

Babbling Brook

by Kim Lee

This complex effect combines elements of the meandering brook's clear refraction and animated noise maps with particle systems to re-create the white frothy motion of water falling down over rocks. Again, the scale of the effect is smaller than that of a brook, but it is visually faster and in places quite chaotic. There will be a much more noticeable change in elevation of both the landscape and the brook itself from the point in the frame where the brook enters to the point where it exits.

Because the topography of this effect varies significantly from almost level to almost vertical at various points, you will create three separate brook objects. This will give you the flexibility to customize different variants of the flowing water material and allow for areas of faster and slower moving water.



Note

All position and rotational information is based on absolute world coordinates. When positioning objects in your scene, always use the Transform Type-In dialog box located in the Tools menu. This ensures proper object orientation. Most objects are created in the Top viewport.

Leave any settings that are not listed in the example at the MAX default values.

Creating the Brook Objects

The first thing you need to do is create the geometry for the parts of our brook that flow more horizontally than vertically.

1. In the Top viewport, create a Quad Patch:
Length = 500
Width = 180
Length Segments = 2
2. Rename the Quad Patch **Brook01**.

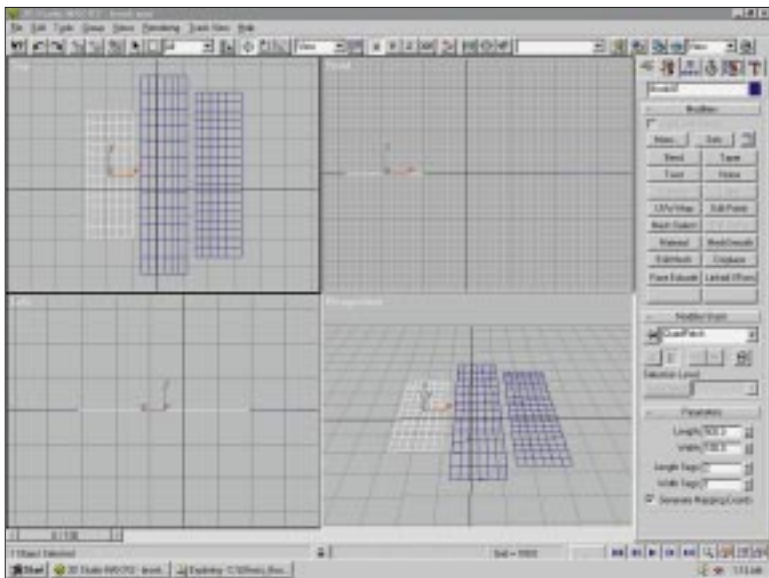


Figure 1
Creating a Quad Patch.

3. Create two more objects with the following settings:
Brook02: Length = 780, Width = 180, Length Segments = 2
Brook03: Length = 650, Width = 180, Length Segments = 2
4. Add an edit patch modifier to the modifier stack and deselect the Sub-Object button:
Steps = 30
5. Repeat step 4 for all three objects.
6. Place an Edit Mesh modifier to the stack and deselect the Sub-Object button. Repeat this step for each Brook object.
7. Add a Displace modifier to the stack:
Strength = 10
Planar = checked

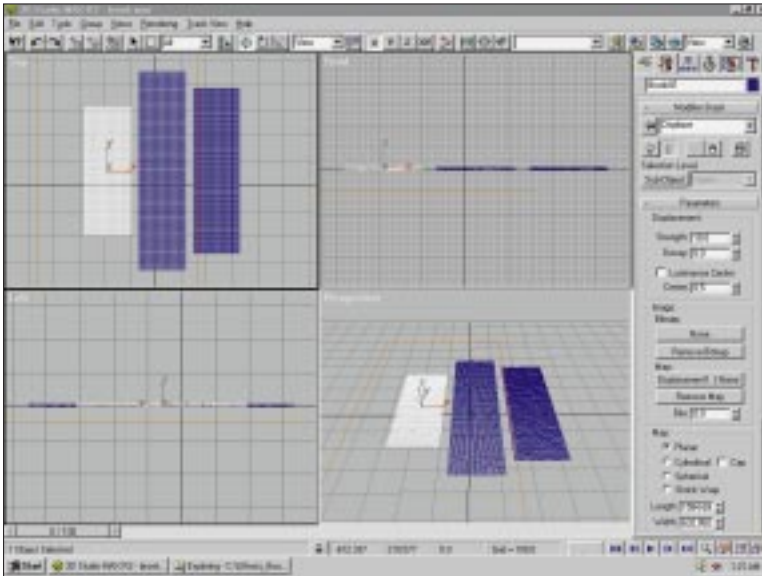


Figure 2
Adding a Displace modifier.

8. Repeat step 7 for the remaining two objects.
9. Select Brook01 in the Image section of the Displace parameters, click None under the label MAP and choose a Noise map.
10. Open the Material Editor and click and drag the button now labeled Map #1 (noise) from the command column to the first material sample slot. Select Instance and then select OK.
11. Rename the Material in slot 1 **Displacement1**. Repeat steps 9 through 11 for Brook02 but use slot 2 and name the material **Displacement2**. You will use Displacement1 for both Brook01 and Brook03.
12. In the Material Editor, set the following for both materials:
Noise Type = Fractal
Size = 32
13. Turn Animate on and go to Frame 100.
14. For the Displacement1 material set the following:
Y Offset = -1000
Phase = 5
15. For the Displacement2 material, set the following:
Y Offset = -700
Phase = 5
16. Close the Material Editor and turn off Animate.

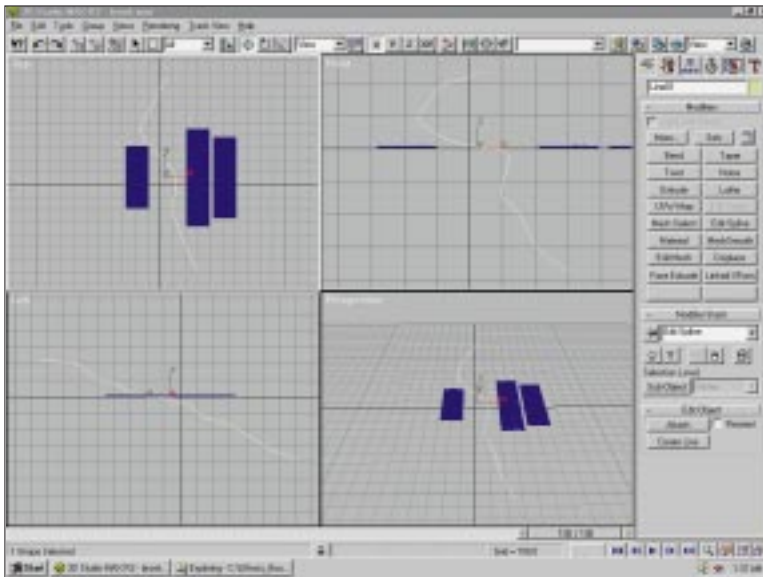


Figure 3
Creating a spline
line.

17. In the Top viewport, I've created a spline line in the shape of a curvy wave like the one shown above. You should draw from top to bottom as the vertex order will become important in later steps. Apply an edit spline modifier to this line to get the shape you want. Remember to change the elevation of the spline in the Left viewport.
18. Select the Brook01 object and add a PathDeform modifier to its stack.
19. Click Pick Path and select the line01 shape. Repeat steps 18 and 19 for Brook02 and Brook03.
20. For each Brook object, click Move to Path and select a Path Deform Axis of Y. Use the following settings for the three objects:
 - Brook01:** Percent = 11.5, Rotation = 90
 - Brook02:** Percent = 45.5, Rotation = 90, Twist = -24
 - Brook03:** Percent = 84.0, Rotation = 77

You should now have three Quad Patches deformed end to end along a single spline shape. It should resemble a winding brook.

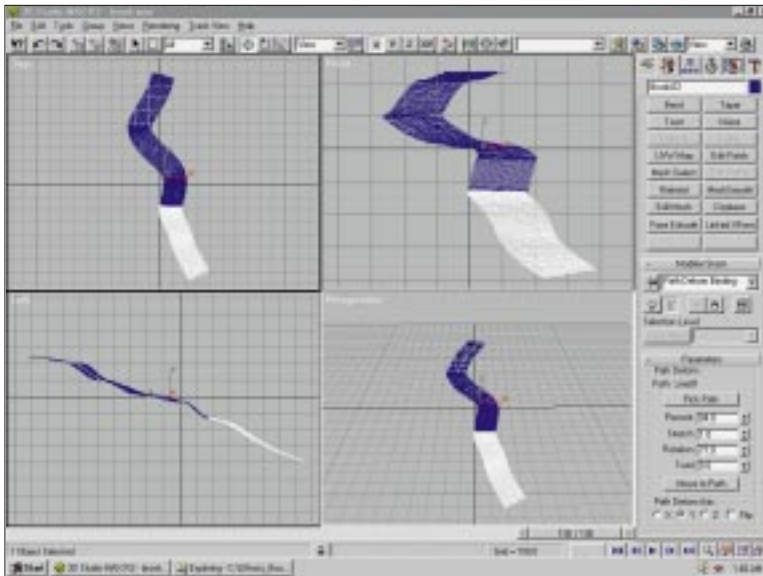


Figure 4
Three deformed
Quad Patches.

