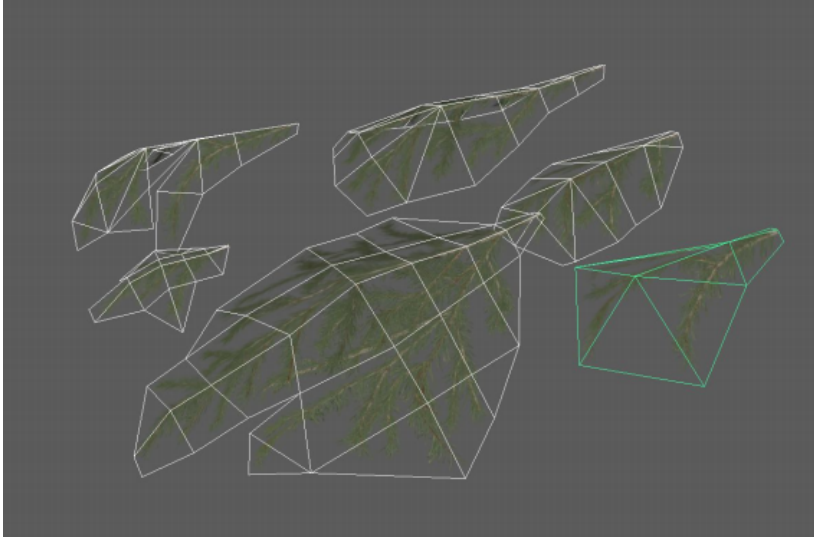
Now let's cut out our Branches and create some Silhouette to them!



Now we're going to use soft selection to shape them into a ^ shape.



Repeat this step until you have all of your low poly branches made.



Now we just need to place a few variations together to create an extra silhouette. Now we're going to start shaping the tree by positioning the branches.



Finish Shaping your Tree to have a silhouette that can bring a forest to life.

Repeat this process by shortening the trunk of the tree and making a thicker fir.

Adding variation will give you multiple Variations of the Same Tree

