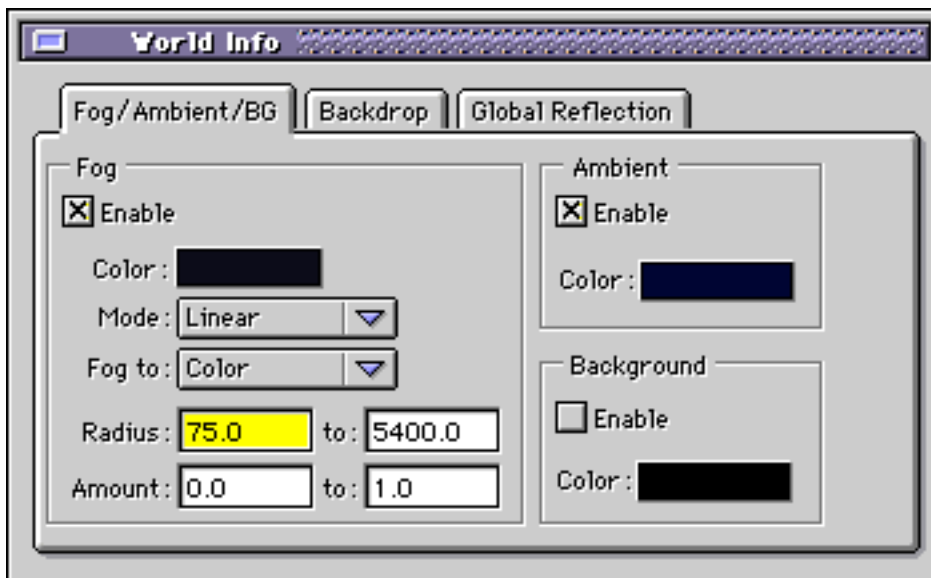Night Fog

this example will explore the subtleties of nighttime moon lighting and moving fog.

It is important to work one light at a time. It is easy to start adding lights without testing them and before you know it you have a big mess on your hands. Also, you may think that lighting has only to do with the way you place lights. But, It can be greatly dependent on surface attributes as well, specifically, the ambient and diffuse settings.

open the project entitled Nightimefog.prj. I'm using the same project file I used for the daylight outdoor lighting tutorial. We will be using quite different lighting though.

Lets start with the ambient settings. Double click "World in the project window to open it's info box.

Click on the Fog/Ambient/BG tab. Be sure the Ambient Enable box is checked. We're doing a nighttime scene so we'll need a darker ambient. click on the Color "box". this will bring up the color picker. Using the HSV sliders enter 234, 100 and 20.
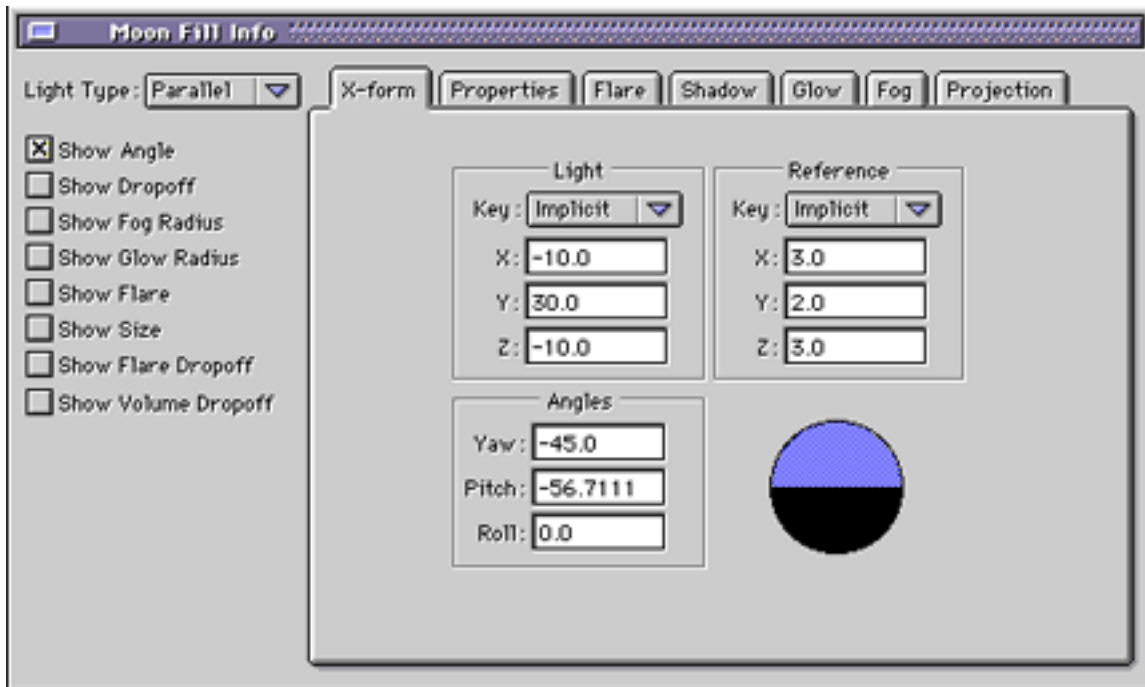
This should produce a dark, almost black, blue.

Because there is not much light at night other than from the moon on clear nights we will need to set a depth cue.   Under Fog/Ambient/BG click the enable button under Fog.   Click on the Color Box to bring up the color picker again.   This time enter HSV values of 240, 52 and 9.   This will produce a black fog that will simulate depth cue at night.   the same effect can be used to simulate being at depth in water. Set the "Mode" to linear and "Fog to" Color.   These settings will give me a nice clean drop-off to black.   Since we still want to see the tree in the picture we'll set the Radius to 75 and extend to 5400.   This will allow us to see into the background for a distance and make it look like soft moonlight is still illuminating the ground.   We'll leave the "Amount" at (0) and "to" at (1).

