CS148: Introduction to Computer Graphics and Imaging
Final Project - Summer 2025

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The Idea

?

Final Rendered Image

Variant A

Variant B (sand and ocean assets hidden)

Main geometry from scratch

- Anglerfish
  - Body - Self
  - Teeth - Self
  - Fins - Self
  - Eyes - Self
- Diver
  - Diving helmet - Self
  - Diving suit - Self
  - Boots - Self
  - Flashlight - Online
  - Spear gun – Online
  - Gloves – Online
  - Hose - Self
- Rock wall / floor - Self
- Sand - Self
- Water (volumetrics) - Self
- Light (caustics) - Self
- Bubbles - Self

UV mapping and texturing from scratch

- Anglerfish
  - Body – UV Mapped: Self, Textured: Self
  - Teeth - Textured: Self
  - Fins - Textured: Self
  - Eyes - Textured: Self
- Diver
  - Diving helmet - Textured: Self
  - Diving suit - UV Mapped: Self, Textured: Online
  - Boots - UV Mapped: Self, Textured: Self/Online
  - Flashlight - Online
  - Spear gun – Online
  - Gloves – Online
  - Hose - Textured: Self
- Rock wall / floor – Textured: Self
- Sand - Textured: Self
- Water (volumetrics) - Textured: Self
- Light (caustics) - Textured: Self
- Bubbles - Textured: Self

Blender/Cycles advanced feature

- Water
  - Volumetrics were used for the water part of the rendering, for light scattering to to create “god rays” and to affect the lights of the diver and anglerfish

Assets

- Anglerfish
  - Body
  - Teeth
  - Fins
  - Eyes
- Diver
  - Diving helmet
  - Diving suit
  - Boots
  - Flashlight
  - Spear gun
  - Gloves
  - Hose
- Rock wall / floor
- Sand
- Water (volumetrics)
- Light (caustics)
- Bubbles

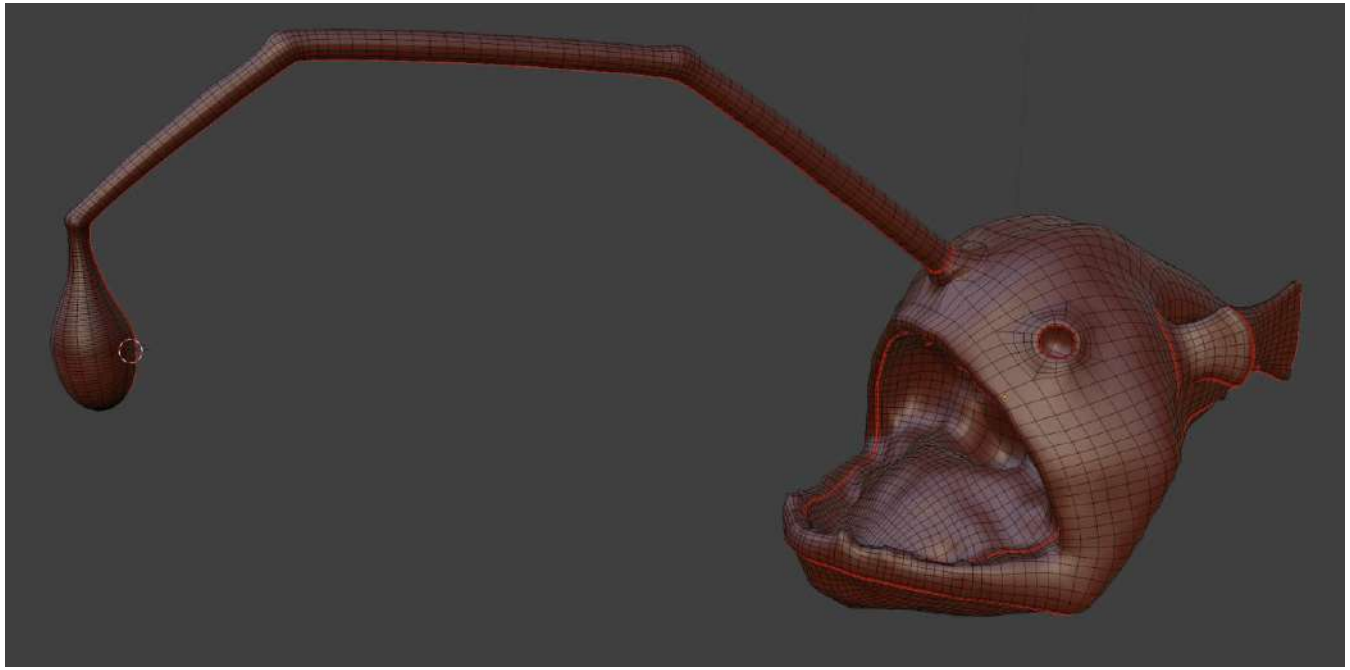
Object: Anglerfish

- Geometry: Self
- Material: Self
- Description:
  - The idea for this project came from looking at the Blender Studio training section. A tutorial on an anglerfish model was one of them, and the idea started from there.
  - I sculpted an entire model for the fish. However, only the front of the fish shows up in the final render. This was found to create a more dramatic scene. If I had known how the scene would look ahead of time, it would have saved a lot of time and work.
- References:
  - Anglerfish tutorial

Object: Anglerfish - Body

- Geometry: Self
- Material: Self
- Description:
  - Sculpting of the main body started with a subdivided cube.
  - The lure was constructed from a Bezier curve, and attached to the main body mesh using the Bool Tool extension.
  - Eventually, as the geometry of the creature became more complex, sculpting was done using the “dynotopo” mode. This ended up requiring that the model be retopologized for UV unwrapping and painting.
  - Multires sculpting was used to add details to the model after retopology was complete. Skin details were added using a lot of sculpting brushes from BlenderKit. The sculpt brush “giger tissue” was used most.
  - Once the model was UV unwrapped, two image textures were made. One for the base color of the fish. The second was an emission map for the lure.
- References:
  - Sculpting Tutorial
  - Retopology Tutorial
  - UV Unwrapping
  - BlenderKit – Giger Tissue
  - Texture Painting (lure)