Environment Setup

Next, create the land around our brook geometry.

1. In the Top viewport, create a Quad Patch with the following parameters:
Length = 1500
Width = 1500
Length Segments = 4
Width Segments = 3
2. Name the object **Land**.
3. Reposition the Quad Patch so that it is centered on the brook object.
4. Add an Edit Patch modifier to the stack and deselect the Sub-Object button:
Steps = 20
5. Select Sub-Object and edit the patch vertices up and down to roughly conform to the brook object's elevation changes. Deselect the Sub-Object button when finished.
6. Add a Mesh Select modifier to the stack and deselect the Sub-Object button.

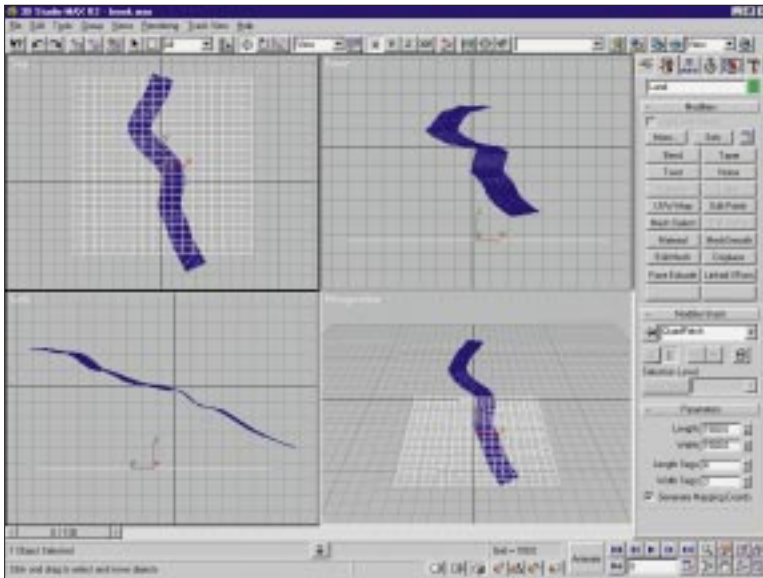


Figure 5
Creating a Quad Patch.

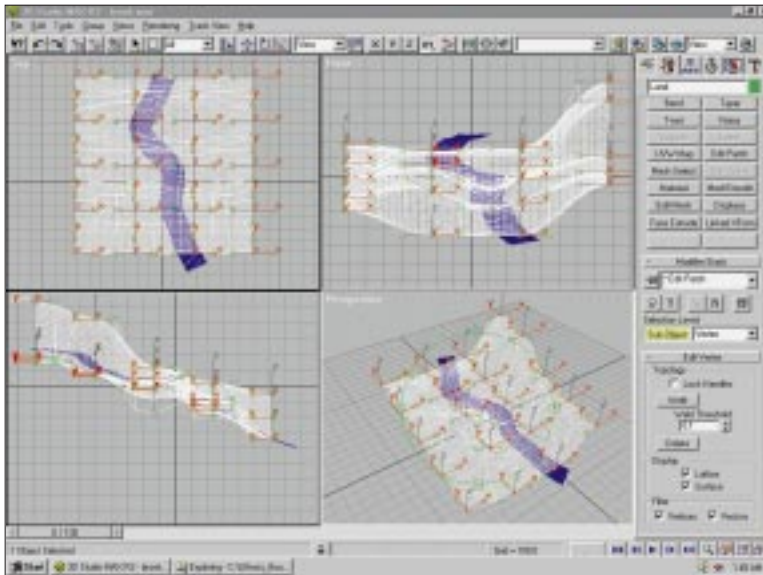


Figure 6
Editing the patch vertices.

7. Create a Displacement Bitmap for the land object that matches the contours of the brook object. Begin by clicking the Render Scene button, set the Output Size to 500×500, and choose Close.

8. Right-click the viewport label and select Show Safe Frame. Zoom and pan the Top view so that your objects fall squarely within the outer yellow safe frame box.
9. Render this view and save the image.

You would now normally save your MAX2 scene file and open a bitmap-based editing program, such as Photoshop or Painter, where you would use the saved bitmap as a guide to paint a displacement map. I have already created one called Land3_Displ.tga, which you will use for this example. (Make sure to set output size back to 640×480.)

Creating a Terrain with a Displacement Map

Now you will complete the land by using a Bitmap to actually deform the geometry.

1. In the Top viewport, turn off Show Safe Frame and click the Zoom Extents button.
2. Select the Land object, and in the Modifiers tab add a Displace modifier to the stack.
3. In the Image section of the displace parameters, select the None button under Bitmap and select Land3_Displ.tga from the file selection box:
Strength = 116
4. Switch to a Perspective view in Smooth+Highlights mode:
Reference Coordinate System = view
5. Select the Land object and move it up and down, constraining to the z-axis, until it looks similar to the following image.

Lighting Setup

In this section, you create the lighting effects for the scene.

1. Create an omni light in the Top viewport beyond the upper-right corner of the land object at $x = 461.122$, $y = 1465.266$, $z = 1373.448$. Set the following:
R = 255, **G** = 255, **B** = 255
Cast Shadows = on
2. Create a second omni light in the Top viewport and place it below the Land object. Set the following:
R = 180, **G** = 180, **B** = 180

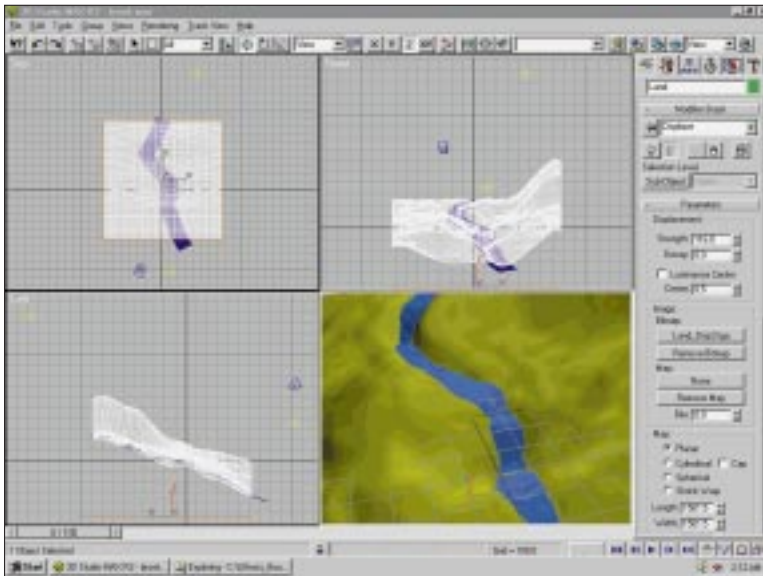


Figure 7
Moving the Land
object.

Setting the Environment Map and Camera

1. From the Rendering drop-down menu, select Environment.
2. Click the None button under environment map and select Bitmap from the list. Click OK. The button now reads Map#1(Bitmap).
3. In the Material Editor, drag and drop the Map#1(Bitmap) button from the Environment dialog box to an empty sample slot as an Instance.
4. In the Material Editor, change the name of the material to Backdrop and set the following:
Environ Mapping = screen
Bitmap = checked
5. Select sky.jpg and click OK.
6. Create a free camera and place it at $x = -272.498$,
 $y = -1039.241$, $z = 723.169$. You might want to set the absolute world rotation or the camera to $x = 57.532$, $y = 0$, $z = -15.504$.
7. Make adjustments to the spline shape used as a path for the brook objects to assure that the two objects are well integrated.

At this point you have all of our geometry built as well as lighting and camera setup.

Animation

Now you need to create particle systems for the parts of our brook that fall down over rocks and drops. Essentially, anywhere the water will be traveling more vertically will be created with particles.

Particle Systems and Space Warps Creation

1. In the Front viewport, create 3 Quad Patches:
 - Length** = 7
 - Width** = 95
 - Length Segments** = 1
 - Width Segments** = 1
2. Rename the Quad Patches **Emitter01**, **Emitter02**, and **Emitter03**.
3. Position each emitter object at the top of a steep vertical drop along your brook.
4. Add an Edit Patch modifier to each emitter and edit each to conform to the width of the visible brook. (Remember that you might not be able to see the entire width of the brook objects because of their intersection with the land object.)