These settings set up the general environment for nighttime lighting.   This is not the only answer to nighttime environments but is a good base to start with.

The first directional light in our scene is the moon.   by default EI has one light in the scene.   In the project window rename the light to "Moon Fill". and then double click the light to bring up the light dialog box.   Take a minute to click through and explore the seven different tabs within the lighting info dialog box.
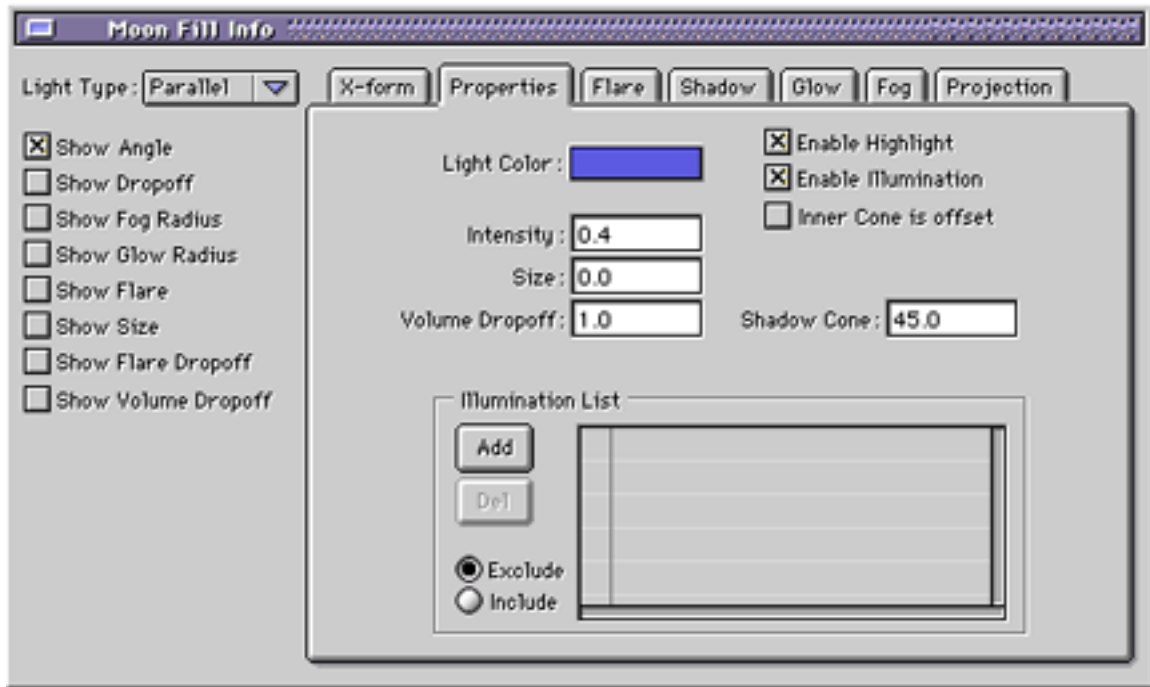
Click and pull down the Light type menu. Select parallel. Moonlight , like Sunlight requires the light cover a broad, even infinite, area. If a parallel light is parallel to the Y axis it will light everything infinitely on the ZX plane. Think of a light above your head lighting the floor under you forever in all directions. It is important to remember that a parallel light still has a definable shadow cone which is not infinite and does not cast parallel shadows. This means you should keep the light close to the actual interest point but not so close as to distort the shadow it casts.

Click on the X-form tab. here is where we will adjust the position of the source and the reference. the source being where the light starts and the reference where the light is going. For ease of example I will using a pretty generic camera position. Under "Light" enter, X(-10) Y(30) and Z (-10). Under Reference type X (3) Y (-2) and Z (3). This will produce a northern latitudes Midnight moon position. Notice you also have the ability to adjust the light by angles as well.

Lets check where this light is pointing. instead of looking at the top, front and side views lets go to the camera view. Holding the Option key click on the menu bar where it says "Camera view of Nighttime.prj". A drop down menu will appear with two options, "Camera1" and "Moon fill". Select "Moon fill". You should be looking straight at the tree. In this view you can move lights the same way you would move the camera in the camera window, using Orbit, Pan, Dolly, Track and Zoom. I find this helpful in

areas where the geometry isn't perpendicular to anything and also when I'm trying to line up a shadow cone to an object or a number of objects.

Click on the Properties tab.

Here, we will be setting the variables of the light itself. Click on "Light color". Change the HSV settings to 241, 60 and 88. This will produce a blue color. When lighting outdoor night scenes I like to go with a pretty saturated blue. Not just because Moonlight and ambient tends to be blue but because It will give the scene a cold, spooky feeling.