UV Unwrap: Anglerfish - Body



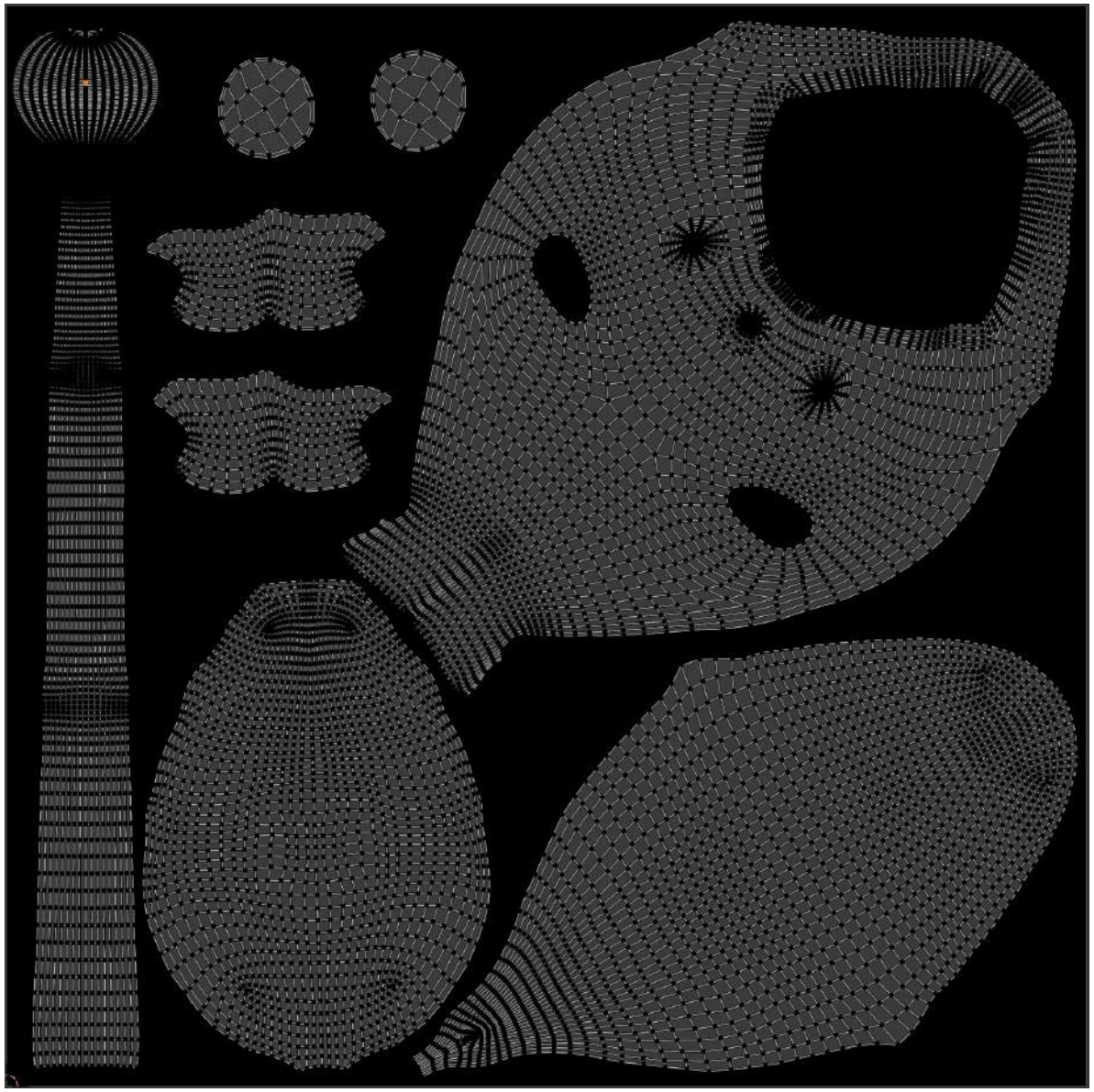
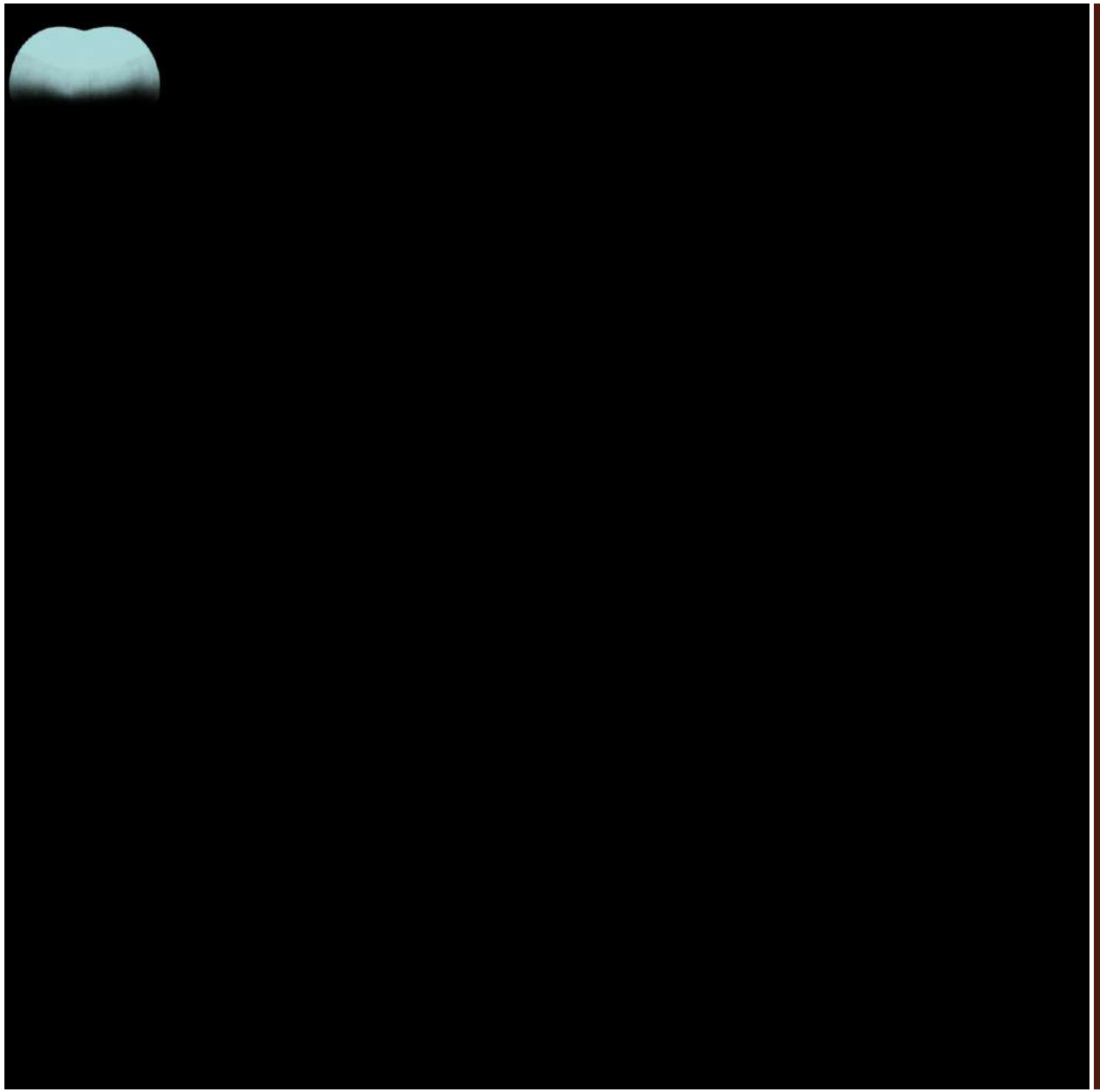
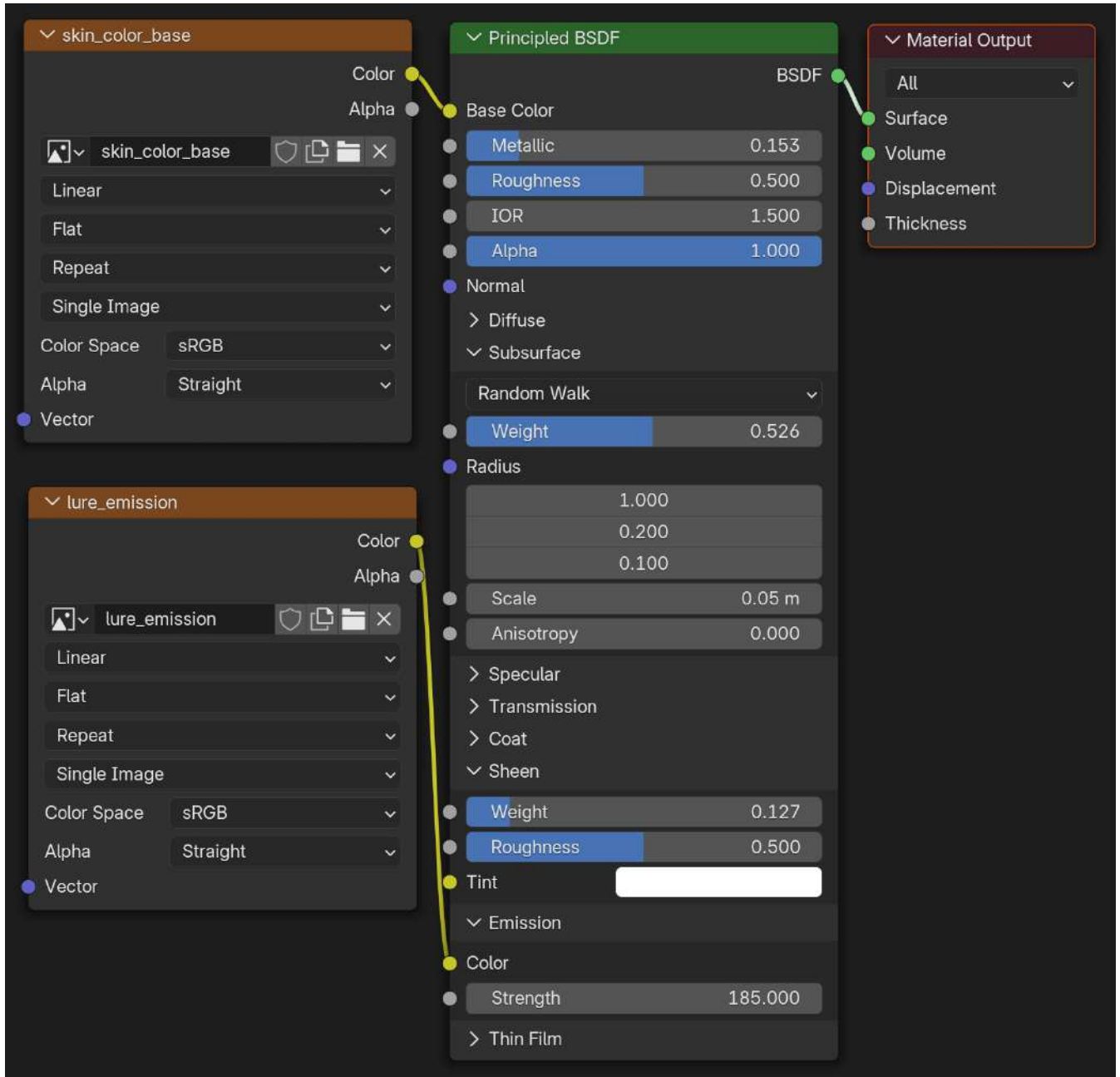