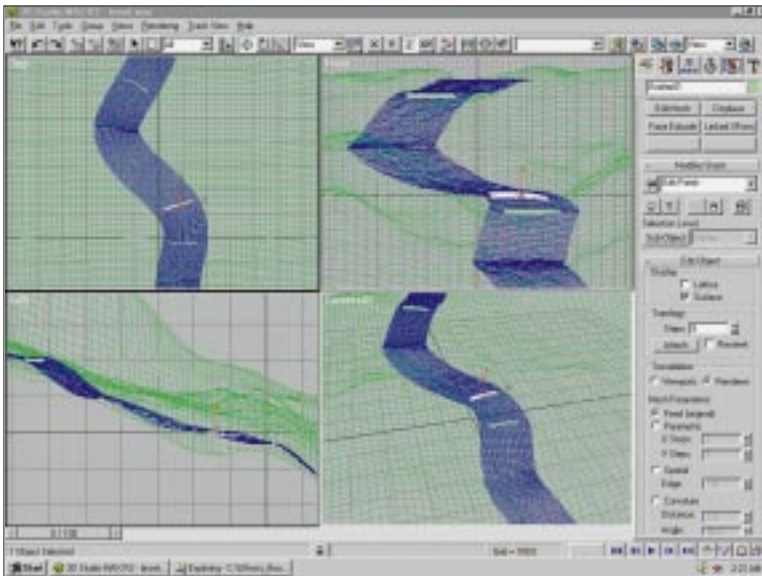


Figure 8
Adding an Edit
Patch modifier.

5. In the Top viewport, create a Particle Array anywhere off to the side of our land object. Under Basic Parameters, click the Pick Object button and select Emitter01.
6. In the Particle Generation rollout, set the following:
 - Use Rate** = 30
 - Speed** = 7
 - Emit Start** = -15
 - Emit Stop** = 100
 - Display Until** = 120
 - Life** = 20
 - Particle Size** = 7.5
 - Grow For** = 10
 - Fade For** = 5
 - Particle Type** = standard
 - Tetra** = selected
7. In the Particle Rotation rollout, set the following:
 - Direction of Travel/Mblur** = selected
 - Stretch** = 1
8. Create a Gravity space warp in the Top viewport. Set the following:
 - Strength** = 0.6
9. Bind the PArray icon to the space warp.
10. Create a Deflector in the Top viewport and position it under the surface of the brook object where the particles are falling through the brook. In my scene, this was at $x = 10.351$, $y = -3.742$, $z = 19.661$. Set the following:
 - Bounce** = 0.8
11. Bind the PArray to the Deflector.
12. With the PArray icon selected, right-click it and select Properties from the pop-up menu:
 - Motion Blur** = Image
 - Multiplier** = 1
13. Repeat steps 5 through 12 for each emitter object.
14. For PArray02, set the following in the Particle Generation rollout:
 - Use Rate** = 30
 - Speed** = 7
 - Emit Start** = -30
 - Emit stop** = 100
 - Display Until** = 120

Note

The settings used in the following steps are specific to the example file (Brook.max). Depending on the differences between your brook model and the one used here, you might have to adjust these parameters accordingly.

Note

Depending on the angle of the drop, you might need separate Gravity space warps for each PArray.

Life = 28
Variation = 2
Size = 7.5
Grow For = 10
Fade For = 5

15. For PArray03, set the following in the Particle Generation rollout:

Use Rate = 30
Speed = 8
Variation = 25%
Emit Start = -30
Emit Stop = 100
Display Until = 120
Life = 30
Variation = 2
Size = 7.5
Variation = 25%
Grow For = 10
Fade For = 5
16. Bind the two new PArrays to their respective Gravity and Deflector space warps.

Now you should have our entire effect built with particles acting like mini waterfalls.

Creating Materials

Now for the last phase—the creation of materials.

1. In the Material Editor, select an empty sample slot and set the following:

Ambient (R = 208, G = 208, B = 208)
Diffuse (R = 247, G = 247, B = 247)
Specular (R = 255, G = 255, B = 255)
Shininess = 25
Shin. Strength = 94
Self-Illumination = 50
Opacity = 100
2. Name the material **White Water** and apply it to all three PArray object icons.
3. In the Material Editor, choose an empty sample slot, name it **Brook1**, and apply it to the brook object. Set the following:

Ambient = (R = 44, G = 55, B = 68)
Diffuse = (R = 123, G = 113, B = 94)

Note

Using my file as an example, notice that I was able to use one of the Gravity space warps for two of the PArrays. Also note that the angle of rotation and the positions of the other deflectors are totally dependent on the topography of the brook. Following are the PArray settings used in the example file. Note that Particle Type and Particle Rotation settings are the same in all three.

Specular = (R = 255, G = 255,
B = 255)

Filter Color = (R = 41, G = 25,
B = 12)

Shininess = 62

Shin. Strength = 100

Opacity = 30

4. Click the Bump slot and set the Map Type to Noise. Set the Noise Parameters:
 - UVW1** = selected
 - V Tiling** = 4.0
 - Noise Type** = Regular
 - Size** = 0.05
5. Go to Frame 100 and turn Animate on. Set the V Offset to -6.5 and the Phase to 10. Turn Animate off.
6. Click the Refraction map slot and set the Map Type to Thin Wall Refraction. Set the following:
 - Select every Nth Frame and set to 1
 - Thickness Offset** = 0.5
 - Bump Map Effect** = 2.0
7. Click the Reflection map slot and set the Map Type to Reflect/Refract. Set the following:
 - Automatic** = Source
 - Use Environment Map** = on
8. At the parent level of the Brook material, open the Extended Parameters rollout and set the following:
 - Falloff Amt.** = 0
 - Refract Map/RayTrace IOR** = 1.3
 - Falloff** = IN
 - Type** = Filter
9. Apply the Brook1 material to the Brook01 and Brook03 objects.
10. Copy the Brook1 material into an empty sample slot and rename the copy **Brook2**. Click the Bump map channel, turn on the Animate button and go to Frame 100. Change the V Offset to -3 and turn off the Animate button.
11. Apply this new Brook2 material to the Brook02 object.

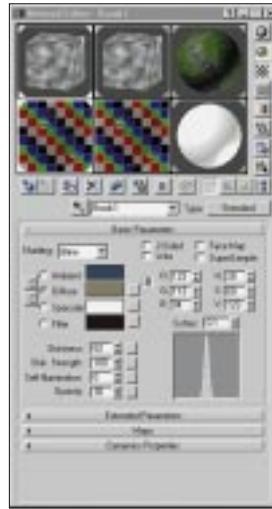


Figure 9
Creating the
Brook1 material.

Notice that the addition of particle systems has created a very convincing effect. As I did not include any props (such as trees trunks or plants), it

may be difficult to picture this as a small brook only about a foot or two wide. Depending on the scale of the effect, you can use this technique to simulate everything from small brooks flowing down over rocks to full blown waterfalls.

By combining this with the texture mapping techniques used on both the Stream and River effects, almost any body of water can be simulated convincingly.

Meandering Stream

by Kim Lee

While similar to the river effect, there are significant differences when re-creating a meandering stream. For one, the scale of the effect is now smaller as well as slower and more calm. The bottom of the stream will be relatively close to the surface of the water, forcing the artist to pay special attention to the issues of reflection and especially refraction. We will again use the procedural noise functions of the material editor to simulate the fluidity of the stream.



Note

All position and rotational information is based on absolute world coordinates. When creating objects, use keyboard entry when possible. When positioning objects, use the Transform Type-In dialog box located in the Tools menu. These techniques ensure proper object placement and orientation.

Leave any settings that are not listed in the example at the MAX default values. Create objects in the Top viewport, unless otherwise indicated.

Preconfiguration

1. Before beginning this effect, please reset *or* restart MAX.
2. Copy the Stream project map files from the accompanying CD-ROM to the MAX maps subdirectory.
3. Load the file Stream.max from the CD-ROM.

Creating the Stream Object

First, create the stream object and deform it.

1. Create a Quad Patch somewhere in the middle of the Top view-
port:
Length = 250
Width = 22
Length Segments = 6
2. Name the object **Stream**.