Under Intensity enter ".4". Moonlight is soft and creates subtle contrast at night. At night the only areas you can really see are the direct areas where an object is being hit by direct light. Any areas in shadow will be black.
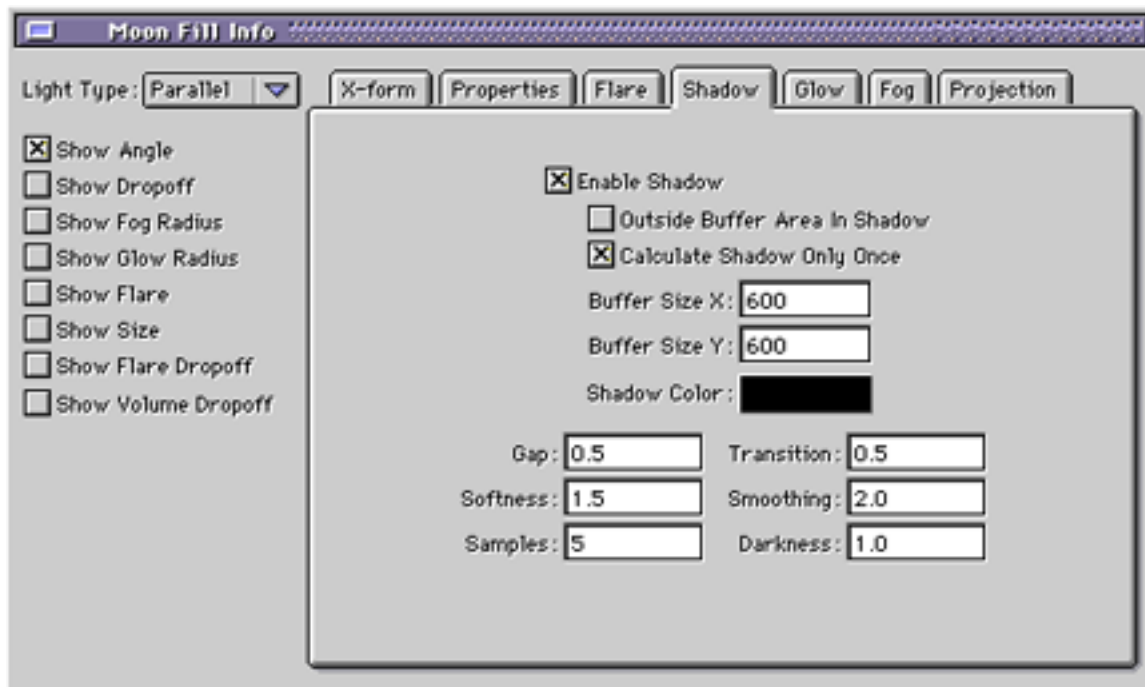
Leave the Size of the light at default. for this tutorial size won't change the end result.

Enter a "1" for the volume drop-off.

Make sure Enable Highlight and Enable Illumination are checked. We want the main fill light to cast soft highlights which were set unter the material settings and of course Illuminate the scene.

Under Shadow Cone enter a value of 45. If you switched the camera window back to the camera use the option key to again look at what we are including in the shadow cone. Notice that it is only encompassing the tree and flowers but is not right on top of them. This is because these are the only objects that need to cast shadows and I want the shadow to fall straight under the tree. Render a test. Look at the hills in the background. With midnight lighting there won't be long shadows being cast by the moon so we don't have to worry about including them in the shadow cone. This could allow us to use a smaller shadow buffer which will speed rendering time ,take less memory but often will soften our shadow.

Click on the Shadow Tab.

For this example I really don't care if the shadows are crisp because it will be very dark. So I'll change the default setting of 1280x1280 to 600x600. (may put a "refer to chapterX about shadow buffers). Make sure "Enable Shadow" and "Calculate Shadow only Once" are clicked. Enable Shadow allows us to toggle the shadow on or off. Calculate shadow only Once will do just that. For animation's with moving shadow lights we would want that check box off. An example of this would be the moon traveling across the sky causing the position of the shadow to change over time. Since we don't have moving lights It is not necessary to take the extra time each frame to calculate the shadow(not that we're rendering many frames but just in case....). The shadow will calculate once and store it for each frame beyond the first frame rendered. It will not, however, store the shadow

buffer from test to test. We'll leave the shadow color at default black because the scene is at night. I want to make sure the shadow starts at the base of the tree so change the Gap to (.5) and the Transition to (.5). Because the scene is at night I'm going to soften the shadow. Set the Softness to (1.5) to create a softer shadow. Set the Smoothing to (2). this will help smooth the dropoff of the edges making the shadow very clean. You can leave the Samples and Darkness at their default.

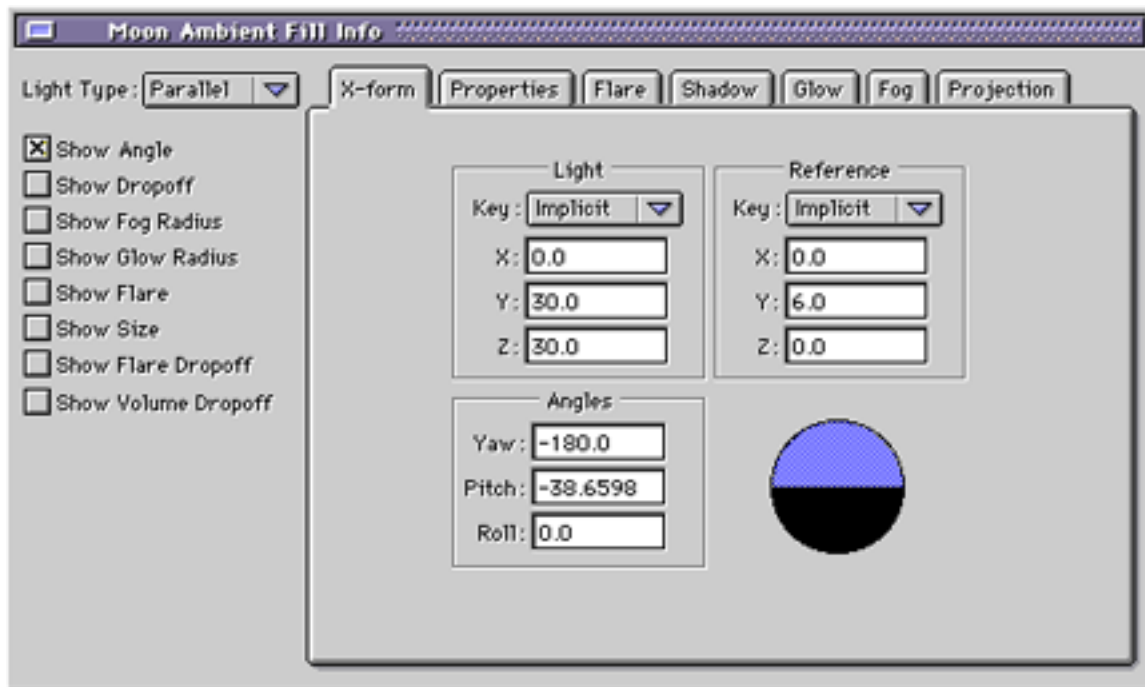Type command E to bring up the object palette.

