

Creating A Flowing Water Effect With A Displacement Map

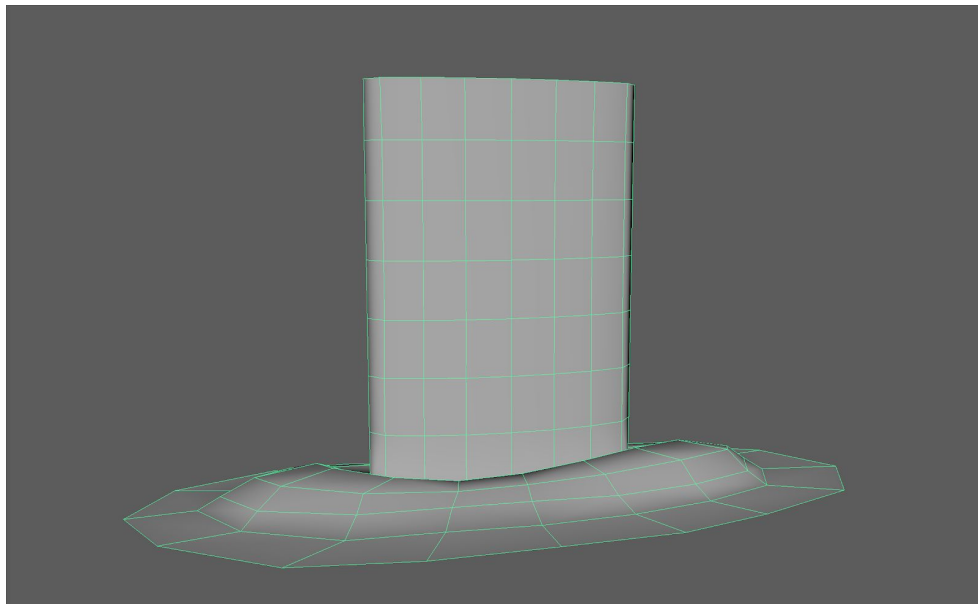
Written by Shawn Felski

All textures painted by Clara Kopitnik

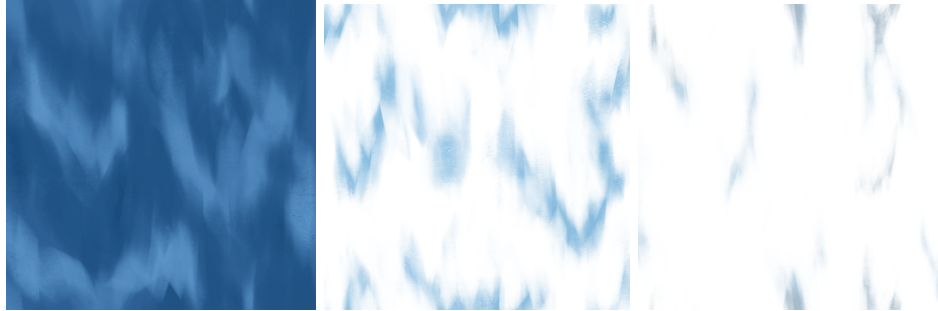
In this paper, we will be going through the process of attaching an ocean-shader scrolling textures to your objects to give the illusion of rushing water, without utilizing Houdini simulations or high-poly to low-poly baking. This method is particularly useful when trying to save resources on background elements and those that will not be up close to the camera. Followed by how to add a particle effect for added panache.

PREPARATION

Before anything else you should have your object and any other geometry modeled, UV'd, and placed. Once you've done that, it's time to start adding textures.(Your mesh may differ from mine.)

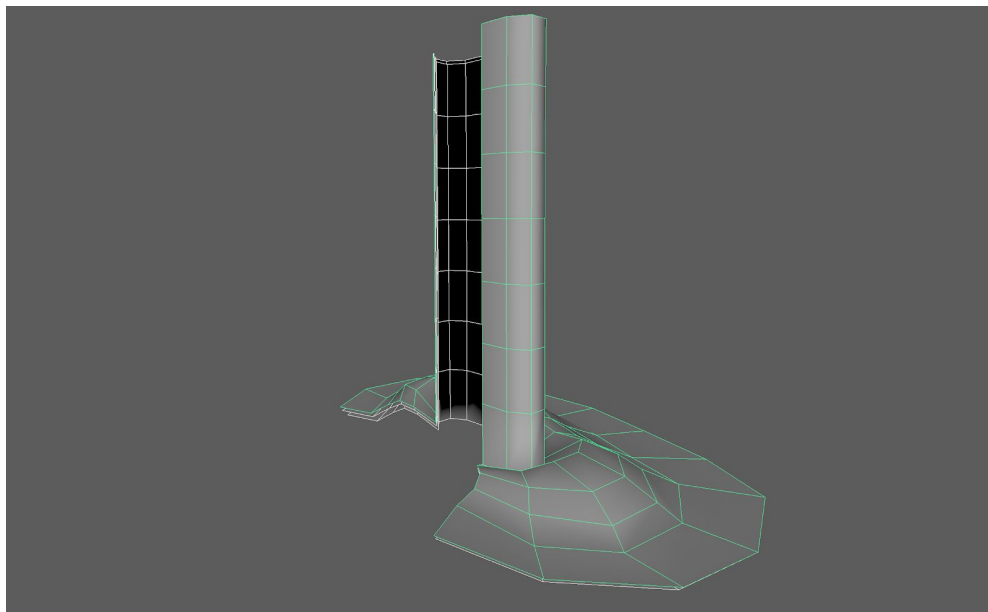


The next step is to prepare your textures, or have a talented texture artist take care of that. They need to be seamlessly scrollable so make sure to line things up properly.