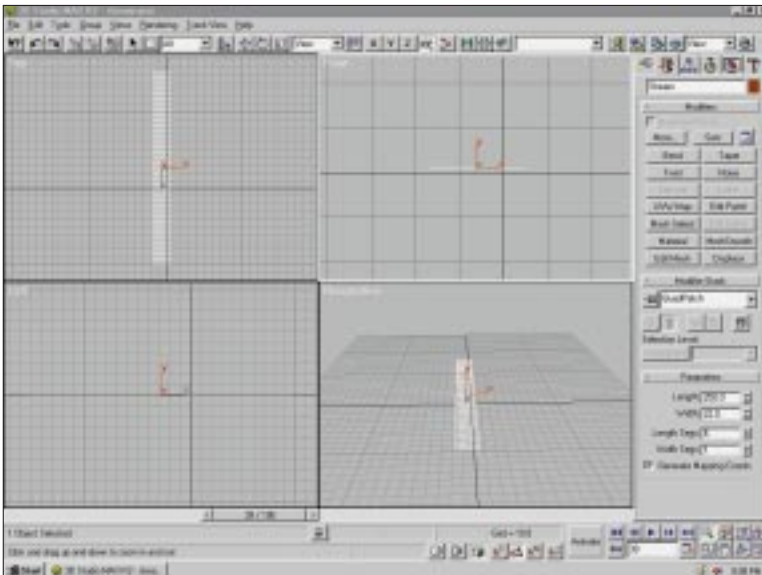


Figure 1
Creating the
stream object.

3. Add an Edit Patch modifier to the Modifier Stack and deselect the Sub-Object button. Set steps to 45.
4. In the Top viewport, reselect the Sub-Object button and slightly move some vertices along the x-axis to vary the width of the stream. Deselect the Sub-Object button when you finish editing the vertices.
5. Place an Edit Mesh Modifier to the stack and deselect the Sub-Object button. This transforms the patch object to a polygonal mesh object.
6. Add a Displace modifier to the stack and set the following:
Strength = 1
Planar = selected

7. In the Image section of the Displace Parameters, click None under the label MAP and select a Noise map.
8. In the Material Editor, click and drag the button now labeled Map #1 (noise) from the command column to the first material sample slot. Select Instance in the Instance (Copy) Map dialog box and select OK.
9. Name the material **Displacement**.
10. Set the following in the Noise Parameters rollout:
Noise Type = Fractal
Size = 3

The surface of the stream object should now have a wave-like distortion.
11. Turn on the Animate button and go to Frame 100. Set the Y Offset to -50 and the Phase to 5. This will move the Noise pattern -50 units along the y-axis and apply an undulating motion to the pattern itself. Close the Material Editor and turn off the Animate button.
12. In the Top viewport, create a spline line in the shape of a curvy wave. Draw from top to bottom as the vertex order will become important in later steps. You might need to apply an Edit Spline modifier to this line to get the shape you want.

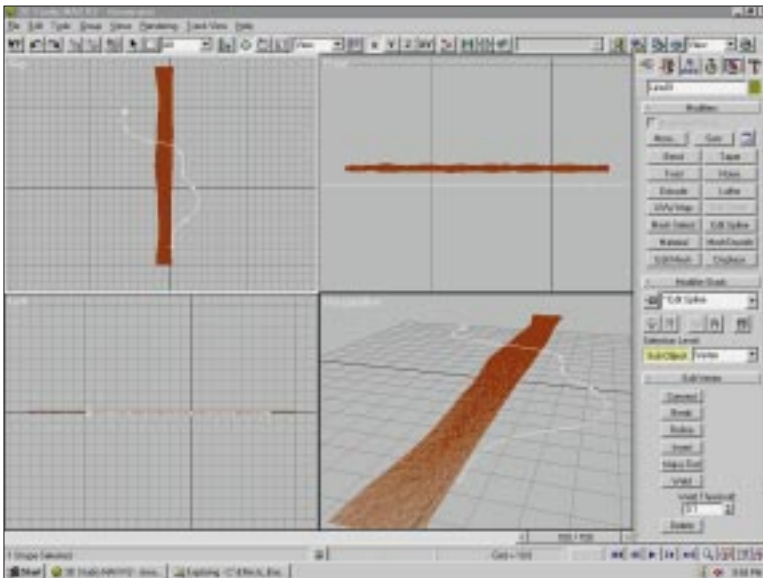


Figure 2
Creating a spline
line.

13. Select the stream object and add a PathDeform modifier to its stack.
14. Click the Pick Path button and select the line shape.
15. Click the Move to Path button and select a Path Deform Axis of Y. Set the following:
 - Percent** = 50
 - Rotation** = 90

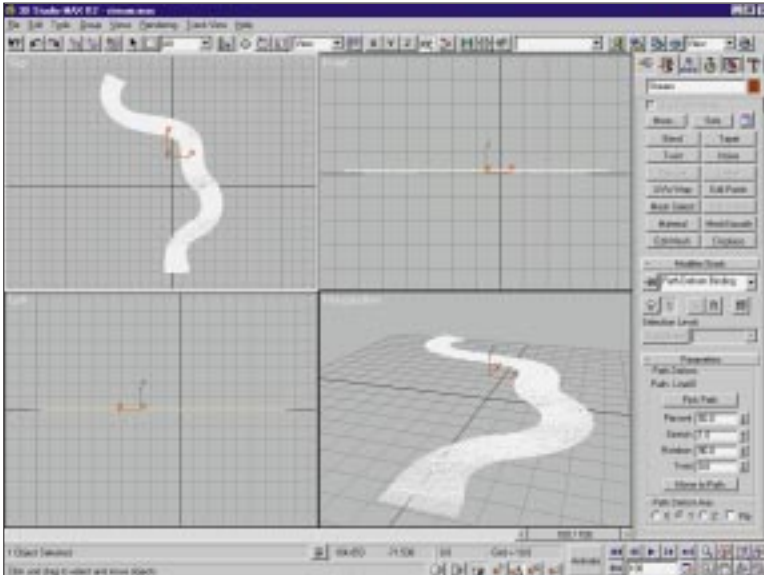


Figure 3
Deforming the stream object.

The stream object is now deformed into the shape of a generic stream and has an animated surface displacement resembling flowing current. Render a preview to see the results thus far.

Creating a Landscape and Environment

Now you need to create the surrounding land geometry and set up the background environment.

1. Activate the Top viewport.
2. Create a Quad Patch at $x = -15.8$, $y = 12.7$, $z = -0.65$ so that it overlaps the stream object. Set the following:
 - Length** = 185
 - Width** = 190
 - Length Segments** = 1
 - Width Segments** = 1

3. Name the object **Land**.
4. Reposition the Quad Patch so that it is centered on the stream object.

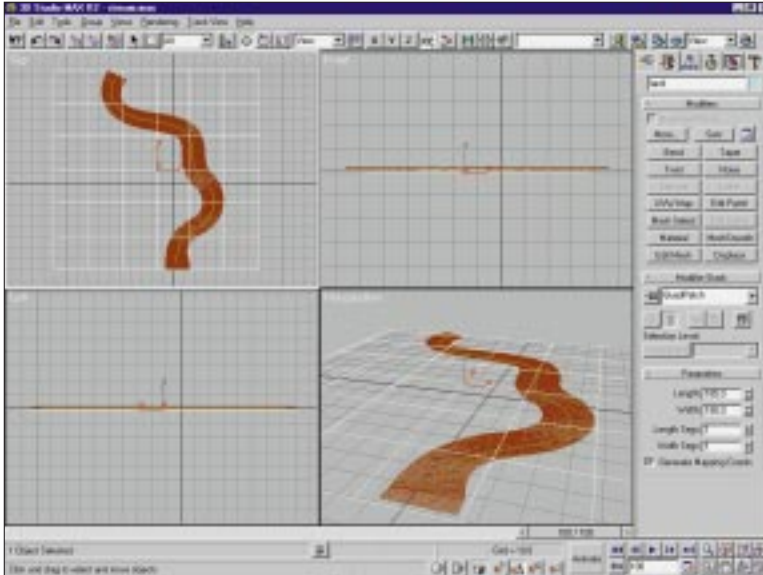


Figure 4
Creating the land
object.

5. Add an Edit Patch modifier to the stack and deselect the Sub-Object button. Set steps to 80.
6. Add an Edit Mesh modifier to the stack and deselect the Sub-Object button. This converts the patch object to polygonal geometry.
7. Create a Displacement Bitmap for the land object that matches the contours of our stream object. Click the Render Scene button, set the Output Size to 500×500, and choose Close.
8. Right-click the viewport label and select Show Safe Frame. Zoom, then Pan the Top view so that the objects fall squarely within the outer yellow safe frame box.

