

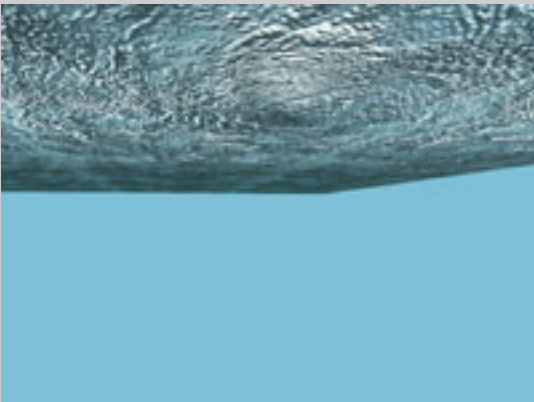
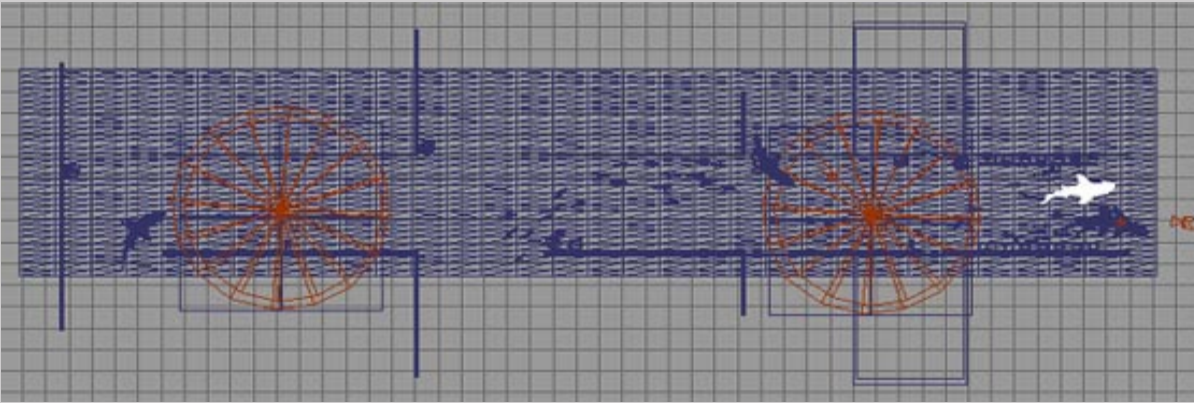
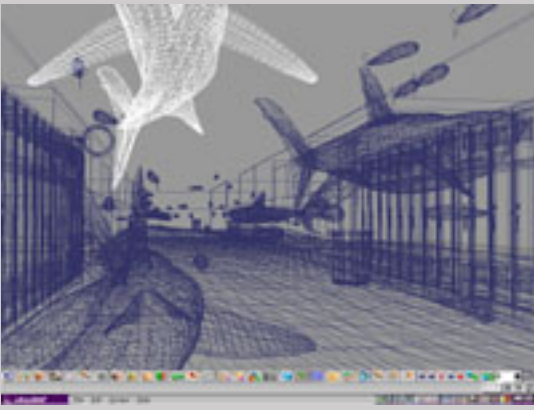
Underwater Scene © Ian Dale

I've gotten over two dozen letters in one week asking me how I did the water surface and caustic lighting effects in my "School of Fish" image. So I've decided to write a tutorial to help everybody achieve these seemingly difficult effects.



Here is the finished image. It is a spruced up version of the November runner-up in the Caligari trueSpace Image Gallery. The image is of sharks and pilot fish swimming down the hallway in my submerged high school. In this tutorial I will explain how I did the water ceiling and the caustic shadows on the sea floor.