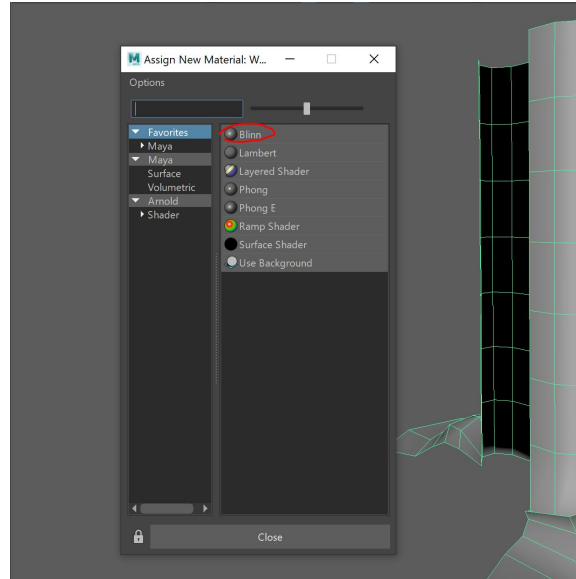
APPLYING THE TEXTURES

Duplicate your geometry twice. You should now have three separate objects of the same shape. You'll want to manipulate their scale and position on the **Y axis** so that they all rest one on top of the other without interpenetrating. Subdivide the lowest one once.

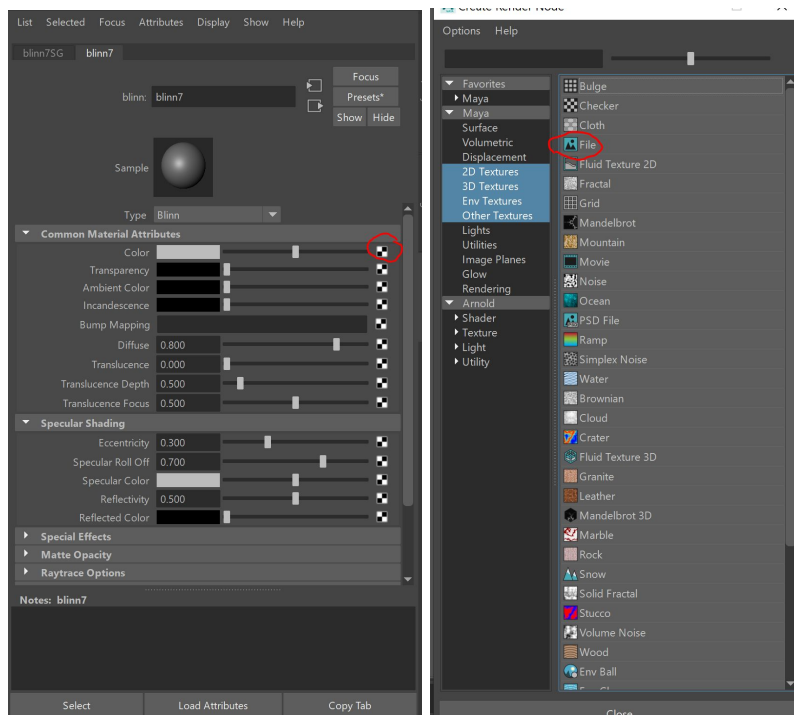


We'll start with the bottom object, so hide the other two for now with **CTRL + H**

Start by holding down the **right mouse button** and Going down to the option to **Assign New Material**. We're going to use a **blinn** for this example just because it's simple.

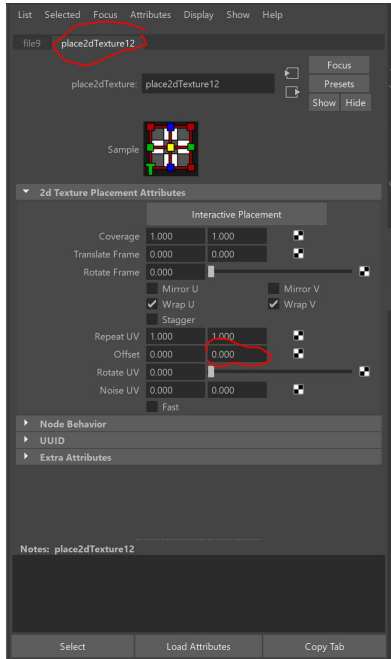


In the **Attribute Editor** we're going to click the icon to the right of the **color** attribute, then click the option for **File**.