Image Textures: Anglerfish - Body

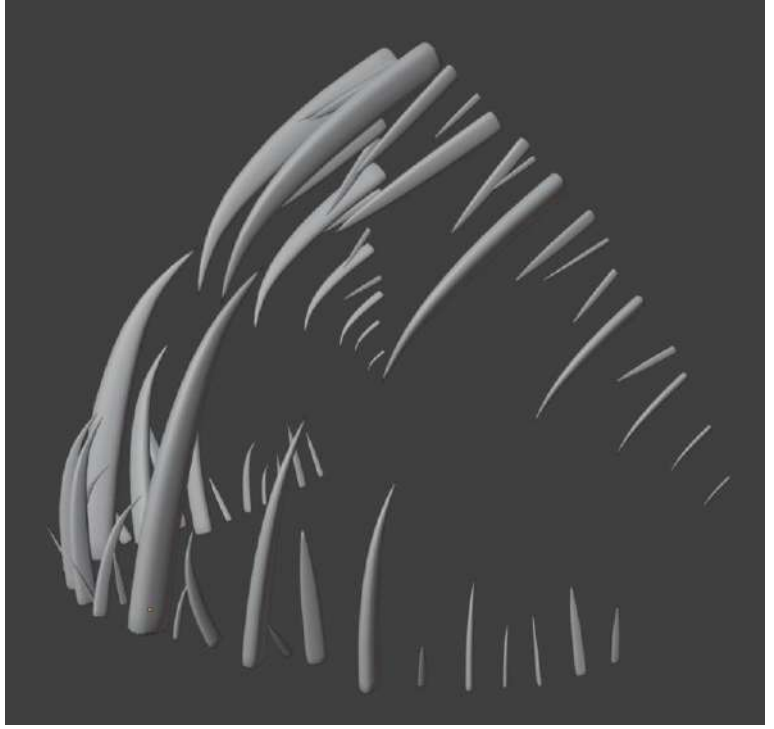


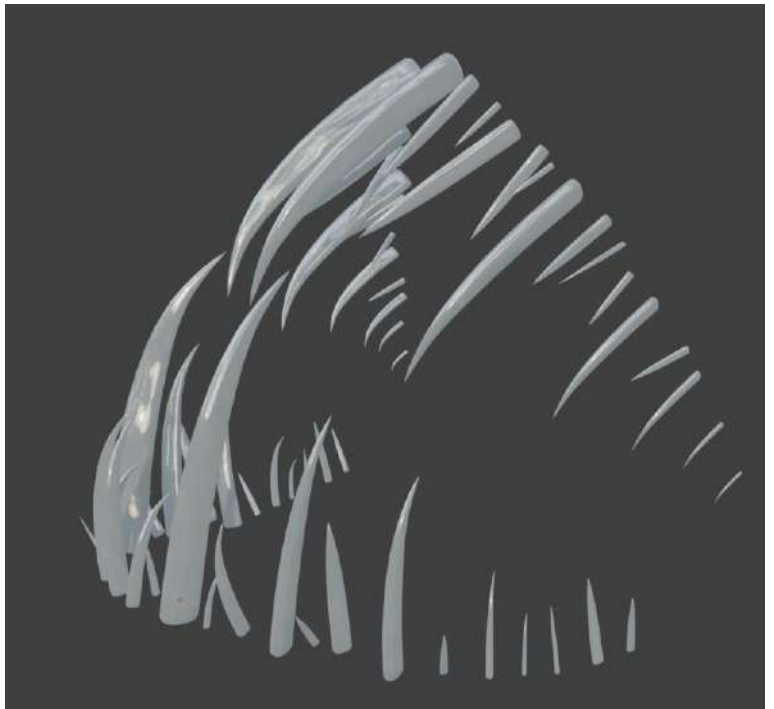
Material: Anglerfish - Body



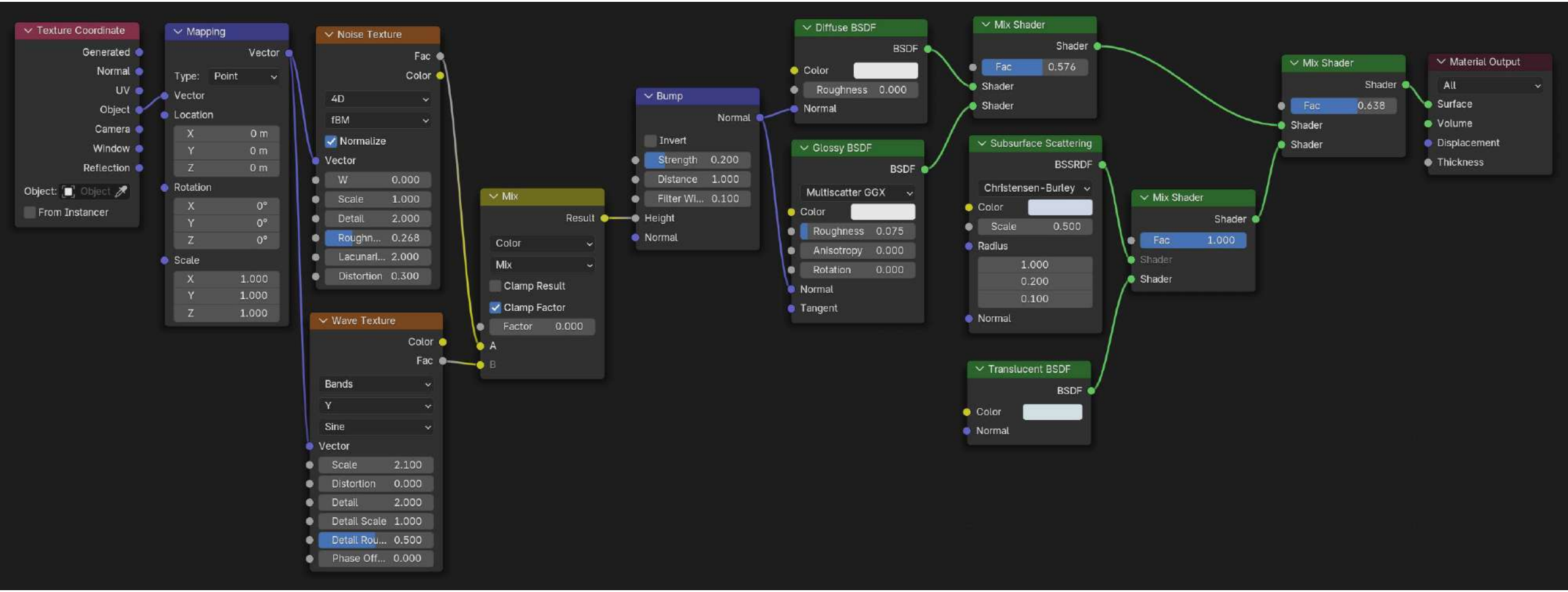
Object: Anglerfish - Teeth

- Geometry: Self
- Material: Self
- Description:
  - The teeth were duplications of two base tooth models. One of the models was straight and the other was curved.
  - Mirror modifiers and scaling were used to create a full mouth of teeth.
  - The material was created using a collection of BSDF nodes to create the slightly irregular surface and the translucent effects.
- References:
  - Teeth Material