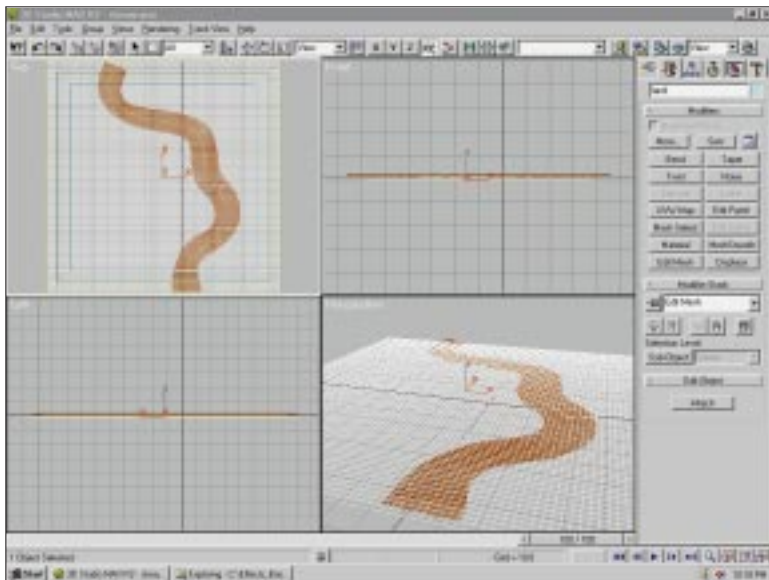


Figure 5
Zoom and pan in
the Top view.

9. Render this view and save the image.
10. Now, you would normally save your MAX2 scene file and open a bitmap-based editing program, such as Photoshop or Painter, where you will use the saved bitmap as a guide to paint a displacement map. I have already created one called Land2_Displacement.tga, which we will use in this example.
11. In the Top viewport, turn off Show Safe Frame and click Zoom Extents.
12. Select the land object and the Modifiers tab, and then add a Displace modifier to the stack.
13. In the Image section of the Displace parameters, select None under Bitmap and select Land2_Displacement.tga from the file selection box. Set the following:
Strength = 12
14. Switch to a Perspective view in Smooth+Highlights mode. Make sure that the reference coordinate system is set on View.
15. Select the land object and move it up and down, constraining it to the z-axis until it looks similar to the following image.

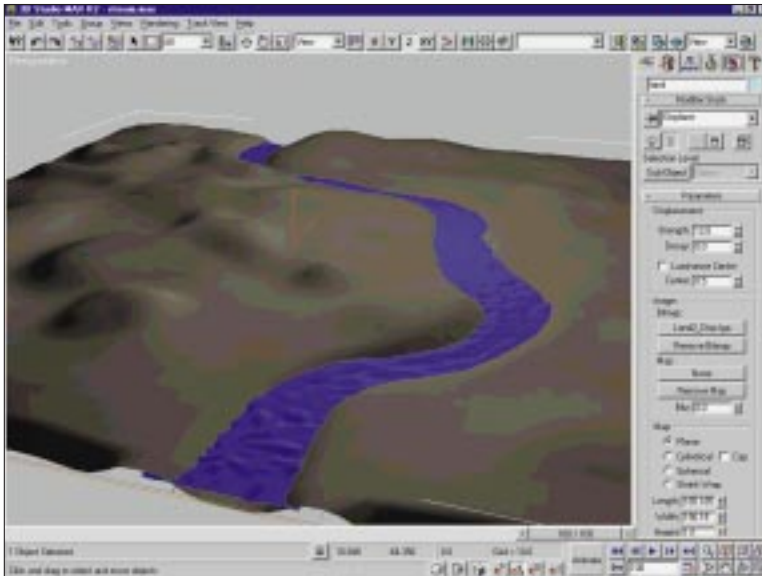


Figure 6
Your scene should look similar to this.

You should now have all of the geometry built for both the river and the land.

Lighting Setup

In this section, you will create the lighting effects for the scene.

1. Create an omni light in the Top viewport over the middle of the stream object at $x = 16.511$, $y = 16.427$, $z = 50.928$. Set the following:
V = 180
Cast Shadows = on
Use Ray-Traced Shadows = selected

This light will be the main light and provides a bit of localized glare off the stream's surface. Use the image above as a guide.

2. Create another omni light in the Top viewport and place it beyond the lower-right corner of the land object at $x = 118$, $y = -118$, $z = 81$. Set the following:
V = 100.

This will act as a fill light. Again, use the accompanying image as a guide.

3. Create a third omni light in the Top viewport and place it beyond the upper-left corner of the land object at $x = -65.575$, $y = 185.244$, $z = 67.126$.
V = 130

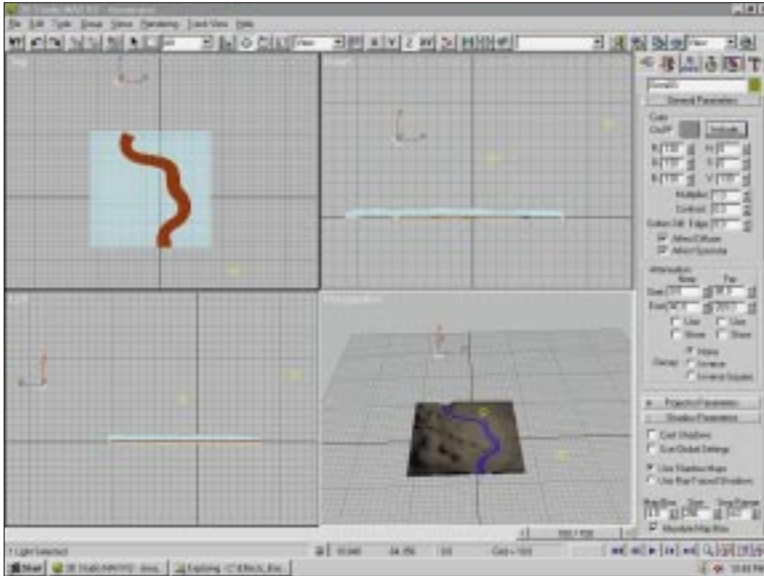


Figure 7
Creating the third omni light.

4. Click the Exclude button, and in the resulting dialog box, make sure that Include is selected. Select Stream from the Scene Objects column and move it to the right column. Now Omni03 will only affect the stream object. Click OK.
5. Select Environment from the Rendering drop-down menu.
6. Click None under Environment Map and select Bitmap from the list. Click OK. The button now reads Map#1(Bitmap).
7. In the Material Editor, drag and drop the Map#1(Bitmap) button as an Instance from the Environment dialog box to the second material sample slot.
8. In the Material Editor, change the name of slot 2's material to Backdrop and set the Environ Mapping to Screen.
9. Go to Bitmap Parameters and click the blank button next to Bitmap. Select sky.jpg and click OK.
10. Create a target camera. Make sure the camera is at $x = 50.448$, $y = -36.13$, $z = 9.938$. Position the target at $x = 30.518$, $y = -10.23$, $z = -1.422$.

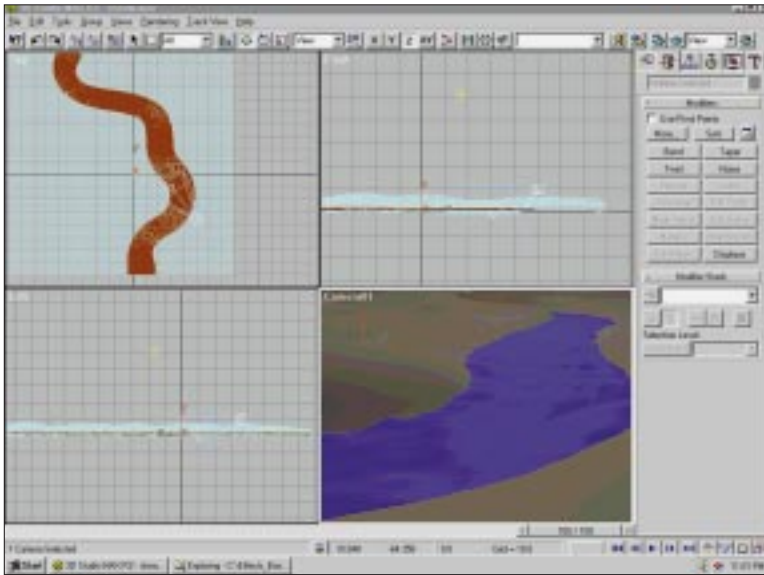


Figure 8
Creating the camera.

At this point you are almost finished. All you need to do is create materials for everything.

Creating Materials

First, you must create a material for the landscape that produces an interesting rock texture for the area of the stream bed and a different mixture of grass and dirt elsewhere. Next, you need to make part of the stream bed texture darker to simulate the falloff of light as it passes through the water. You can achieve this effect through the use of Mix, Composite, and Mask Map Types as with a variation of the Displacement map. Because this material is secondary to the actual effect, jump right to the Stream material. Please refer to the Landscape material itself if you are not sure how to create your own.