Three down on the left you will see a light bulb. Click hold and drag two new lights into any view window. the initial placement of the lights is not important because we'll be using numerical information to place them.
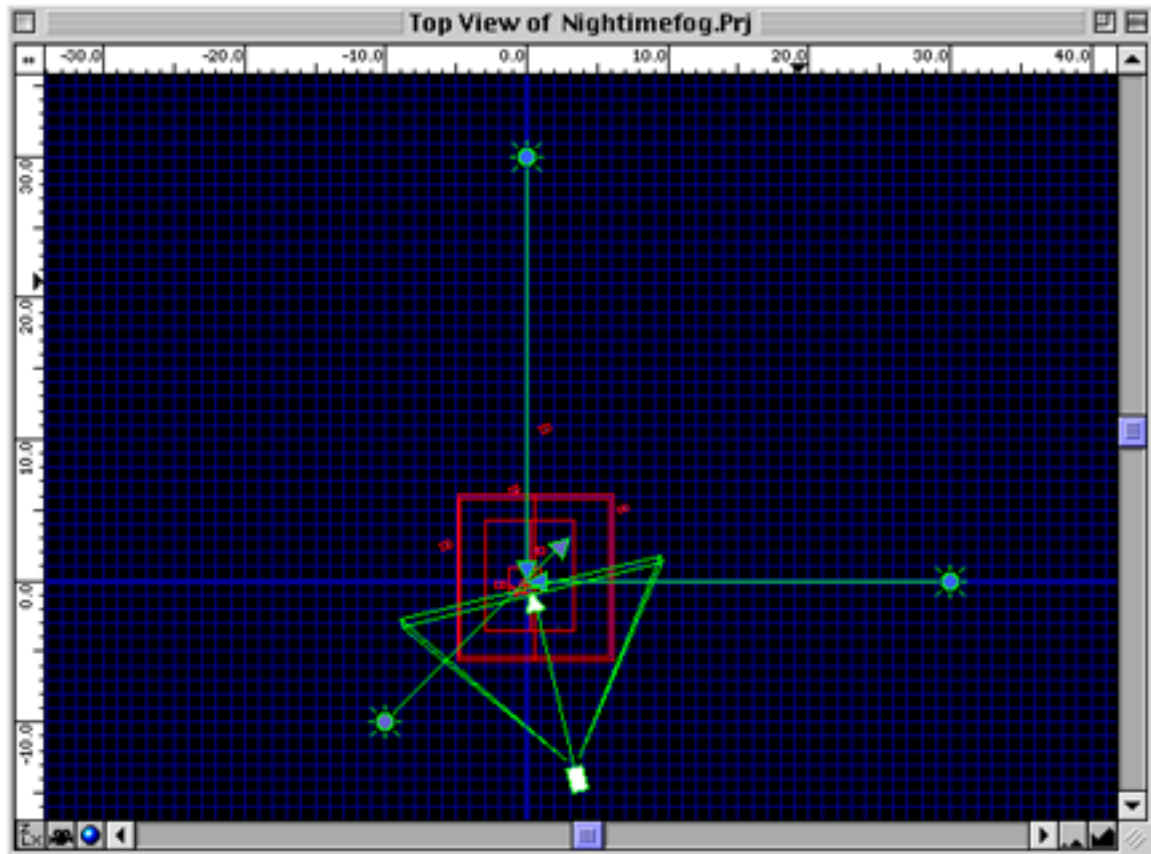
In the Project window you will see two new lights entitled light 2 and light 3. These will be our ambient fill lights. Rename the light to "Moon Ambient Fill" and "Moon Ambient Fill2". Because of the darkness of the scene we'll be using two ambient lights so we can spread the ligh out further.