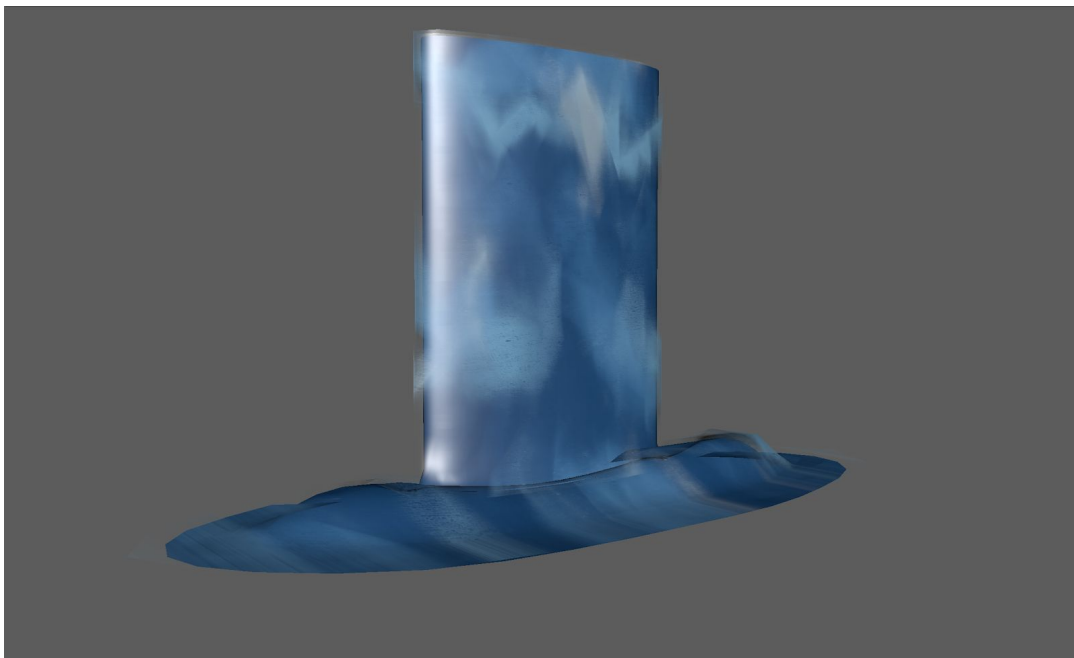


Next, select the texture you want to be applied to your base layer.

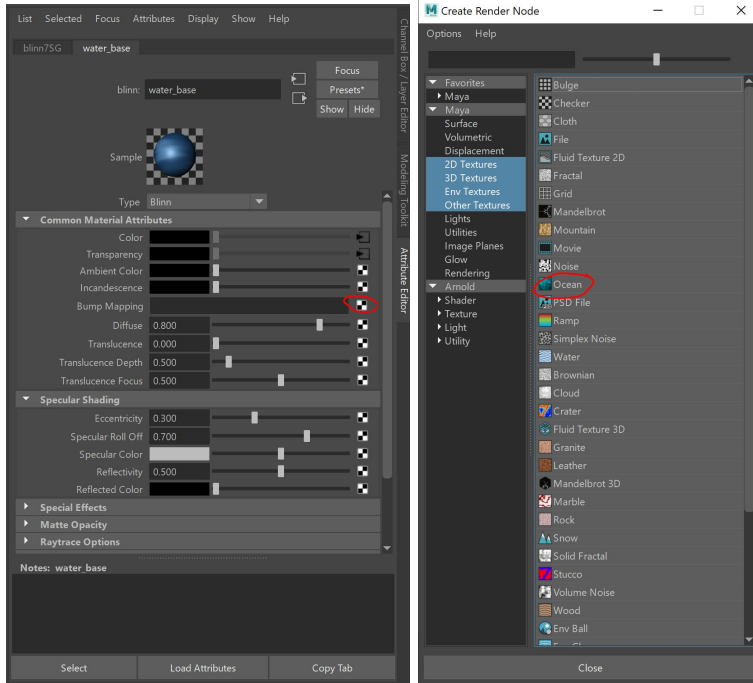
From there you're going to select the attribute labeled **Place2dTexture** and type the expression **=time** into the box indicated below.



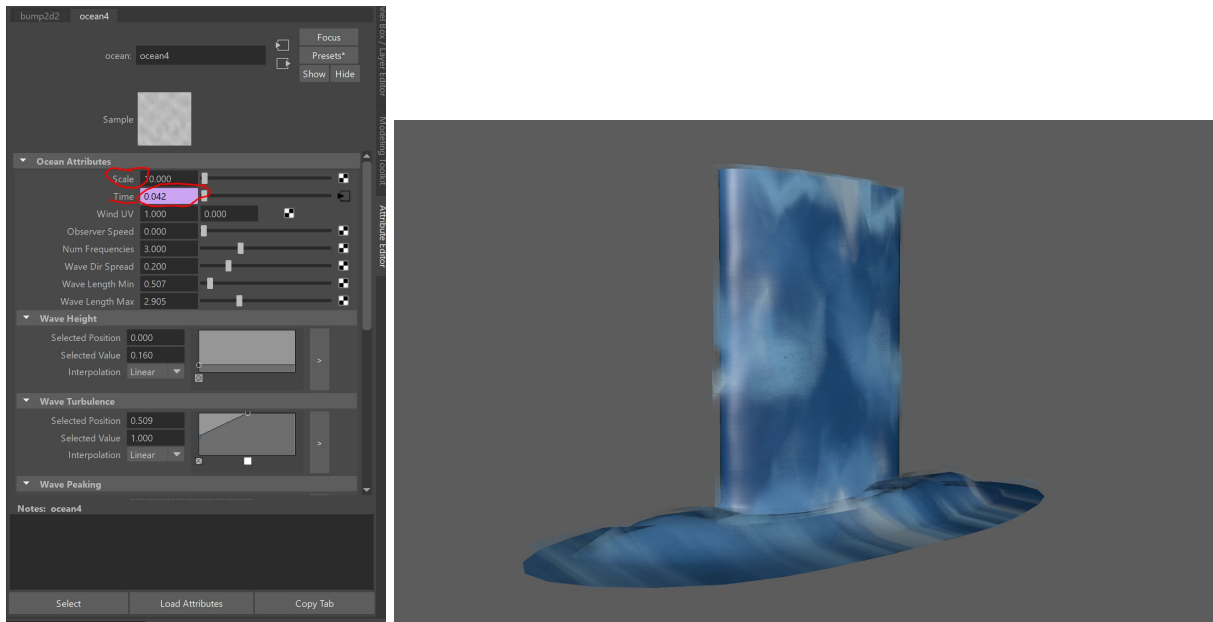
The next step is to repeat with all of the other layers with their respective textures until they're all scrolling along.



You can then add an effect to the base like an ocean deformer. First, go to the material attributes for the base layer, and select the box next to the attribute labeled **Displacement Map** and select the option labeled **Ocean**.