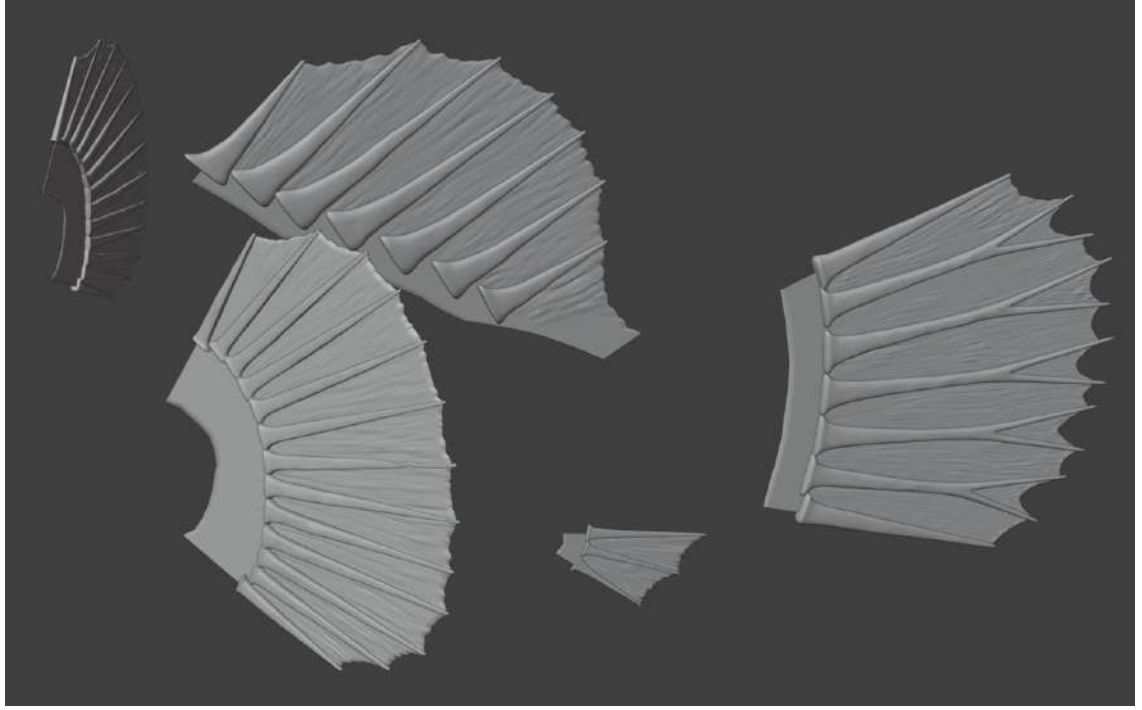


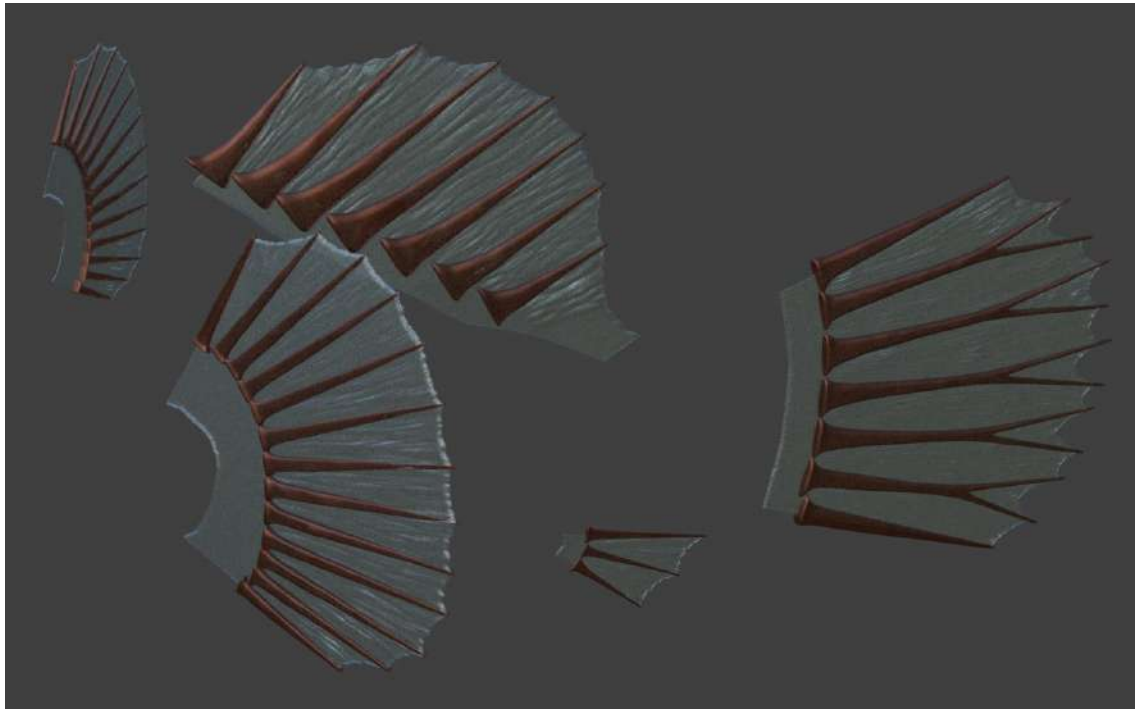
Material: Anglerfish - Teeth



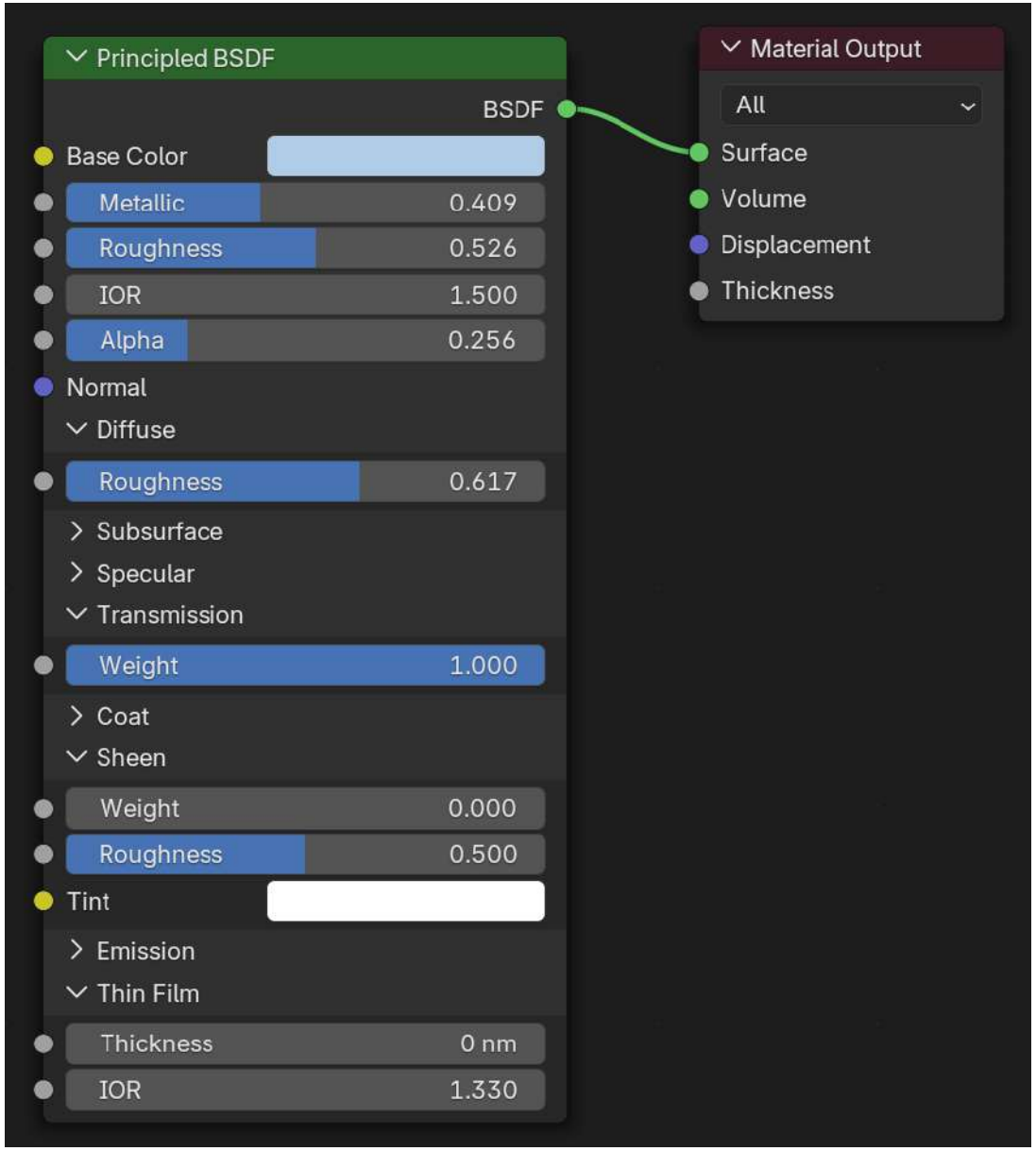
Object: Anglerfish - Fins

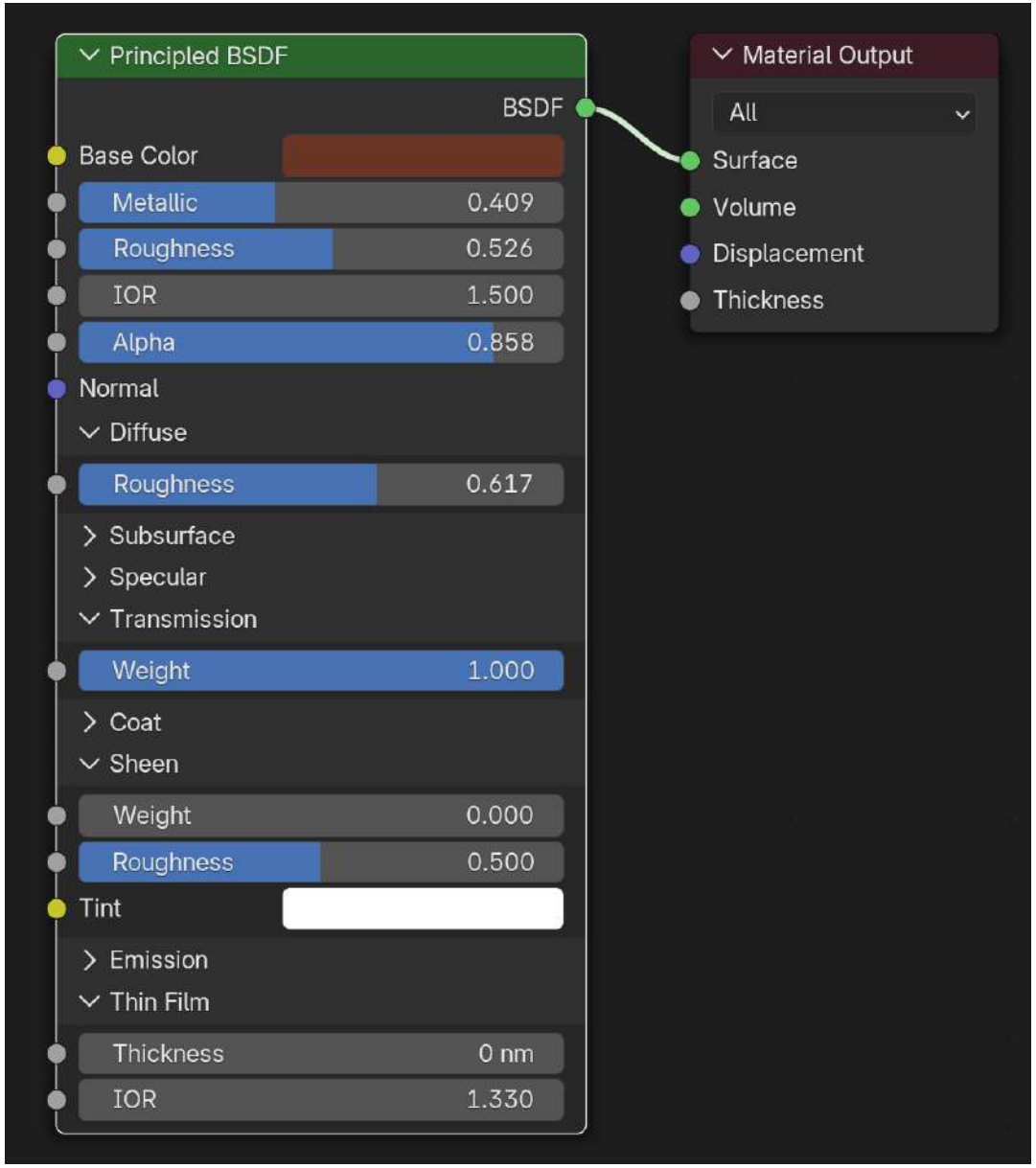
- Geometry: Self
- Material: Self
- Description:
  - The fins were originally Boolean added to the body model. However, during the retopology process, it was found that the difference in scale of features made. retopologizing the fins with the rest of the body exceptionally difficult.
  - The fins were removed from the model and their geometry and material was treated separately.
- References:





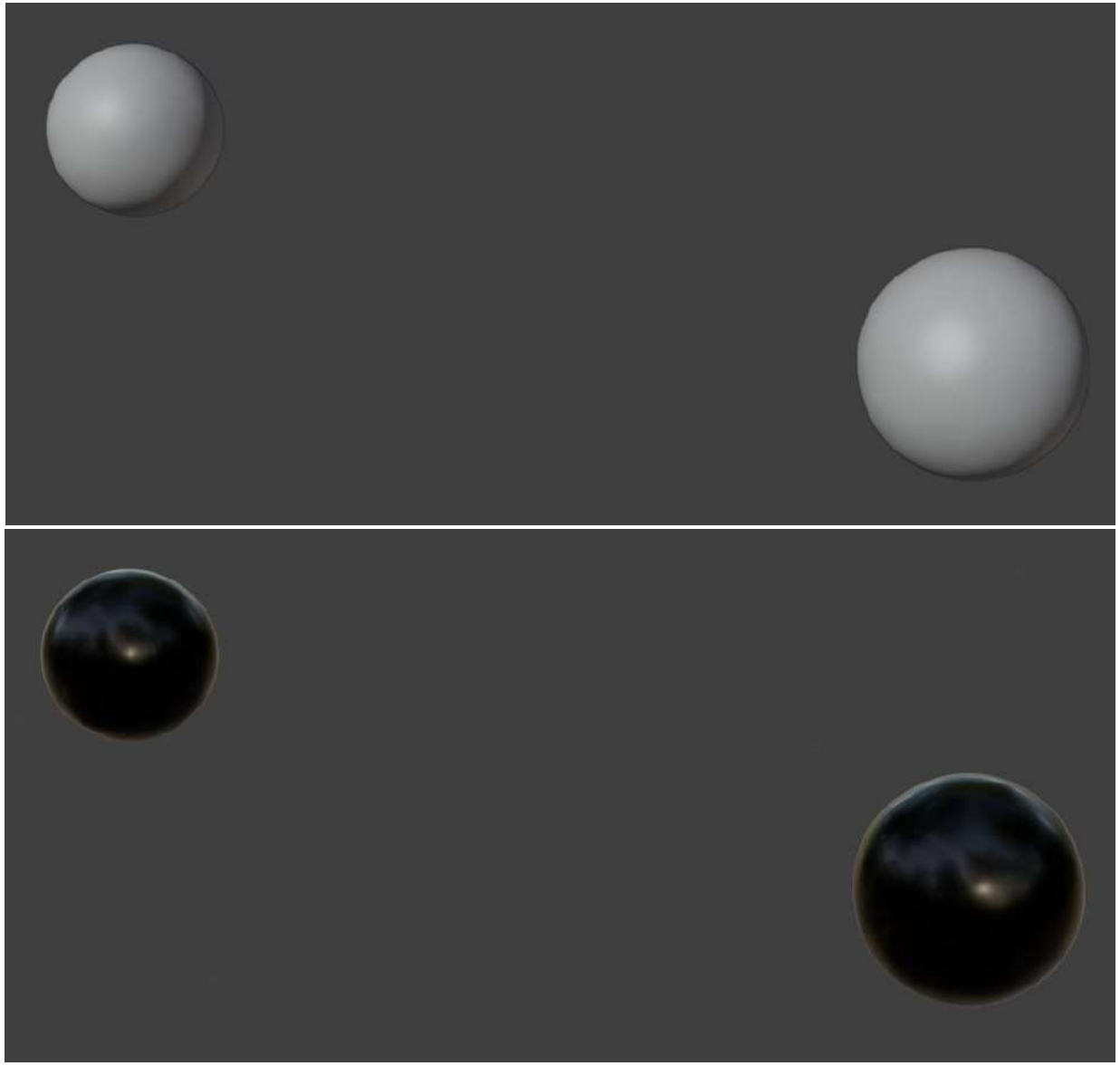
Material: Anglerfish – Fins



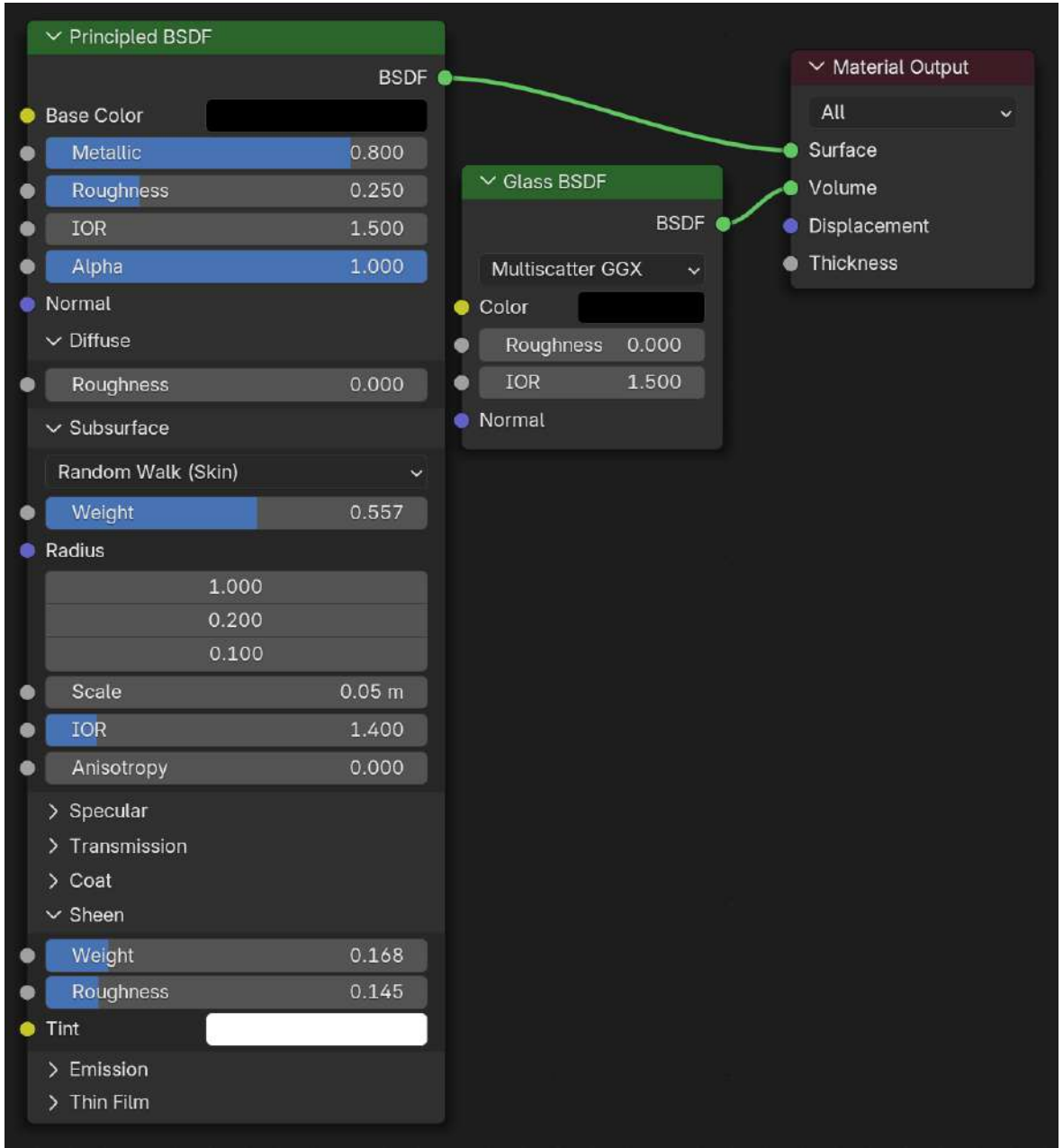


Object: Anglerfish - Eyes

- Geometry: Self
- Material: Self
- Description:
  - These are simple subdivided icospheres with a material added to make them shiny and stuff
- References:



Material: Anglerfish – Eyes



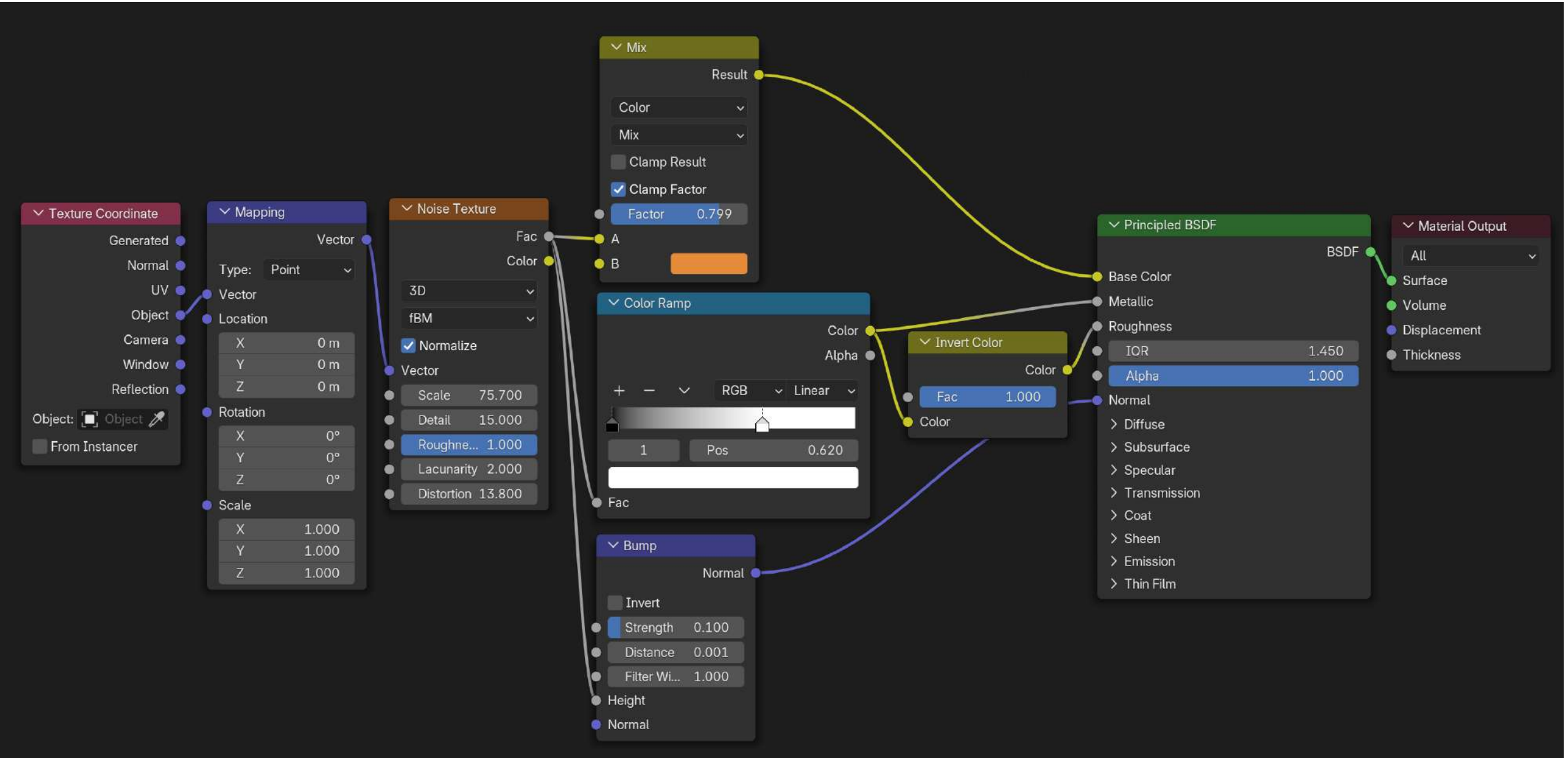
Object: Diver

- Geometry: Self / Online
- Material: Self / Online
- Description:
  - A fully suited diver was created because it has the benefit of being a human without having to worry about sculpting and texturing human skin / hair / other characteristics.
  - Humans are notoriously easy to make look uncanny.