In addition to the "World" ambient we will be using two parallel lights for directional ambient. the reason for using a directional ambient light instead of relying on world ambient is to help bring out the contrast in bump maps and to create better shading falloff on objects in shadowed areas. In this case because it is very dark and we want to keep it that way we are only interested in bringing out some bump detail in dark areas. It is not consistant with reality but more interesting to look at none the less.
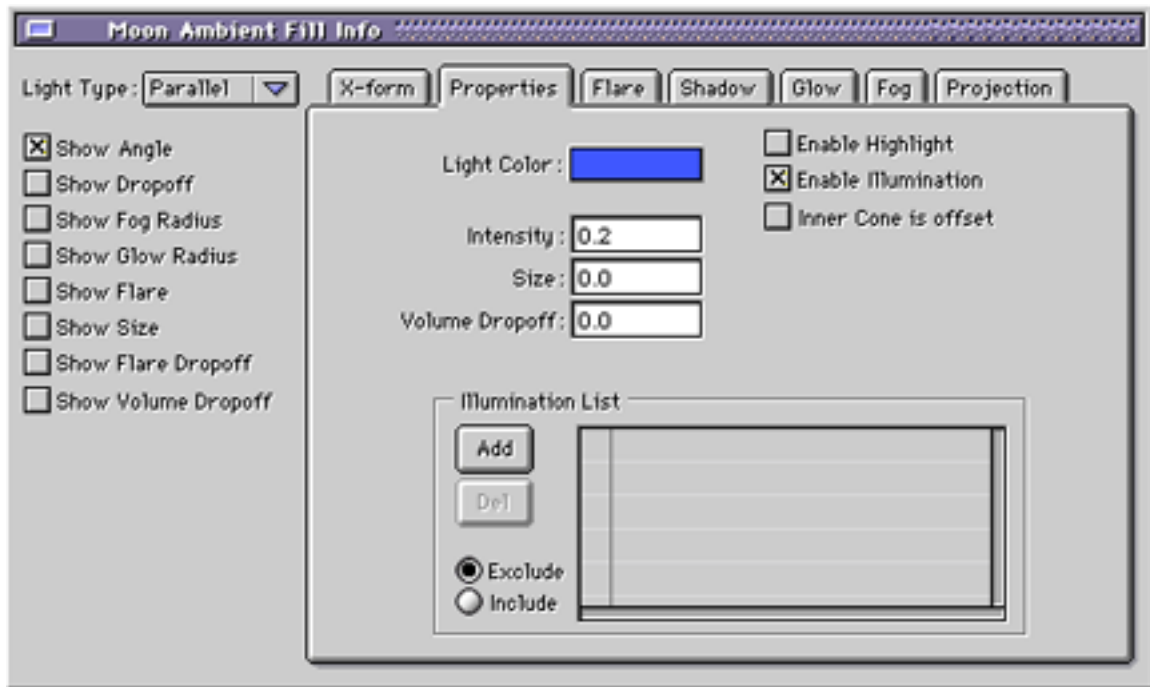
Double click on Moon Ambient Fill.

Under light Type choose Parallel. Click on the X-form tab. Set the lights position to "Light" X(0) Y(30) and Z(30). Set the Reference to X(0) Y(6) and Z(0). You'll notice that puts the light facing at a 135 degree angle to the moon.

Top View of Nightimefog.Prj

This is because we want to spread the ambient out around more of the tree to bring out bump detail without lightening the shadows to an unbelievable level or adding a specific strip of light.

Click on the "properties" tab.

Set the light color to HSV 232, 75 and 100. Set the Intensity to (.2), Size to (0) and Volume Drop-off to (0). the Intensity setting of (.2) will be enough to bring out contrast in bump maps but not enough to wash out the image or loose the night feeling we want. Make sure the Enable Highlight check box is NOT checked. there is no specific light source for ambient so there is most often no source for a highlight. Leave Enable Illumination on.

Click on the Shadow tab. Make sure "enable Shadow" is NOT checked. Again, since there is no specific source for ambient light there will be no cast shadows.

Double click on Moon Ambient Fill2. Under light Type choose Parallel. Click on the X-form tab. Set the lights position to "Light" X(30) Y(30) and Z(0). Set the Reference to X(0) Y(6) and Z(0). once again You'll notice that puts the light facing at a 135 degree angle to the moon and 90 degrees to moon Ambient Fill. Again, This is because we want to spread the ambient out around more of the tree to bring out bump detail without lightening the shadows to an unbelievable level or adding a specific strip of light.

Copy the above Properties and Shadow settings from Moon Ambient Fill to moon Ambient Fill2.

Under File/Add/Type/ there is an option called smoke. Select "smoke" and add a smoker by drawing a marquee in any view window. A new object

called "Smoker" will appear in the project window. Rename the smoker to "Ground fog". Double click on Ground fog to bring up its dialog box.

Click on the X-form tab.

Make sure the position is set to x(-15), y(0) and Z(168). We're going to be animating the actual position of the smoker box so I want it out of the way and easily accessible. Under Size enter X(80) Y(80) and Z(80). Changing the "Size" will visibly scale the bounding box of the smoker. This in turn scales the size of the smoke clumps we will use as fog. Setting the size fairly small will produce good clumps of fog. Under Scale enter (5). this will shrink the overall size of the smoke clumps as well so we have a lot of clumps to look at.

Click the Properties Tab.

There are eleven variables in the smoker dialog box. Each can have a great impact on the kind of smoke you can produce.

Mist. Mist is the fill between the smoke clumps. The more mist there is the less contrast there would be between smoke clumps. Because it's a foggy night we want some mist in-between the clouds. Enter (.25) for mist.

Contrast. Contrast is the amount of contrast between the smoke clumps and the mist areas. a value of (0) reduces the areas of solid white areas while higher values increase the amount of solid white areas. Lets put a value of (2) in for the contrast because we want to have very distinguishable areas of thicker fog.

Density. Density controls how many smoke clumps are in a given area. Lets say we have a 1x1x1 cube. A higher value increases the number, size and closeness of smoke clumps. A Lower value decreases the number of smoke clumps and reduces the general size and closeness of each clump. Remember, smoke clumps extend infinitely past the bounding box. Lets enter (.5) for our density. This will give us some spacing between different densities of fog.