1. In the Material Editor, make slot 4 active, and set the Basic Parameters:
Ambient = (R = 44, G = 55, B = 68)
Diffuse = (R = 123, G = 113, B = 94)
Specular = (R = 255, G = 255, B = 255)
Filter = (R = 41, G = 25, B = 12)
Shininess = 62
Shin. Strength = 100
Opacity = 30

2. Name the material **Stream** and apply it to the stream object.
3. Put a Noise map into the Bump slot. Set the Noise Parameters as follows:
Coordinates = UVW1
Noise Type = Regular
Size = 0.03
4. Go to Frame 100 and turn on the Animate button. Set V Offset to -1 and Phase to 10. Turn off the Animate button.
5. Put a Thin Wall Refraction map into the Refraction channel. Make sure Every Nth Frame is selected and set on 1. Set the following:
Thickness Offset = 0.5
Bump Map Effect = 2.0
6. Put a Reflect/Refract Map Type into the Reflection channel. Set the following:
Source = Automatic
Use Environment Map = checked
7. At the parent level of our stream material, open the Extended Parameters rollout and set the following:
Falloff Amt. = 100
Refract Map/Raytrace IOR = 1.2
Falloff = IN
Type = Filter
8. Apply the stream material to the stream object.



Figure 9
Set the parameters in the Material Editor.

Adding the Finishing Touches

I've added a couple rocks and a swimming fish to my scene to accentuate the refractive nature of the stream. The rocks are simple spheres with noise and a Top/Bottom material type applied. This material allows me to make the top of the rock (which is above the surface of the water) appear dry, while the submerged part can appear wet and shiny. When the current rises and falls it will appear to leave a portion of the rock wet.

The fish was created from editing a simple box and applying a meshsmooth modifier. A spline shape was created and used as a path for a Path Deform modifier applied to the fish. All that is needed to make it swim is to animate the percentage parameter of the Path Deform.

The use of a Thin Wall Refraction map allows us to simulate realistic water refraction in much less time than using a raytrace map. By using the Filter color slot we can control the effect of the stream's transparency relative to its angle from the camera view. Similar to the River Effect, by merely adjusting the offset, phase, and strength/amount parameters of the noise maps used for both displacement and bump, you can animate the speed and intensity of the stream.

You can find the final MAX file, Stream.max, in this project's Scene folder and the final AVI in the Images folder.

Wrinkles

by Jay Kapadia

The Wrinkle effect takes advantage of Free Form Deformation (FFD). FFD is a great way to animate. You can distort polygons—if they are dense enough—as if they were nurbs. One effect that you can use this procedure for is setting up morph targets. For example, if you have a human head, you can use FFD to move the lips, nose, and cheeks to form any expression you like. Then you can take a snapshot to create a morphable head. The uses for FFD are unlimited. In this effect, you use FFD to animate a sleeve being pulled up. Look closely at where the control points will be placed to create a realistic bulging fabric.



Note

All position and rotational information is based on absolute world coordinates. When positioning objects in your scene, always use the Transform Type-In dialog box located in the Tools menu. This ensures proper object orientation.

Leave any settings that are not listed in the example at the MAX default values.

Preconfiguration

1. Before beginning this effect, either reset or restart MAX.
2. Copy the Wrinkle project map files from the accompanying CD-ROM to the MAX maps subdirectory.
3. Load file Wrinkle.max from the CD-ROM.

In this file, you can find a robotic arm wearing a sweater. The arm is broken into two pieces. The animation length is preset to 60 frames.

Applying and Animating FFD

In this section, you use the FFD modifier on an editable mesh.

1. Select the sleeve and under Modifiers, click the Sub-Object button.
2. Activate the Left viewport. Select the vertices that you want to wrinkle—all the vertices that are not perfectly horizontal.

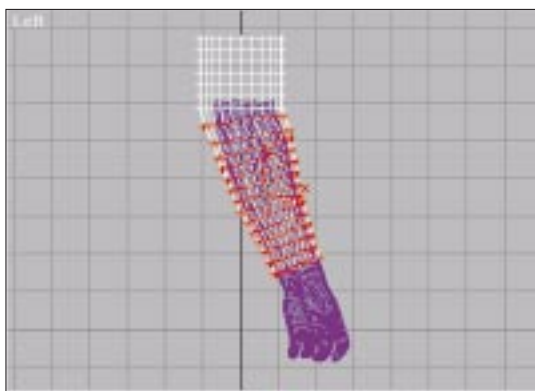


Figure 1
The vertices that you should select.

3. With the vertices still selected, choose FFD(box) from the Modifiers rollout. Click Set Number of Points and make it $2 \times 2 \times 10$. The more points you create, the more control you have.

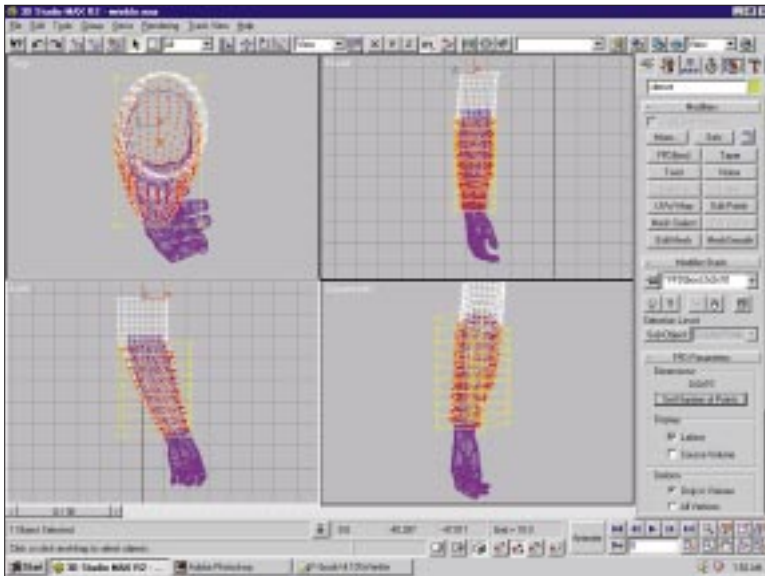


Figure 2
The FFD(box)
applied to the
selected vertices.

4. Click Sub-Object and switch Control Points to Lattice. Position the Lattice around the selected vertices as tightly as possible. You can use move, rotate, and scale to maneuver the Lattice until it fits properly. In the Left viewport, rotate the lattice on the z-axis 15 degrees and position the lattice at $x = -36.2$, $y = -8.3$, $z = -63.8$.

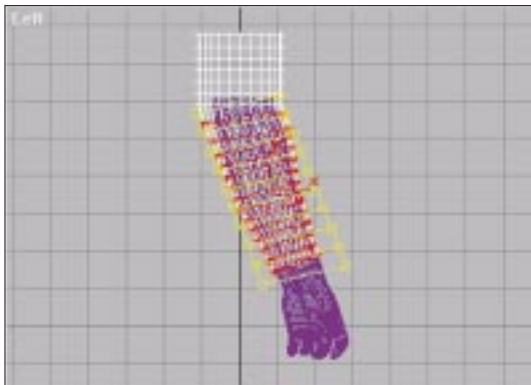


Figure 3
The proper posi-
tion of the
FFD(box).

5. Go to frame 10 and turn Animate on. Under the Modifiers panel, click Sub-Object. Make sure it says Control Points.

6. Select the bottom four rows of control points and move them up. Move them closer and farther from the arm to create a bulging effect. The coordinates for the bottom four rows should be approximately $x = -35.7$, $y = -11.3$, $z = -72.3$.

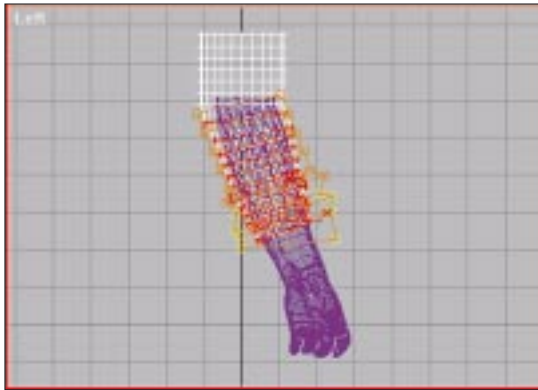


Figure 4
The new location of the bottom four rows of control points.

7. Go to frame 20 and move the bottom six rows of control points upward. Remember to move them closer and farther from the arm. The coordinates for the bottom six rows should be around $X: -35.423$, $Y: -7.727$, $Z: -61.913$.

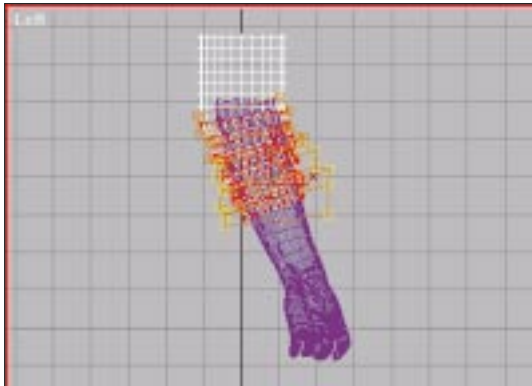


Figure 5
The new location of the bottom six rows of control points.