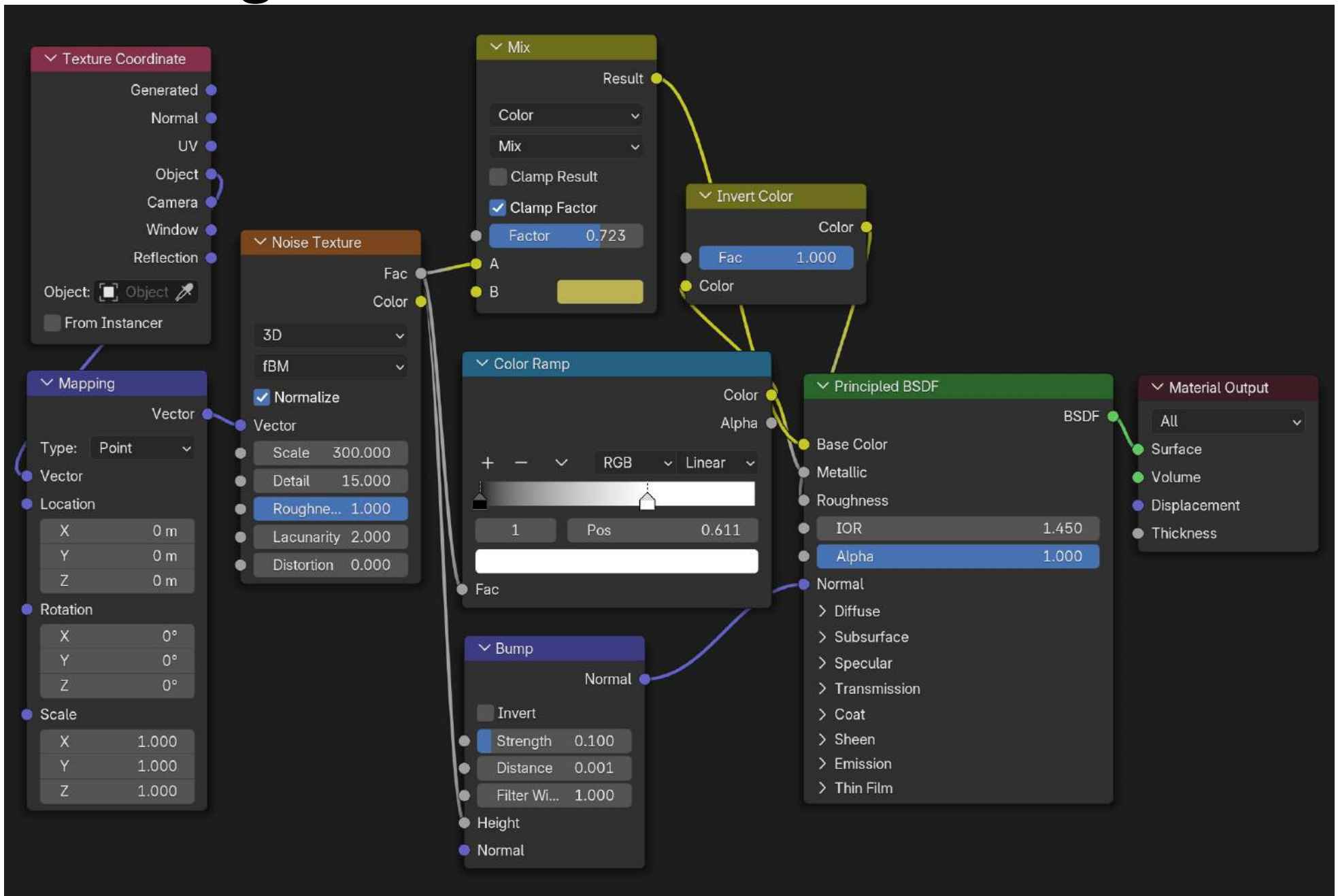
Object: Diver - Diving Helmet

- Geometry: Self
- Material: Self
- Description:
  - Composed of primarily spheres, circles, and plane shapes. All shaping was done in edit mode (no sculpting) to preserve a geometric, man-made look.
  - Consists of three materials. Brass and copper are the same base material with different colors. The third is the glass material for the windows.
- References:
  - Diving Helmet