Next, mess with the attribute for **Scale** until you reach your desired level of distortion, and type the expression **=time** into the box next to the attribute labeled **Time**. Then hit play, sit back, and watch your water flow!



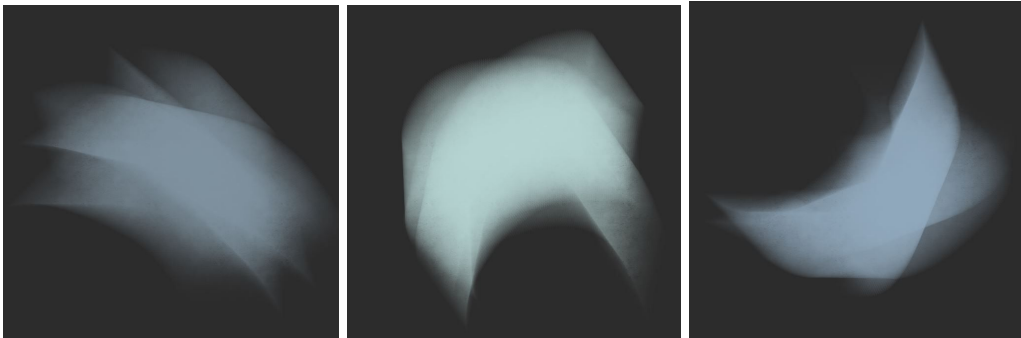
CREATING A WATERY MIST/FOAM EFFECT USING PARTICLE EMITTER

Written by Clara Kopitnik

To create the effect of mist at the bottom of the waterfall and maintain the stylized painterly effect, use a particle emitter with sprites.

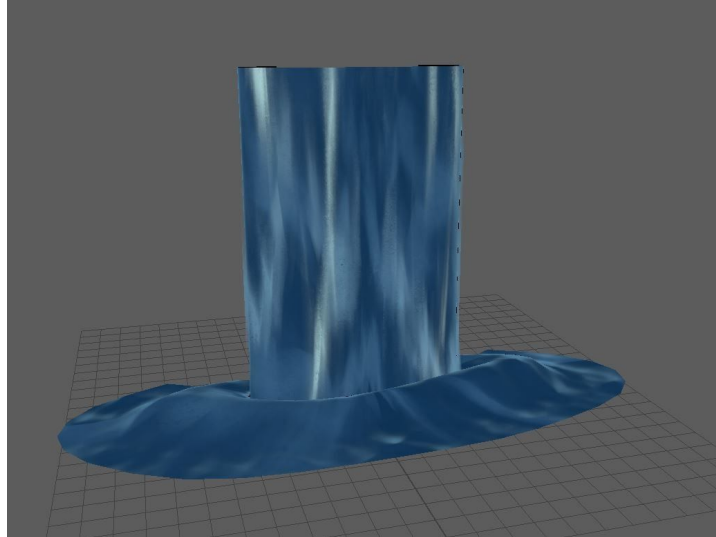
PREPARATION

For the sprites, we used several brush strokes with slight variance of t variance on hue and saturation. For this, 2k PNG textures were used. In this case, 9 varieties at different lengths and angles. Find some of the examples below. We'll be saving these out as **transparent PNG files** and placing them into our **sourceimages** folder in our project. We will name these **waterfallFoam.1, waterfallFoam.2, waterfallFoam.3, etc.**



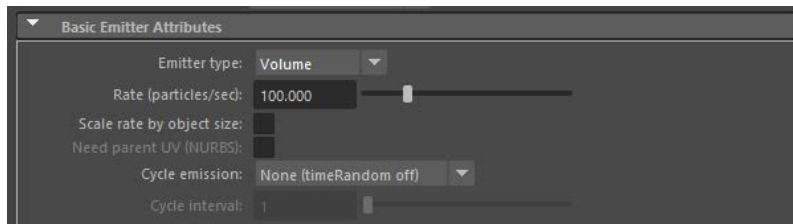
BUILDING THE EMITTER

To add the emitter, open your scene in Maya. We'll be placing the emitter at the base of the waterfall.

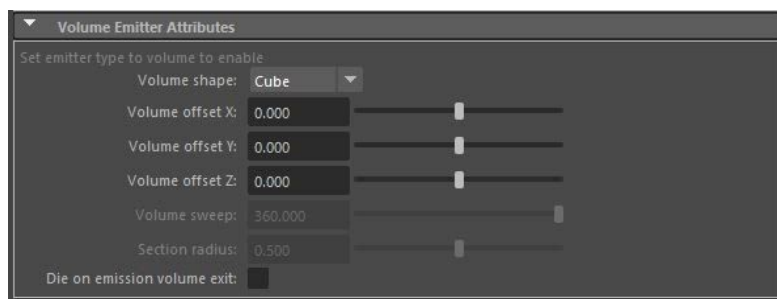


Open the **FX** menu set. Click **nParticles > Create Emitter (option box)**. Reset the settings. We'll be changing a few things here.

Under **Basic Emitter Attributes**, change **Emitter Type** from **Omni** to **Volume**.