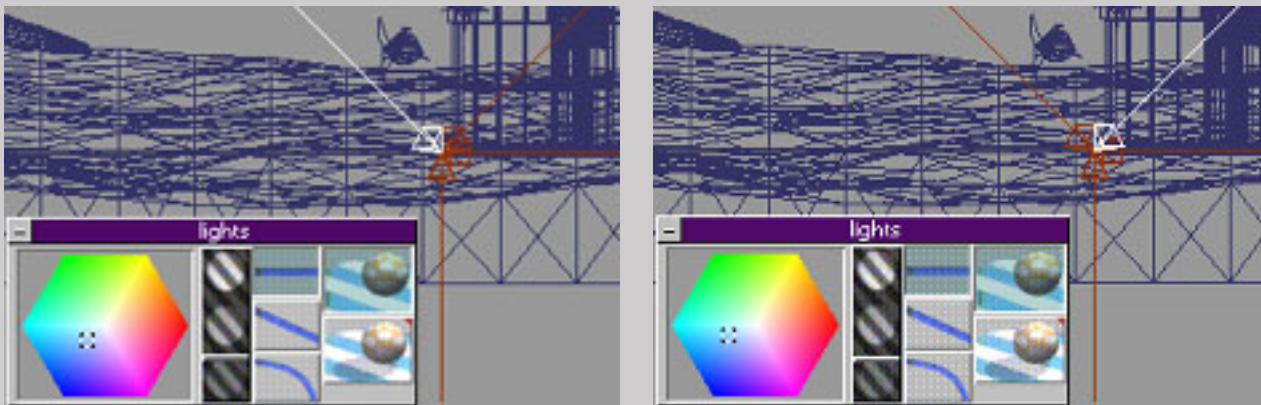
First, just a quick overview of the scene: After creating the hallway as it is in real life, I removed the floor and replaced it with a squashed landscape made with the Landmaker plug-in. The sharks were made with metaballs for the body and polygon tools for the fins. The fish were sculpted with lattice deformations. All the texture maps were painted in Photoshop.



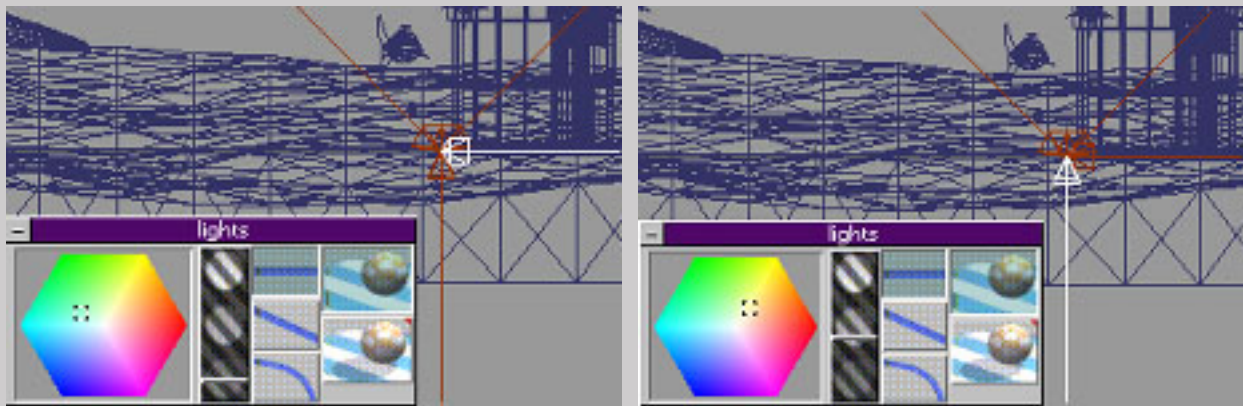
I saved the camera as an object and then loaded it into a new scene. In the new scene I made a large plane in the place where the water surface should be. The water plane was given a shader with a bump



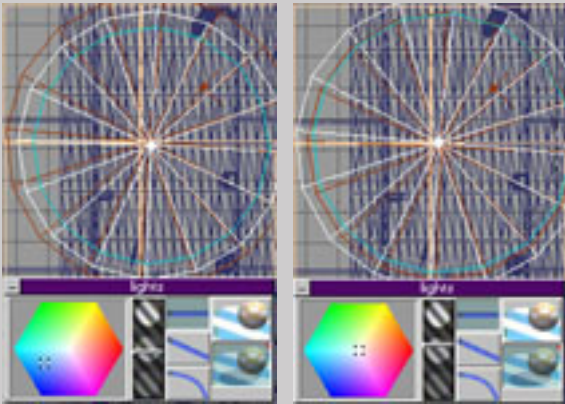
that simulates the ripples in the water. The shininess setting was set to 1.0 and the roughness to .75. This will make the water very bright in the areas where it catches the sun's light. The lighting for this scene consisted of a few local lights with full intensity placed above the water to simulate the sun. I then rendered the camera view and set it as the background image in the hallway scene.