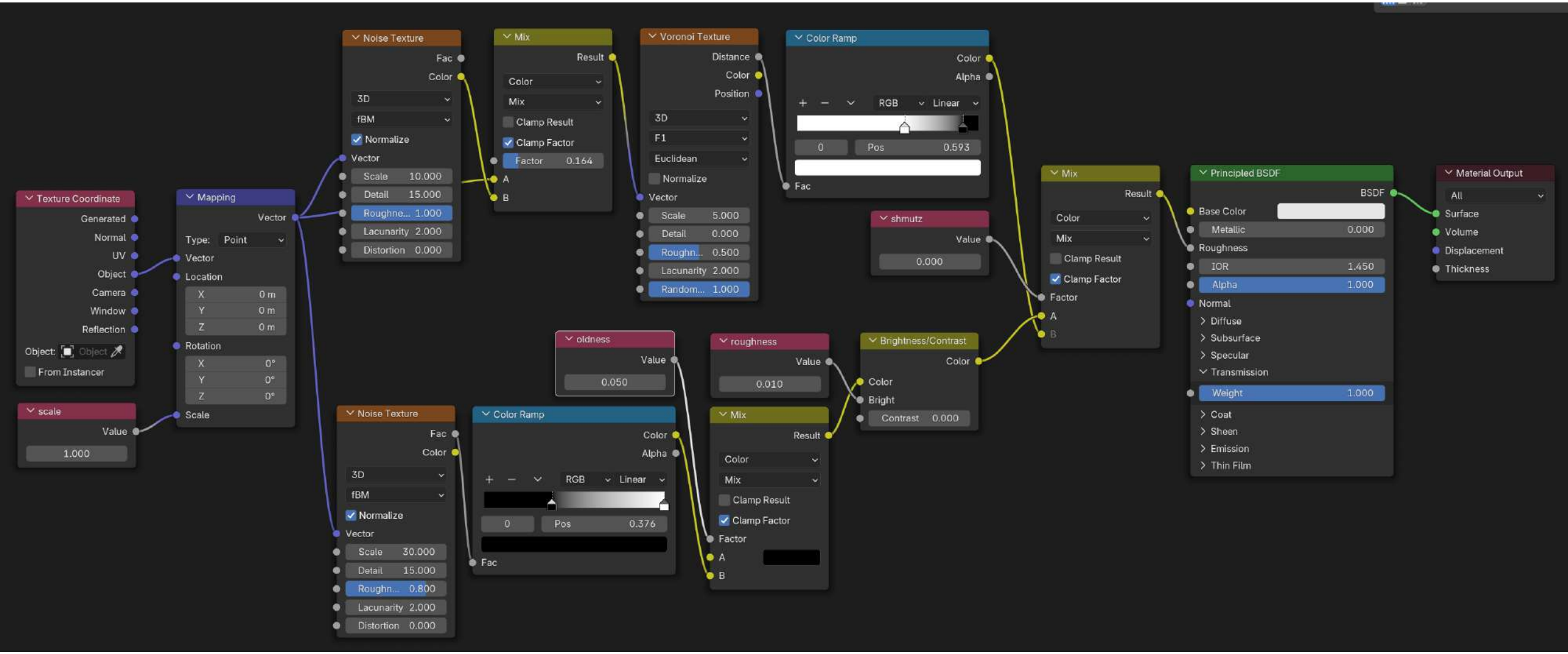
Material: Diving Helmet - Copper



Material: Diving Helmet - Brass



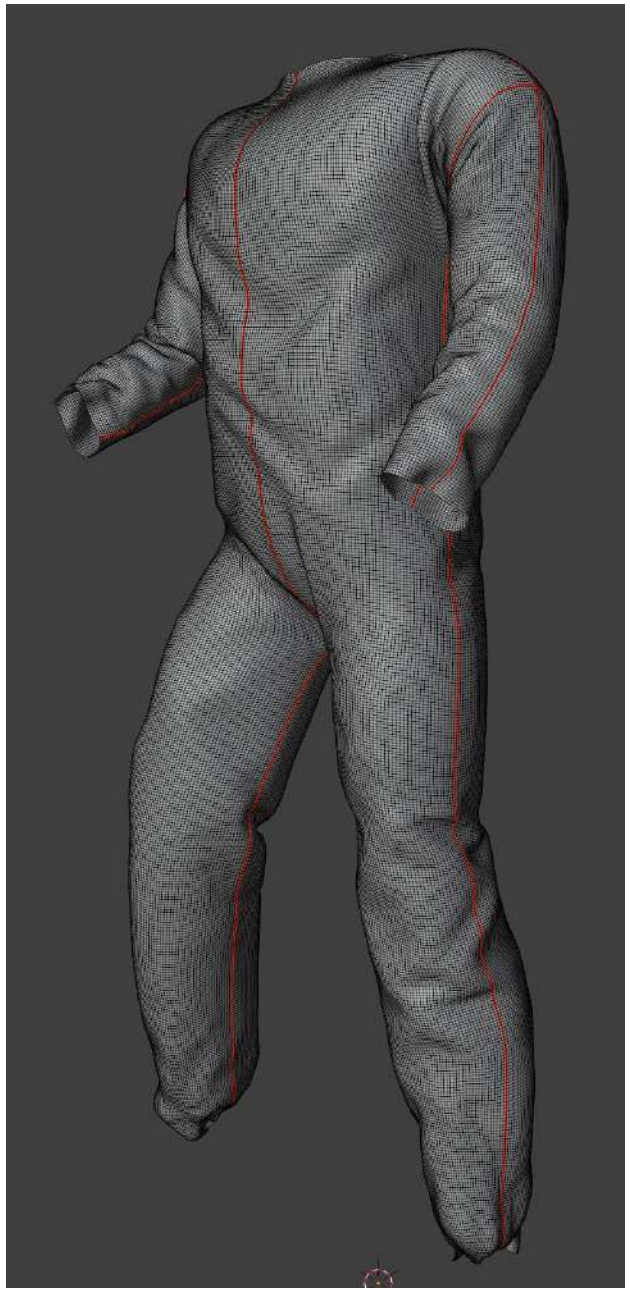
Material: Diving Helmet - Glass

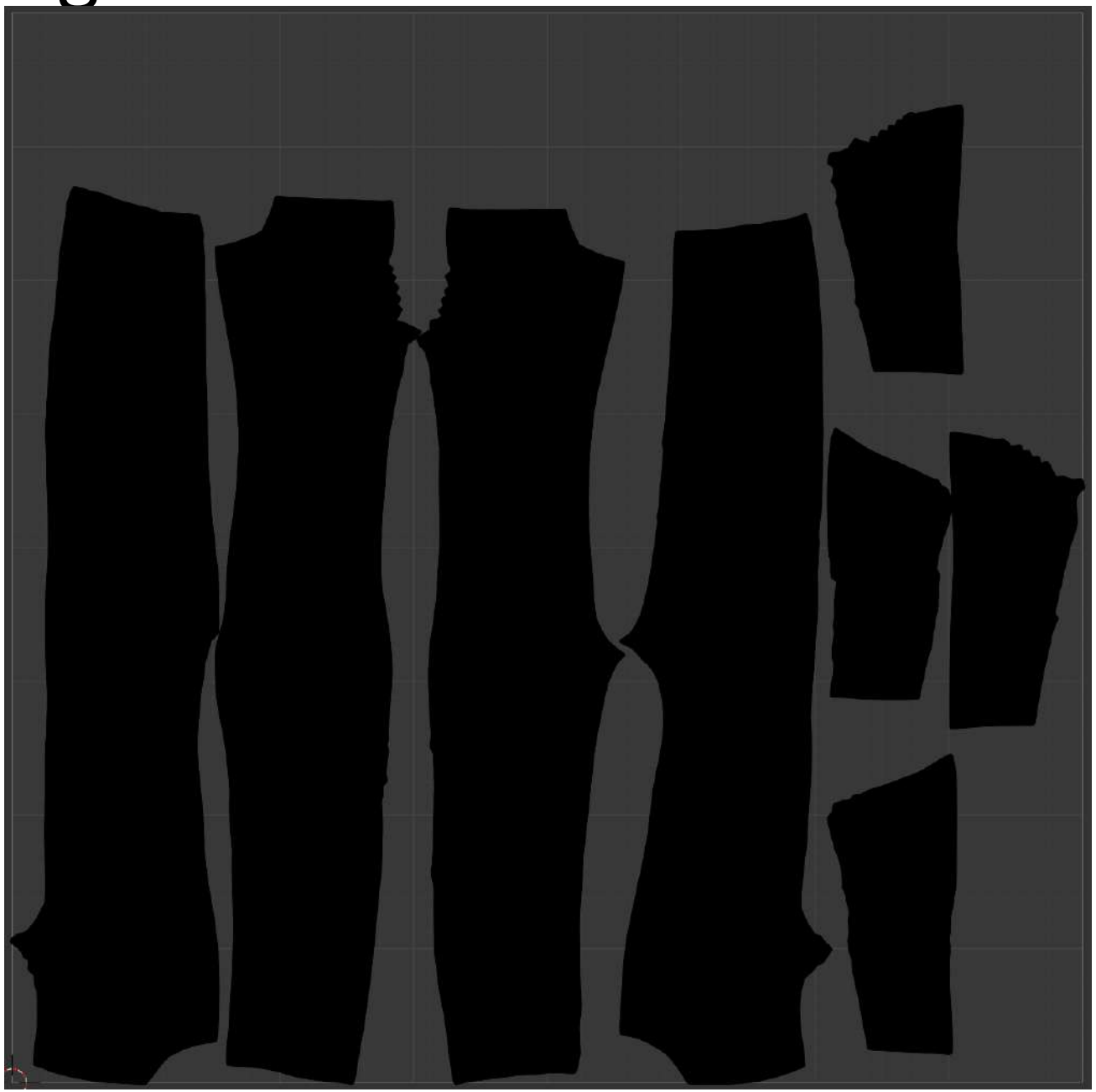


Object: Diver - Diving Suit

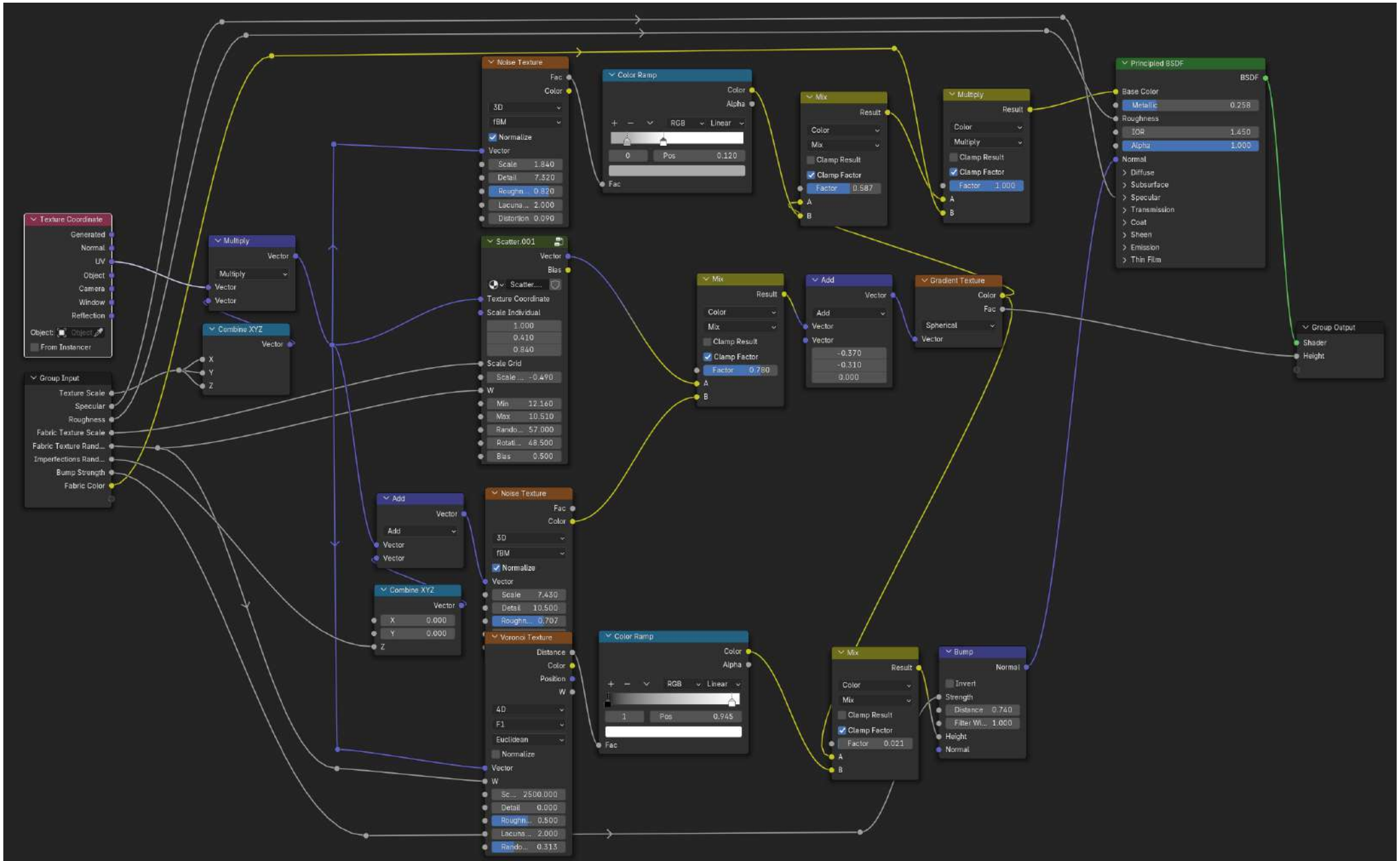
- Geometry: Self
- Material: Online
- Description:
  - First, a human model was created using the Make Human (MPFB) addon for blender. An animated pose was created for the character through the rigging for the model and keyframes for animation.
  - This animation was exported to the clothing simulator Marvelous Designer because the cloth simulator in Blender was creating unstable simulations. Once the suit was tailored and simulated in Marvelous Designer, it was imported back into Blender.
  - In Blender, it was converted into a mesh file and was sculpted some using cloth sculpting tools. This was done to make sure there was no interference / clipping with the other objects of the diving suit
  - A cloth material was applied to the suit from the BlenderKit add-on.
  - The suit was UV unwrapped so that the pieces of the suit could be aligned with the stitching directions of the material.
- References:
  - Human character generator
  - Marvelous Designer
  - Fabric
  - Blender to Marvelous Designer