8. Go to frame 30 and do the same thing, making sure that the underlying arm is not visible through the sleeve. The coordinates should be approximately $x = -35.61$, $y = -4.646$, $z = -50.961$. Turn off Animate.

At this point, you have animated the sleeve being pulled up. You might want to save your work now. When you work with FFD modifiers, be careful not to collapse your Modifier Stack. If you do, you will lose everything you did.

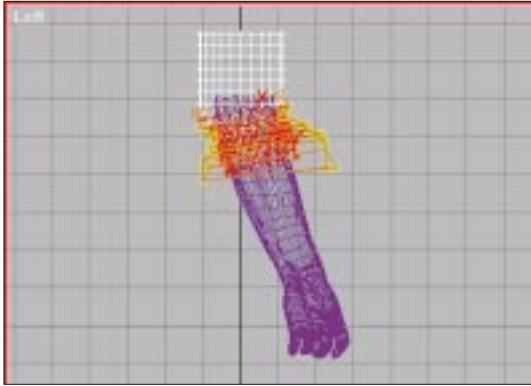


Figure 6
The final location of the control points that affect the sleeve.

To make the arm split apart, I used the same principles that I used to animate the sleeve. I selected the vertices that I wanted to move and applied an FFD(box). The more dense the geometry, the smoother the deformation looks. By selecting either object arm top or object arm bottom and clicking on the Modifier panel, you can see exactly which vertices are affected by the FFD modifier because they appear red.

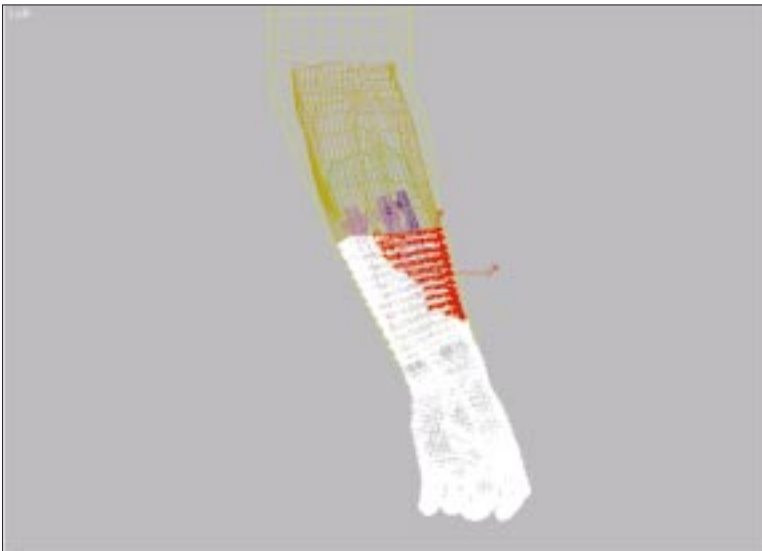


Figure 7
The more dense the geometry, the smoother the deformation looks.

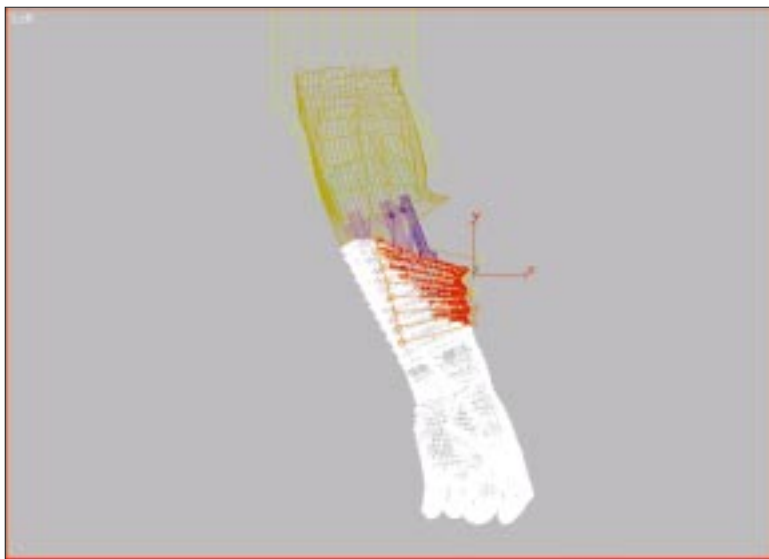


Figure 8
The arm after the FFD(box) has been applied.

If you want to distort two different areas on the same object, all you have to do is add another Edit Mesh modifier. You then select another set of vertices and apply another FFD modifier. Just make sure you don't accidentally collapse the Modifier Stack, or you will have to start over from scratch.

Flamethrower

by Jeff Abouaf

A flamethrower shoots a burning stream of flammable liquid. Particles work well for a fluid stream; Combustion and Lens Effects Glow provide flame effects. 3DS MAX R2 ships with a Combustion atmospheric effect. Blur Studios and Peter Watje, two great assets to the MAX community, have written plug-in variations of the Combustion plug-in: Blur Fire - Ver. 3.03 and Particle Combustion. Both are free and included on the accompanying CD-ROM.

Using Particle Combustion for the entire effect can result in substantial render times; Blur Fire is faster with superior flame detail but requires a SphereGizmo helper object. A SphereGizmo helper object does not accept a Bend or other deforming modifier, which means that alone it can't provide the flexible burning stream as the nozzle moves in the scene. This exercise combines three techniques: making a linear fire stream from Blur Fire, adding a glow with Lens Effects Inferno, and creating movement effects with Super Spray, an animated SphereGizmo, Particle Combustion, and Gravity. The art is in mixing the effects together.



Note

All position and rotational information is based on absolute world coordinates. When creating objects, use keyboard entry where possible. When positioning objects, use the Transform Type-In dialog box located in the Tools menu. These techniques ensure proper object placement and orientation.

Leave any settings that are not listed in the example at the MAX default values. Create objects in the Top viewport, unless otherwise indicated (see Figure 1).

Preconfiguration

1. Before beginning this effect, please either reset *or* restart MAX.
2. Install the Blur Fire - Ver. 3.03 and Particle Combustion plug-ins from the accompanying CD-ROM.
3. Open the thrower.max file in this project's Preload folder. This file consists of the flamethrower nozzle (without animation) and a parent dummy object.

Create the Fire Stream

The first step is to create a particle system and shape it to contain the fire stream.

1. In the Left viewport, create an atmospheric helper SphereGizmo centered along the x-axis of the nozzle at $x = 137$, $y = 2578$, $z = -1$. Set the following:
Radius = 40

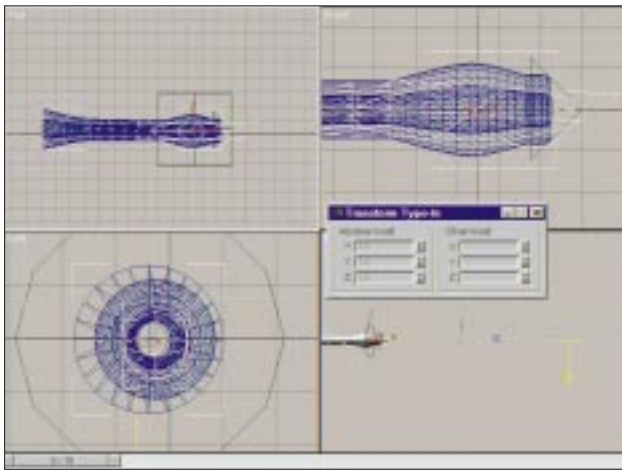


Figure 1
Place the SphereGizmo inside the nozzle, and then animate its scale and position to create the burst effect.

2. Link the SphereGizmo to the nozzle.
3. Create a dummy object at the base of the nozzle at $x = -232$, $y = 1.75$, $z = 0$.
4. Link the nozzle as the child of the dummy.

- Advance to Frame 15 and turn Animate on. Select the nozzle and set Rotate to 30. Turn Animate off.

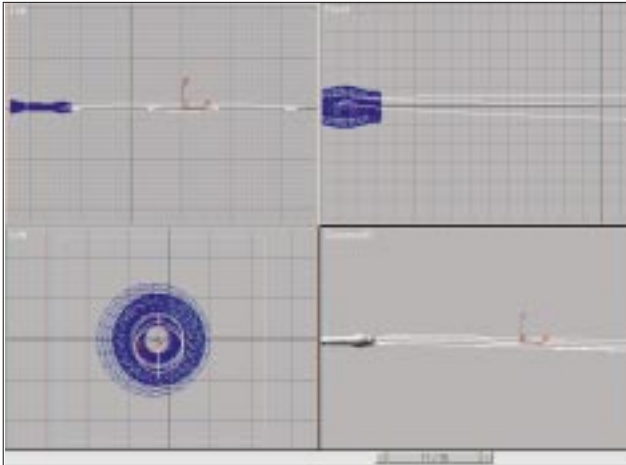


Figure 2
Non-Uniform Scale
a SphereGizmo
helper object to
create a shape to
contain the fire
stream.