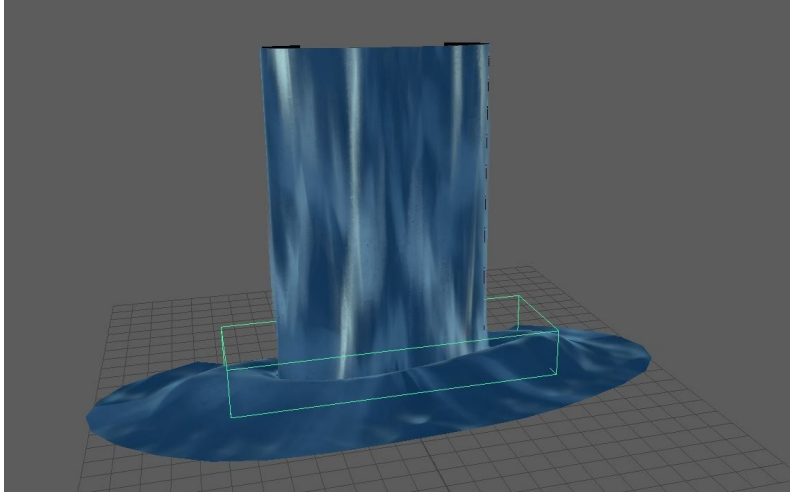


Make sure that under **Volume Emitter Attributes**, the **Volume shape** is set to **Cube**.



Click **Create**.

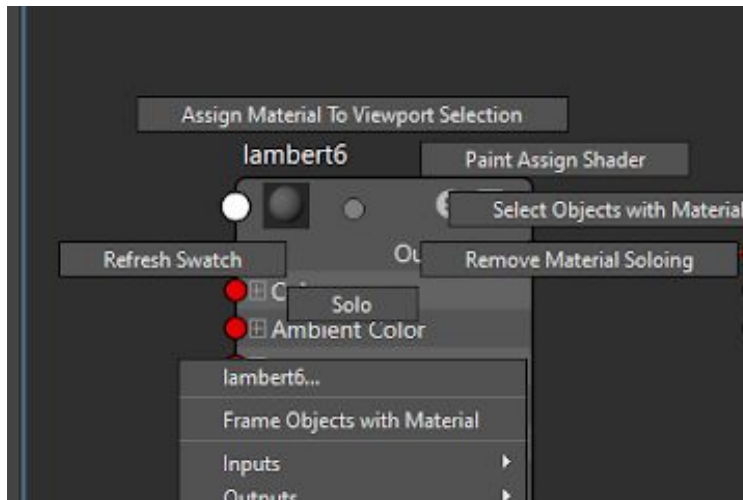
We'll need to resize the emitter to cover the entirety of the bottom of the waterfall. With **emitter1** in the outliner selected, resize the emitter and move it into place.



ADDING THE SPRITES

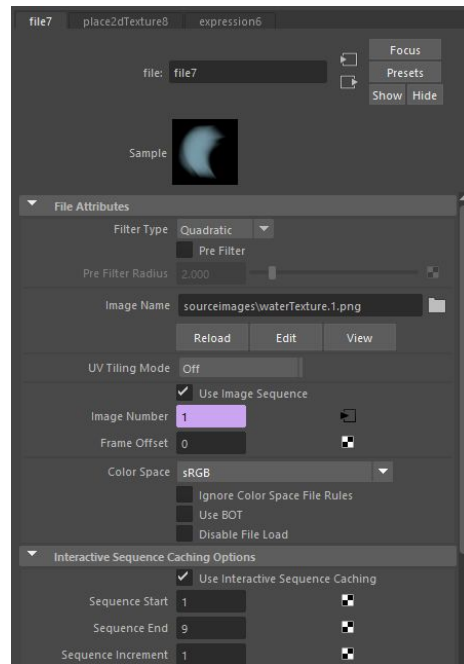
Next, we'll be adding the images to our sprites.

In the outliner, select **nParticle1** and open the **Hypershade editor**. Create a new Lambert material in the node menu. With nParticle1 still selected, **right click** the new Lambert node and select **Assign Material to Viewport Selection**.

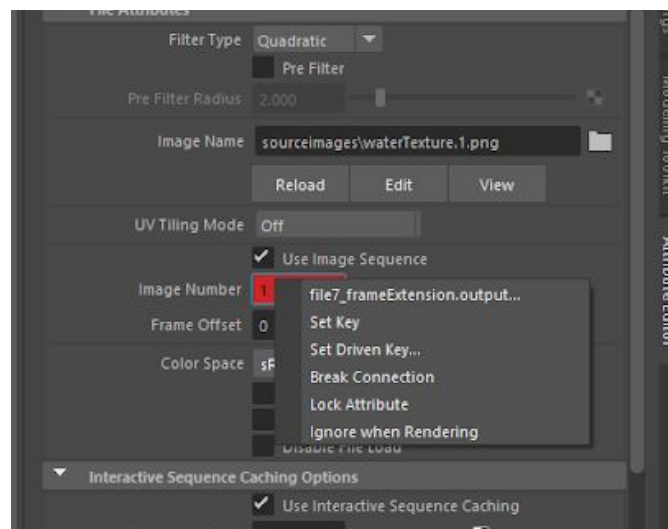


In the **Hypershade editor**, with the new Lambert material selected, **click the checkerboard option next to Color**. Select **File**. Click on the folder next to Image Name and navigate to your first file for the mist/foam.

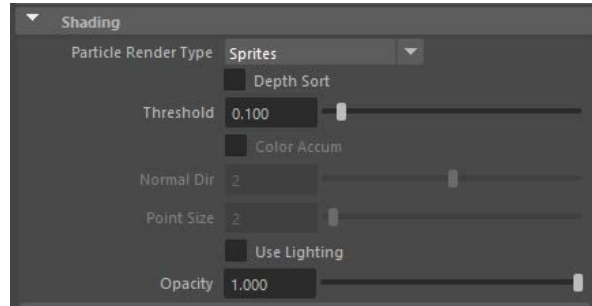
In the **Attribute Editor**, check the box labeled **Use Image Sequence**. Under **Interactive Sequence Caching Options**, check the box labeled **Use Interactive Sequence Caching**. Change **Sequence Start** to **1**, and **Sequence End** to the number of your last image, in this case, **9**.