Noise: Noise will increase or decrease the texture or roughness of our cloud. Noise will also create more contrast in the individual clumps themselves. (0) has a really smooth silky look while (1) has a really choppy turbulent look. We want something in between. Enter (.55). This will give you a clumpy but too turbulent looking fog.

Samples: enter sample def: set to 8

Limit:? make sure it is at 200.

Bicubic Detail: Bicubic Detail will add a more 3D feel to the smoke. If you plan on moving a camera through the smoke or in this case moving the fog past the camera you may wish to increase the Bicubic Detail so there is more layering of the smoke clumps. Remember, as you increase the Bicubic Detail you will increase the render time as well. Lets change this to (4) so we get a feeling of fog going in front of and behind the tree.
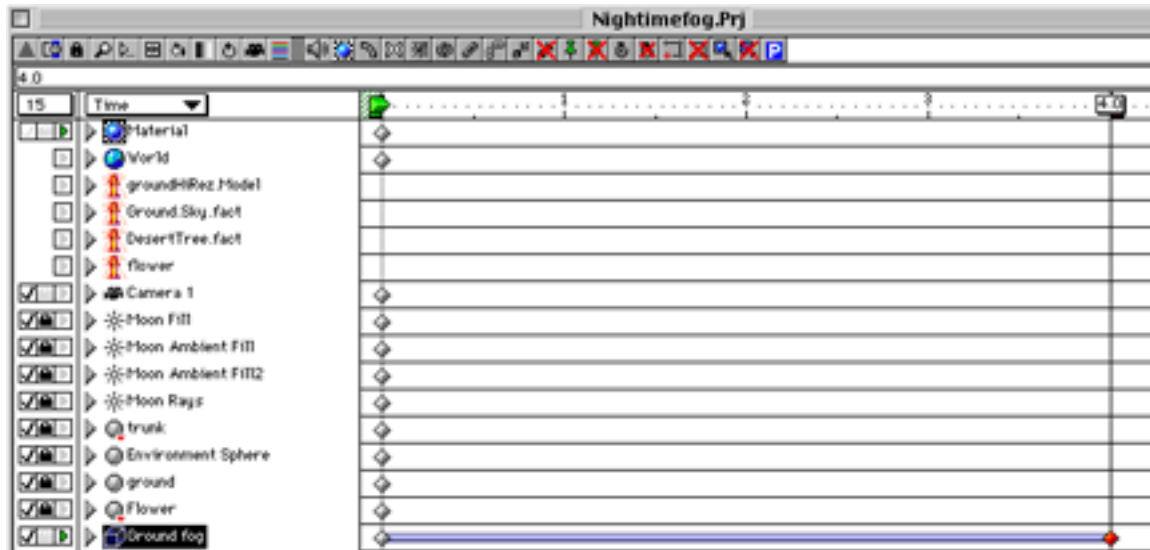
Linear Detail: Linear Detail will help bring out contrast in a more linear fashion From a distance Smoke may look kind of flat. By increasing the Linear Detail we can effectively create the illusion of a 3D cloud but we won't suffer the render times associated with a high Bicubic Detail setting. leave this setting at default

Octave: Octave decreases the time it takes to fade from transparent to opaque. Be careful not to put too high a number in for Octave because you will end up with solid white clumps that look very unnatural. We'll use a setting of (1.5) to achieve a fog with a few opaque clumps to simulate differences in fog density.

Drift: Drift controls the morph of the clumps over time. The higher the number the more extreme the changes. We want the clouds to gently change over time. Enter a (1) here.

Turbulence: Similar to noise in that it breaks up smoke clumps into smaller swirling clumps. turn Turbulence on and set the value to (1) so we get fog that looks like it is being changed and moved by a slight breeze over time.
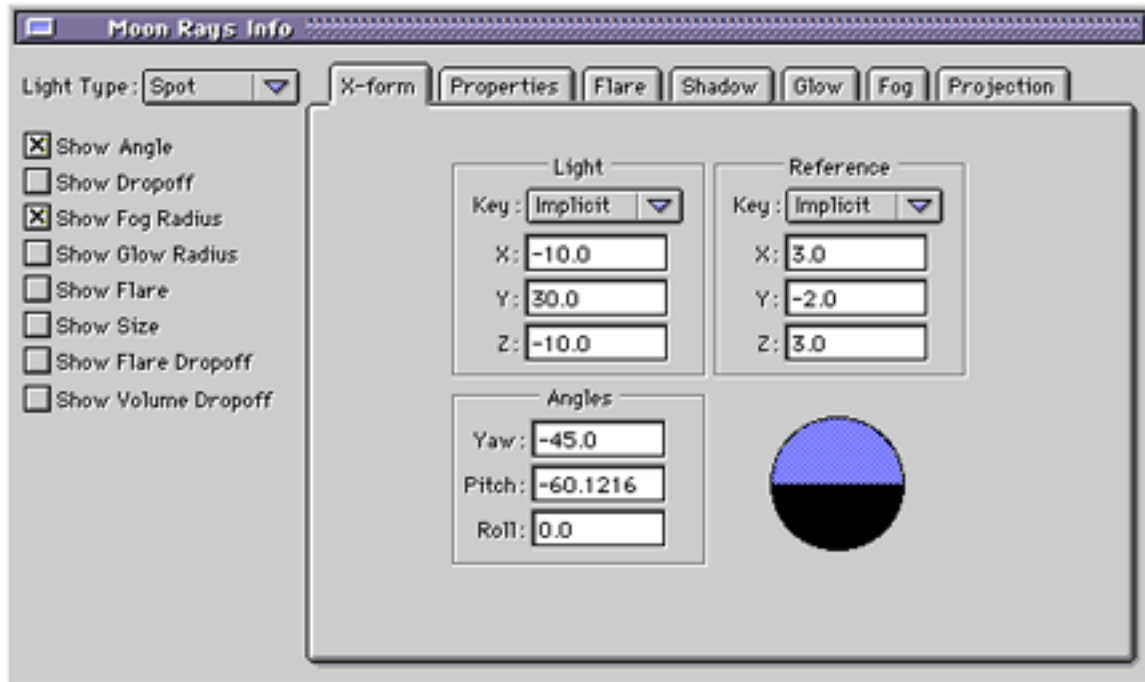
In the project window move the time slider to the four second mark.