- Create a SuperSpray particle system (SuperSpray01) at the nozzle opening. Use the Transform Type-In dialog box to position the particle system at $x = -135$, $y = 3.7$, $z = 0$. Link it to the nozzle.
- Under Basic Parameters/Particle Formation, set the following:
 - Off Axis Spread** = 3 deg.
 - Off Plane Spread** = 45 deg.
 - Viewport Display/Percentage of Particles** = 100%
- In the Particle Generation rollout, set the following:
 - Use Rate** = 5
 - Emit Start** = 0
 - Emit Stop** = 9
 - Life** = 9
 - Particle Size Grow For** = 9
 - Fade For** = 1
- Create a second SuperSpray particle system in the same place as SuperSpray01. Set the following in the Particle Formation section:
 - Spread Settings** = 0
- In the Particle Generation rollout, set the following:
 - Use Rate** = 15, checked
 - Particle Motion Speed** = 45.0
 - Particle Motion Variation** = 2%
 - Particle Grow For** = 2
 - Particle Fade For** = 2

11. In the Top viewport, create a Gravity space warp at $x = 154$, $y = 0.03$, $z = 0$. Set the direction so that it points down along the z -axis. Set the following:
 - Gravity** = Planar
 - Strength** = 0.03
 - Decay** = 0.6
12. Bind each SuperSpray particle system to the Gravity space warp.

Play the animation—the particle stream bends slightly downward.

Animating the SphereGizmo

Now the particles animate as a long burst. Next you must animate the SphereGizmo to move with that burst (see Figure 3).

1. Turn Animate on. Select the SphereGizmo in the Top viewport. At Frame 0, scale the SphereGizmo along the x -axis until it barely protrudes from the nozzle.
2. Advance to Frame 8 and non-uniform scale ($x = 680$, $y = 15$, $z = 16$) the SphereGizmo along its local x -axis until it extends to the end of particle stream:
 - Position** = ($x = 21$, $y = 118$, $z = -4$)
3. Advance to Frame 13 and move and non-uniform scale the SphereGizmo along its Local x -axis until it fits the particle stream ($x = 460$, $y = 15$, $z = 16$); repeat the process at Frame 15. The keyframes and relative positions should appear as in the following figure.

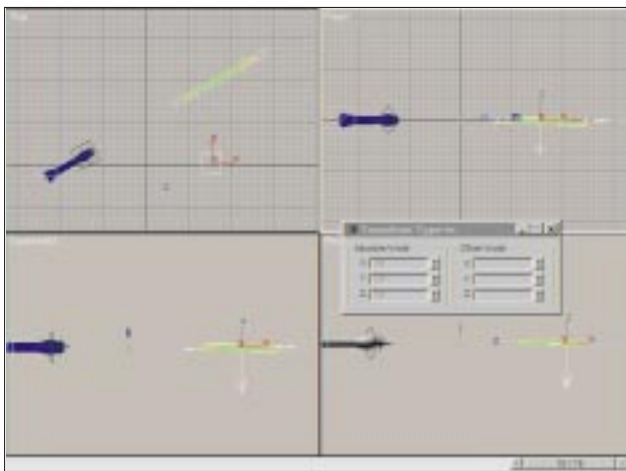


Figure 3
Animate the SphereGizmo to move in sync with the particle streams.

4. In the Environment dialog box, under Atmosphere Effects, click Add and select Blur Fire - Ver. 3.03. Under Fire Parameters/Source Object, click Pick Object and select SphereGizmo01.
5. In the Fire Parameters section of the Fire Parameters rollout, set the following:
 - Regular Fire** = checked
 - Width Clamp** = 1.7
 - Density** = 60
 - Samples** = 8
6. In the Flame Detail section, set the following:
 - Flame Size** = 6
 - Flame Detail** = 3
 - Stretch** = 5
 - Curl** = 10
7. Under Atmosphere Effects, click Add and select Combustion. Click Pick Gizmo and assign SphereGizmo01:
 - Flame Type** = tendril
 - Stretch** = 2
8. Under Atmosphere Effects, click Add and select Particle Combustion. Name it **Particle Combustion - orange**. Click Pick Object and select SuperSpray01 from the scene.
9. Set the colors as follows:
 - Inner Color** = (R = 227, G = 125, B = 25)
 - Outer Color** = (R = 225, G = 30, B = 30)
 - Smoke Color** = (R = 26, G = 26, B = 26)
10. Set the following parameters:
 - Tendril** = checked
 - Stretch** = 15
 - Regularity** = 0.5
 - Flame Size** = 15
 - Samples** = 8
11. Turn Animate on and set the following:
 - Frame 0**: Phase = 0
 - Frame 15**: Phase = 10
12. Turn Animate off. Next to Particle Size, check Use Track View graph. Set a Seed value (for example, 1000).
13. Add another Particle Combustion object. Name it Particle **Combustion - smoke**. Click Pick Object and select SuperSpray01 from the Scene. Click Pick Object and select SuperSpray02 from the Scene.

14. Under Light Sources, set the following:
 - Inner Color** = (R = 252, G = 148, B = 24)
 - Outer Color** = (R = 225, G = 30, B = 30)
 - Smoke Color** = (R = 26, G = 26, B = 26)
 - Illuminate** = checked
 - Sort** = checked
 - Flame Type** = Tendril
 - Regularity** = 0.3
 - Flame Size** = 7.0
 - Flame Detail** = 5.0
 - Density** = 7.0
 - Use Track View Graph** = checked
 - Phase** = 120
15. Check Explosion and Smoke. Click Setup Explosion and set as follows:
 - Start Frame** = 0
 - End Frame** = 15
 - Particle Size** = 17.0
16. Under Particle Info, set as follows:
 - Use Track View Graph** = checked
 - Particle Life** = 15.0
 - Seed** = 1000
17. Select SuperSpray01 in the scene, and right-click the object. Open the Properties dialog box:
 - G-Buffer/Object Channel** = 1
 - Object Channel 1** = SuperSpray02

Video Post Setup

The last step is to add a final touch to the scene with Lens Effect Glow Inferno (see Figure 4).

1. In Video Post, click the Add Scene Event icon and select Camera01. Highlight Camer01 in the VP Queue and click the Add Filter Event icon. From the drop-down menu, choose Lens Effects - Glow. Click OK. Double-click the Lens Effect Glow entry in the queue and then click Setup. Click Load and load flamethrower.lzg from the accompanying CD-ROM.
2. Advance to Frame 12 in the main interface. Click Update in the Lens Effects Glow dialog box.

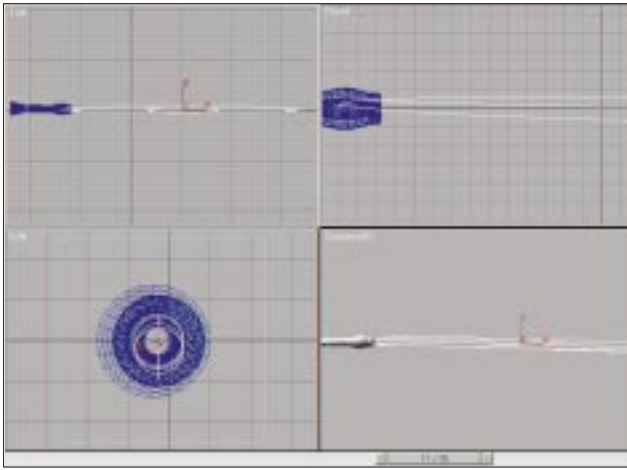


Figure 4
Lens Effects Glow
Inferno adds a final
touch to the effect.

3. Click the white area in the VP queue to deselect all events. Click the Add Image Output Event dialog box; choose Files and specify an AVI file. Click the runner icon in VP and render Range 0–15. You should see the burning particle stream layered with fire and smoke, glowing to add realism.

To add the effect of the Flamethrower hitting an object, combine this file with part or all for the warhead effect. If the flamethrower is in motion, having the gizmo move in sync with the arcing particle stream becomes problematic. One workaround is to use several small elongated, overlapping SphereGizmos linked to form a kinematic chain. Assign the same Blur Fire object to each, and animate the chain bending in sync with the particle stream. If the overlap is correct, the fire stream will look continuous and bend with the particles.