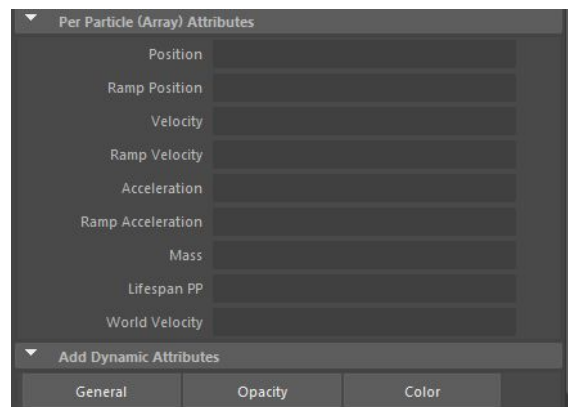
Next, **right click** over **Image Number** and click **Delete Expression**. **MAKE SURE YOU ARE ON FRAME 1 IN YOUR TIMELINE**. For frame 1, set image number to 1. **Right click** and select **Set Key**. Move forward to frame 2, **right click** and select **Set Key** again. Do this for all images.



With **nParticle1** selected in the outliner, select **nParticleShape1** in the Attribute Editor. Scroll down to **Shading**. For **Particle Render Type**, change the option from **Particles** to **Sprites**.



Open the menus labeled **Per Particle (Array) Attributes** and **Add Dynamic Attributes**.



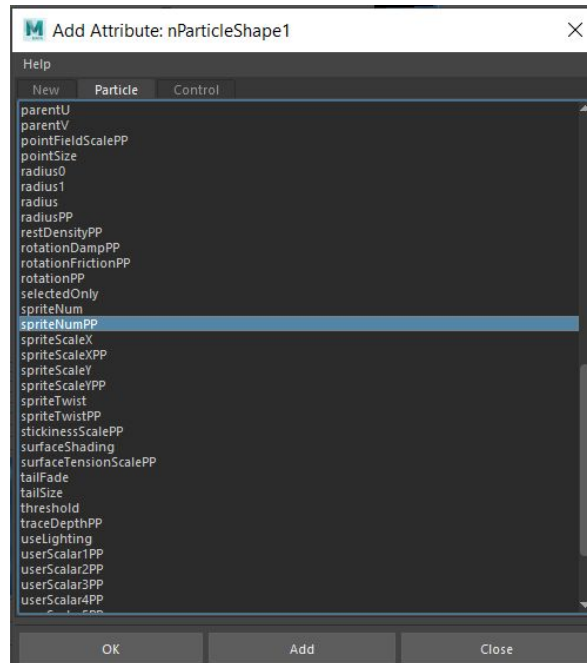
Select **General** under **Add Dynamic Attributes**. Open the tab that says **Particle**. We're going to add some of these attributes. Add the following Attributes:

spriteNumPP
spriteTwistPP

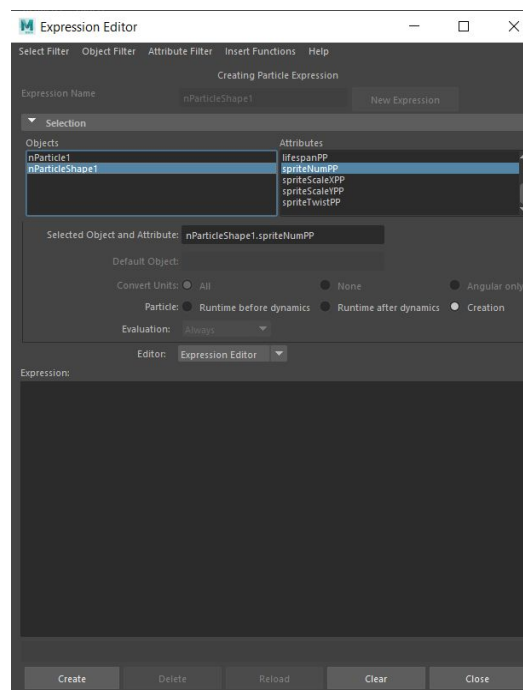
spriteScaleXPP

spriteScaleYPP

If done correctly, these attributes will appear under **Per Particle (Array) Attributes**.

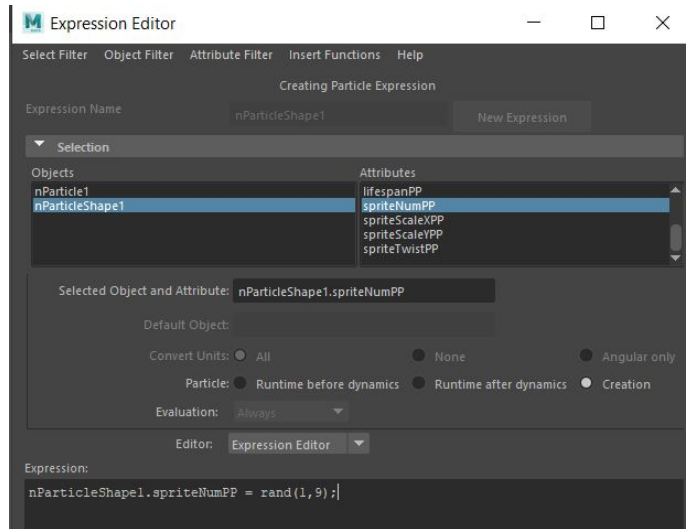


In Per Particle (Array) Attributes, **right click Sprite Num PP**. The following menu will appear.