Click on the X-form tab in the ground fog info dialog box. Change the X value to (0) this should produce a time bar in the project window. In addition to the drift and turbulence changes we set in the fog this translation on the X axis will move the whole body of fog across the cameras view. The effect should be that of a rolling fog bank in a light breeze. Granted there is no tree movement....I'll leave that up to you to figure out using the deformation tutorial. I encourage you to play with the fog settings and translation speed to create different effects.
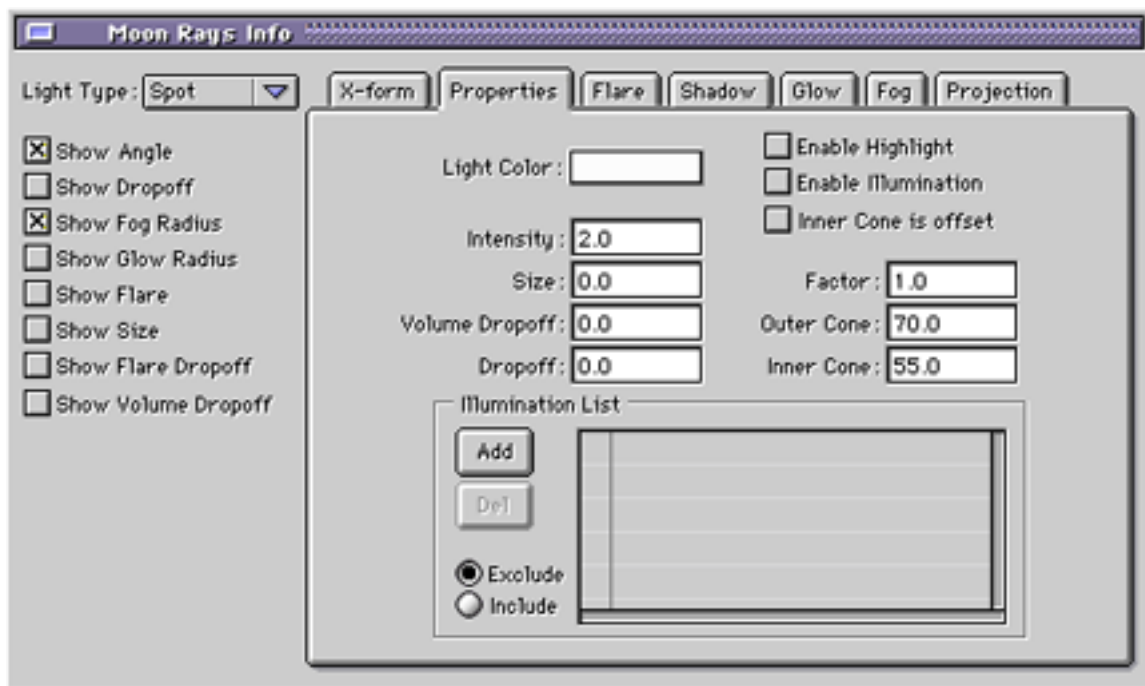
The next light we add will be assigned to the moving smoke. Click once on Moon Fill in the project window. Type Command-D to duplicate this light. Re-name it to "Moon Rays".

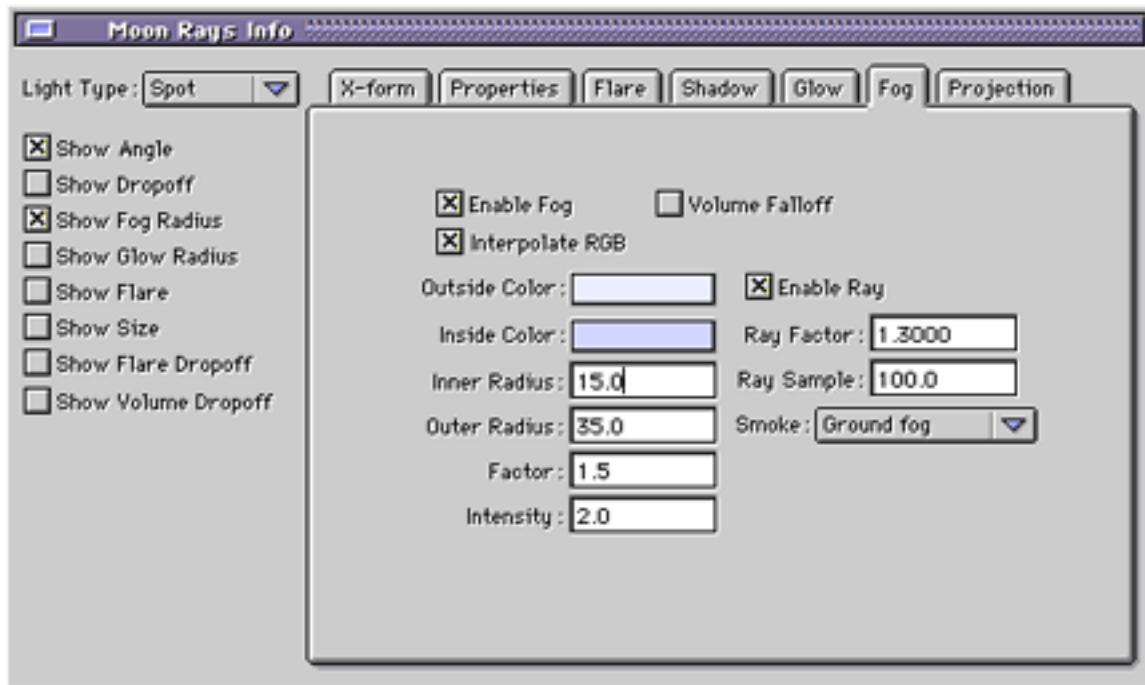Double click on Moon Rays to bring up the lighting info dialog box.