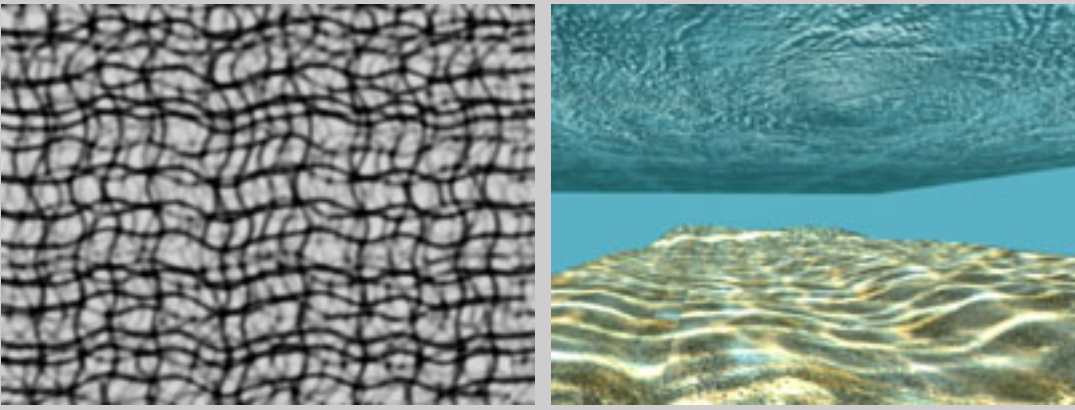
These are the ambient light settings for the scene. I wanted them To make the whole scene look like it was underwater, so used shades of blue and green for the light. There is also a yellowish light pointing straight up to act as bounce light that is reflected up from the sand on the floor. Be sure not to make them too bright or they will start to cancel out the caustic effect that I will cover next.



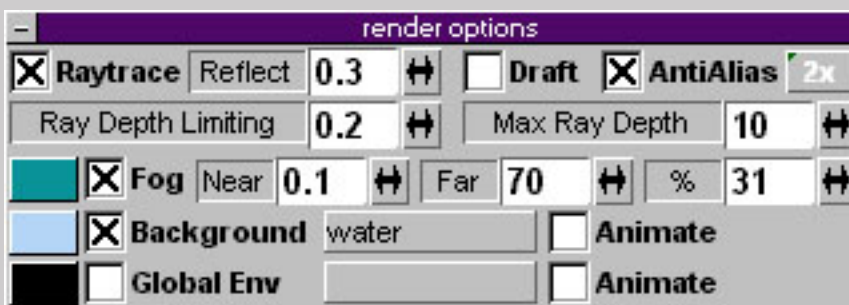
Underwater Scene © Ian Dale



To set up the caustic light, make two spotlights in about the same place. One should be slightly offset to one direction. Both should cast raytraced shadows. I made one white at .6 intensity, and the other light blue at .5 intensity. Next, make a plane and place it right in front of the light so that no part of the light cone reaches past its edges. Map the plane with a caustic texture map. I learned what a caustic map should look like from Andreas Olsson's tutorial on how to make water scenes in 3D Studio MAX. I downloaded his example then made my own version in photoshop by drawing a random grid with different shades of gray, then applying a wave filter and then a blur filter.



This is the image I used for the caustics. Actually, it's the alpha channel for the image. The image itself should be solid black. This image determines what parts are transparent. The white areas will be opaque, and therefore cast shadows. The black part is what light will reach the floor. I glued the lights and plane together and place it high enough above the scene so that you can't see the plane in the camera view. I then made a copy of the light group and placed it farther back in the scene so the whole hallway would be lit. On the right is what the floor should look like. Just to warn you, since this method uses multiple raytraced shadow lights and very complex shadows, this will render very slowly.



Once you have all the lighting set up and your scene is as you want it go to the render settings menu. Make sure you set the water ceiling as your background image, and make sure raytracing is ON. I also set up a

blue-green fog to add to the illusion of being underwater. Be sure the fog is not too strong or it will cover the background image. I used a value of 31%

A note on animation: This technique works best with still images, but can be used for animation as well. If you want realistic animation, you will need to cycle between a couple different caustic maps on the planes. If you are going to have a moving camera, you will need to save the camera and its animation and use that camera when making your water ceiling. It would also be a good idea to make an animated water bump map for the plane. Render the animated scene to an AVI or TGA sequence and use it as your background in the scene. To find out what the caustic and water maps would have to look like, you could study underwater films and look at how the water and light changes.

That's it. If any of these don't work at first, keep on experimenting to get the right effect. If you have any further questions, you can contact me at (dale@usc.edu). Have fun.

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