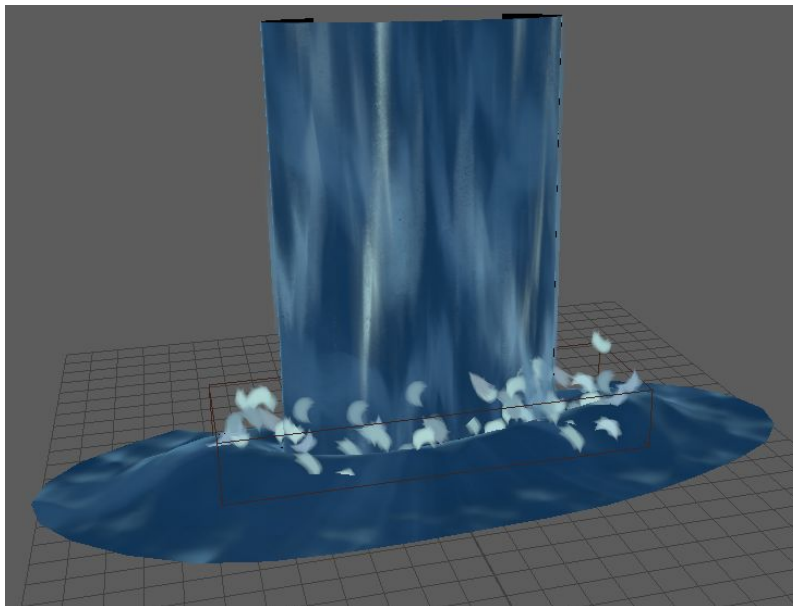
Under **Expression**, type the following:

```
nParticleShape1.spriteNumPP = rand(1,9);
```



This will cause the emitter to randomly cycle through each of the 9 images. If you do not have 9 images, replace 9 with the number of images you want the emitter to cycle through. Click **Create**.

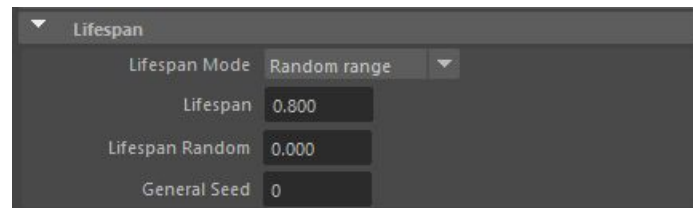
By this point, playing the sequence should allow your images to appear as sprites.



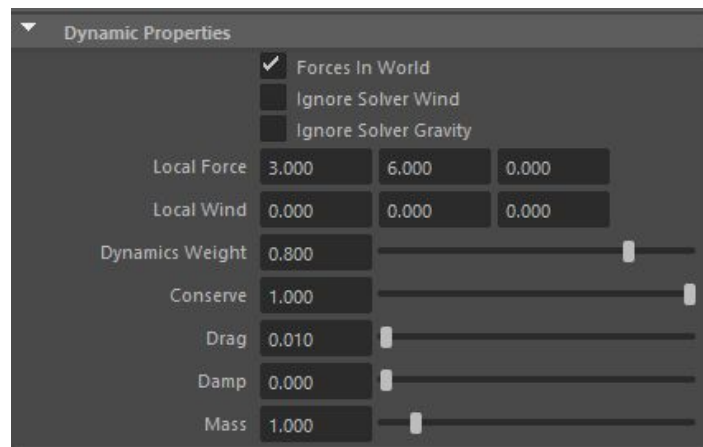
ADJUSTING THE SPRITE BEHAVIOR

Now, we're going to adjust how our sprites behave. A lot of this section is up to your preference, but this document will go through the adjustments made to achieve the effect shown here.

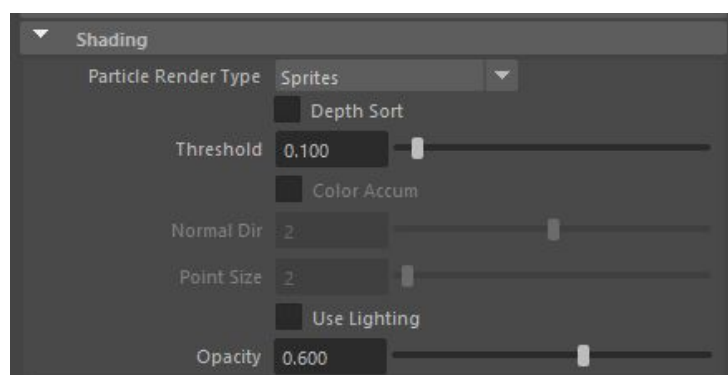
With **nParticle1** selected, open the tab **nParticleShape1** in the **Attribute Editor**. Open the tab labeled **Lifespan**. Change the **Lifespan Mode** option from **Lives Forever** to **Random Range**. Change the **Lifespan** to **0.800**.



Open the tab labeled **Dynamic Properties**. Make sure that **Forces In World** is checked. Change **Local Force** to **3.00, 6.00, 3.00**. Change **Dynamics Weight** to **0.800**.