Change the Light Type to "Spot" so we can cast fog. We want the fog to look like it is being lit by the moon so there is no reason to change the position of the light.
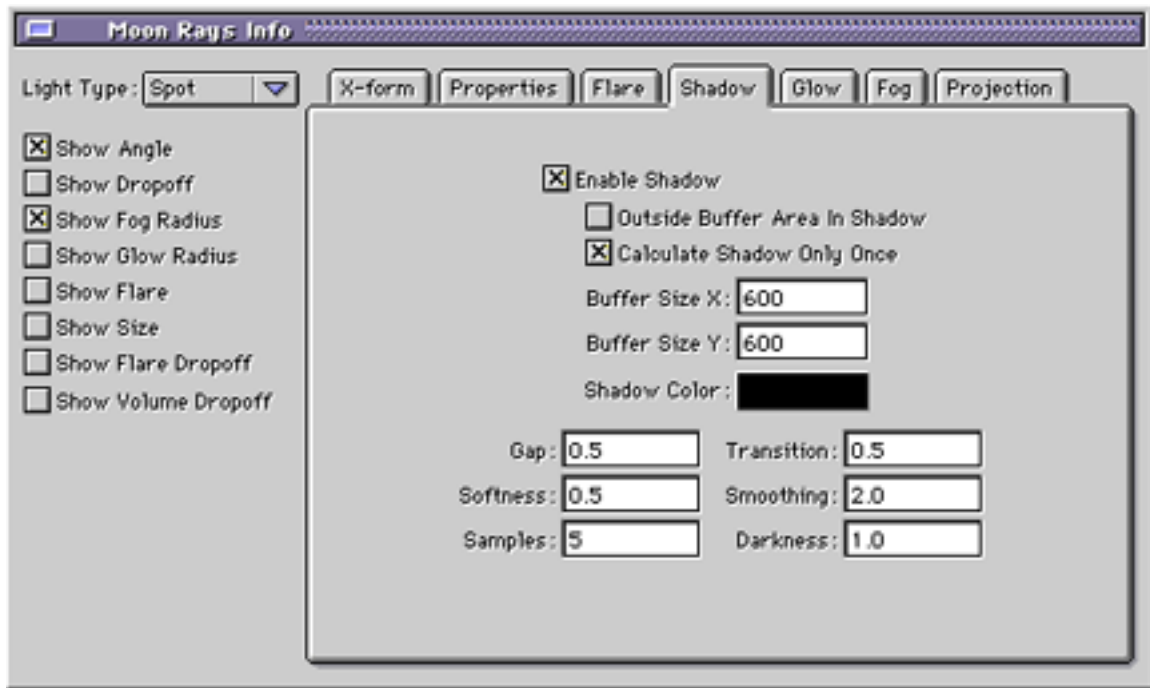
Click on the Properties tab.

We are only going to use this light as a fog light. Un-check Enable Illumination and Enable highlight. The rest of the settings can remain at their previous settings

Click on the Fog Tab.

Click the check box for Enable Fog to turn fog on.   Click Interpolate RGB as well. Click on Outside Color to bring up the color palette. Using the HSV sliders change the value to 231, 8 and 100. I want a unsaturated blue to simulate the moon as a light source. Click on Inside Color. Change the HSV sliders to 238, 17 and 100. This will produce a darker blue. These two colors will help to determine a light source position. It will also help the fog drop off as it reaches the ground. For Inner Radius enter a value of (15). The fog will be at 100% until it reaches 15 units out from the source of the light. For outer Radius enter a value of (35). This value will end the fog just past the ground plane. Essentially the fog will be dropping off in our line of sight which is between the 15 value and the 35 value. Dropping off the fog will soften the effect and make it look more natural. Setting the Factor to 1.5 will also soften the rate at which the fog drops off. We want a prominent fog bank that you can really see changing so we'll set the intensity to 2.0. Check the Enable ray box to turn light rays on. Set the Factor to 1.3. Again, this will soften the drop-off of the Rays in this example. leave ray Sample at 100. We want the rays that pass through the smoke clumps to be clean and not grainy.

Click on the Shadow Tab.

Even though we are not casting light shadows with this light we will still need to render a shadow buffer to define where the fog rays will be falling. Set the buffer to 600x600. All the rest of the settings will be fine where they were.

Type Command-R. This will bring up the render dialog box. Set the range of frames to cover the four seconds we set in the project window. Render the animation to see the results.

Again, I encourage you to play with all the settings creating your own version on this project.