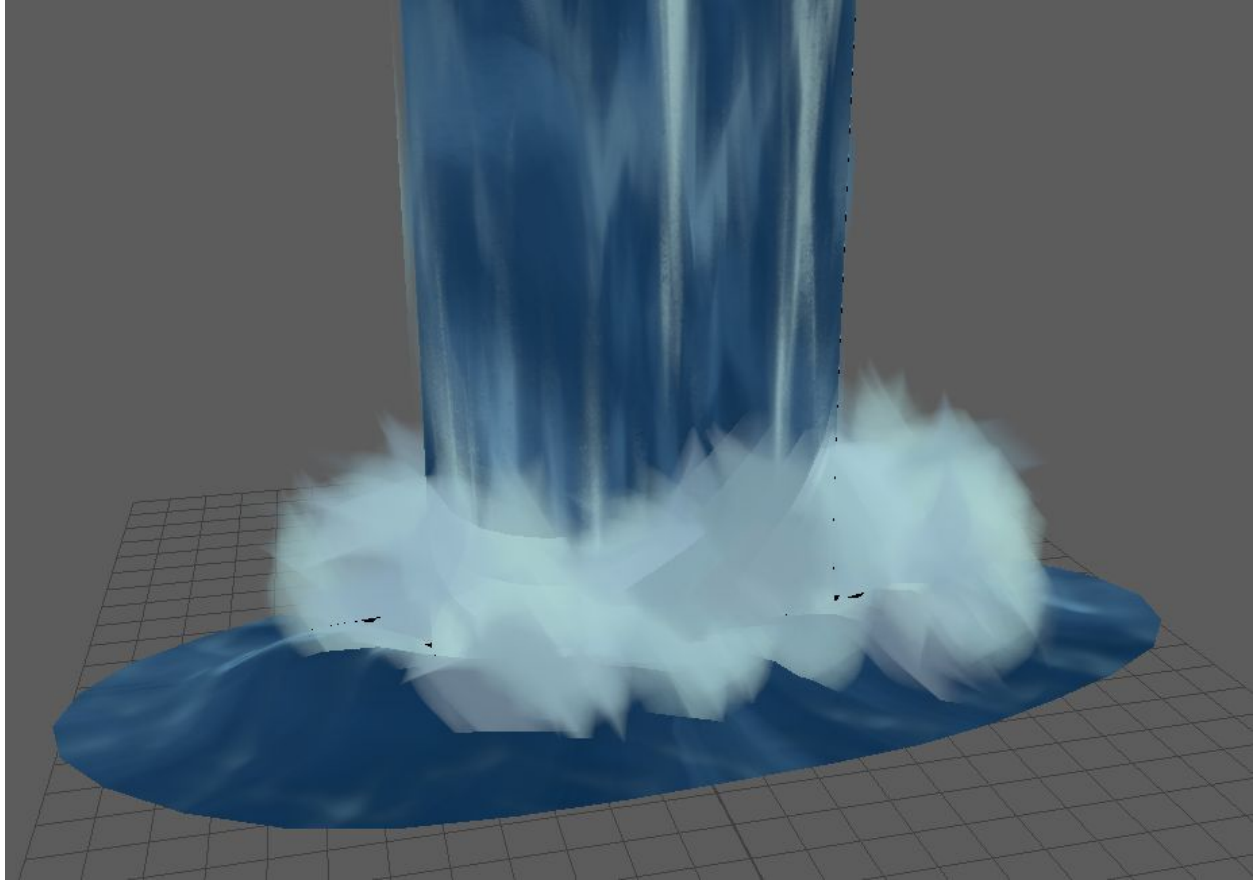


Open the tab labeled **Shading**. Change the **Opacity** to **0.600**.



Open the tab labeled **Sprite Attributes**. Change **Sprite Scale X** and **Sprite Scale Y** to **5.00**.

If all the steps above have been followed, your effect should appear like this:



Finished Example:

https://drive.google.com/file/d/1DQnK_GDHJNGhQTCMWAPz08OoM0Q3uwTR/view?usp=sharing

Resources

https://learn.foundry.com/modo/902/content/help/pages/shading_lighting/blob.html

https://download.autodesk.com/global/docs/maya2014/en_us/index.html?url=files/Surface_Relief_Displacement_maps.htm,topicNumber=d30e632545

https://download.autodesk.com/global/docs/maya2014/en_us/index.html?url=files/Surface_Relief_Connect_a_texture_as_a_displacement_map.htm,topicNumber=d30e632762

<http://forums.cgsociety.org/t/instanced-particles-with-displacement-maps/1258821/4>

<https://forums.autodesk.com/t5/maya-shading-lighting-and/need-help-with-displacement-maps-on-instanced-particle-objects/td-p/8534264>

<https://www.youtube.com/watch?v=iD5keuS9BZU>

<https://www.youtube.com/watch?v=Vrk8pOK02II>

<https://www.youtube.com/watch?v=BBBaWGfaEQQ>

<https://www.youtube.com/watch?v=bPoHHRSN61U>

<https://www.youtube.com/watch?v=UJo9bghTcWk>

<https://www.youtube.com/watch?v=ZuyA44hfGak>

<https://www.youtube.com/watch?v=1TdSFBhxxqo>

<https://knowledge.autodesk.com/support/maya/learn-explore/caas/CloudHelp/cloudhelp/2020/ENU/Maya-LightingShading/files/GUID-E7A03E4E-8C9A-4B62-8218-28FC063A82AB-htm.html#:>

[~:text=Displacement%20maps%20are%20grayscale%20textures.on%20an%20otherwise%20flat%20object.&text=By%20default%20C%20Maya%20uses%20Feature.add%20more%20triangles%20where%20required.](#)

https://www.youtube.com/watch?v=moqrqZ_DfAw

https://www.youtube.com/watch?v=FM-XUP_4WAE

<https://www.youtube.com/watch?v=Yx23PPxEQmM>

<https://knowledge.autodesk.com/support/maya/learn-explore/caas/CloudHelp/cloudhelp/2019/ENU/Maya-Rendering/files/GUID-45376A98-6E91-4AE0-92E7-B83FDA9BC1E3-htm.html>

<https://www.youtube.com/watch?v=C3Xuap8r5JE>

<https://answers.arnoldrenderer.com/questions/822/is-there-a-way-to-baked-selected-geometry-f-or-mult.html>