UV Unwrap: Diver – Diving Suit





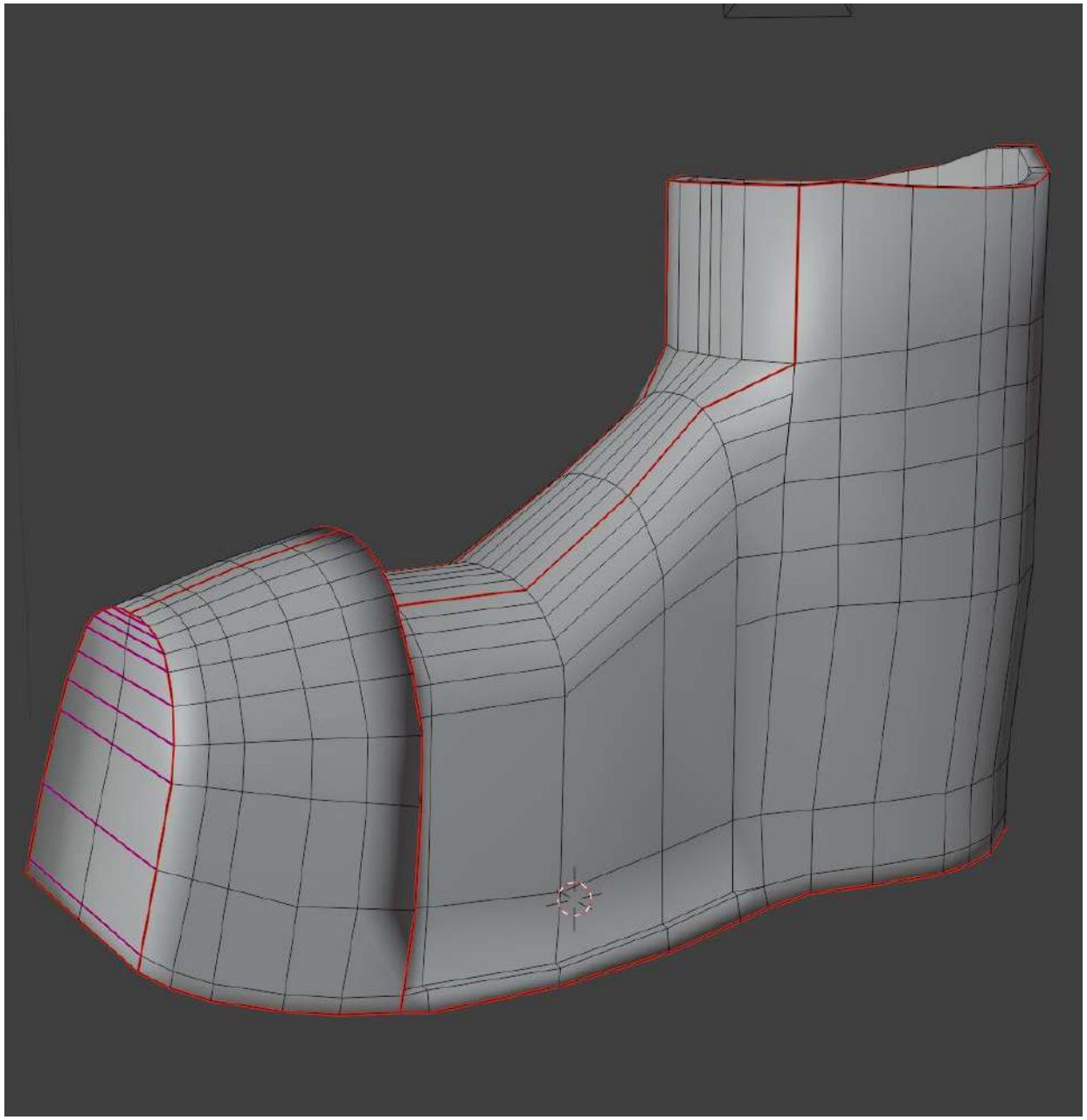
Material: Diving Suit - Cloth

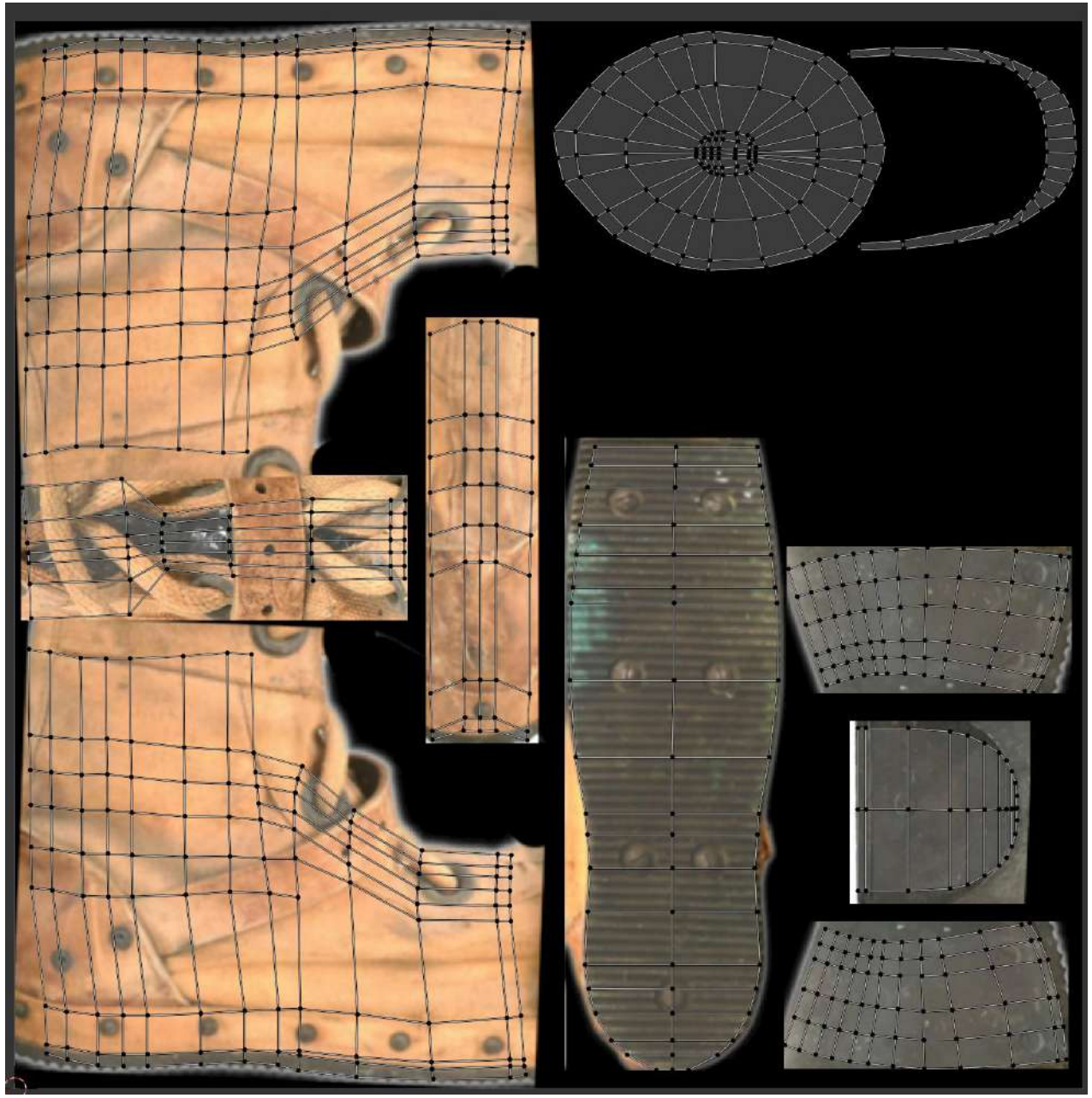


Object: Diver - Boots

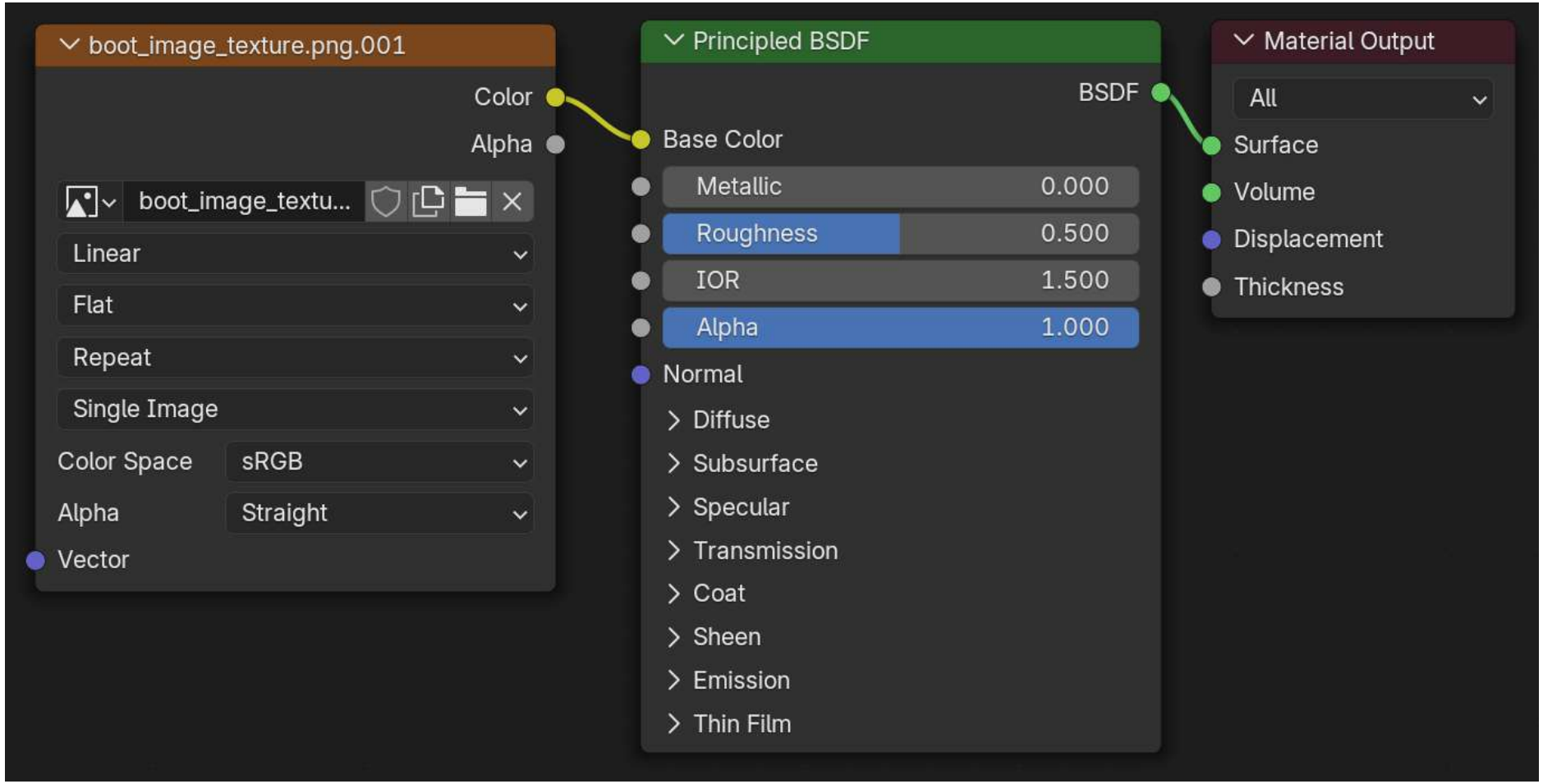
- Geometry: Self
- Material: Online / Self
- Description:
  - I found a series of pictures that captured a pair of diving boots from all angles and sides against a white background. What luck
  - A model was made using these pictures as references. If you ignore the laces, it's a pretty good mapping.
  - The model was UV unwrapped, and the pictures were stitched together to create the image texture for that UV map.
- References:
  - Boot Pictures
  - UV Unwrapping

UV Unwrap: Boots





Material: Boots



Object: Diver - Flashlight

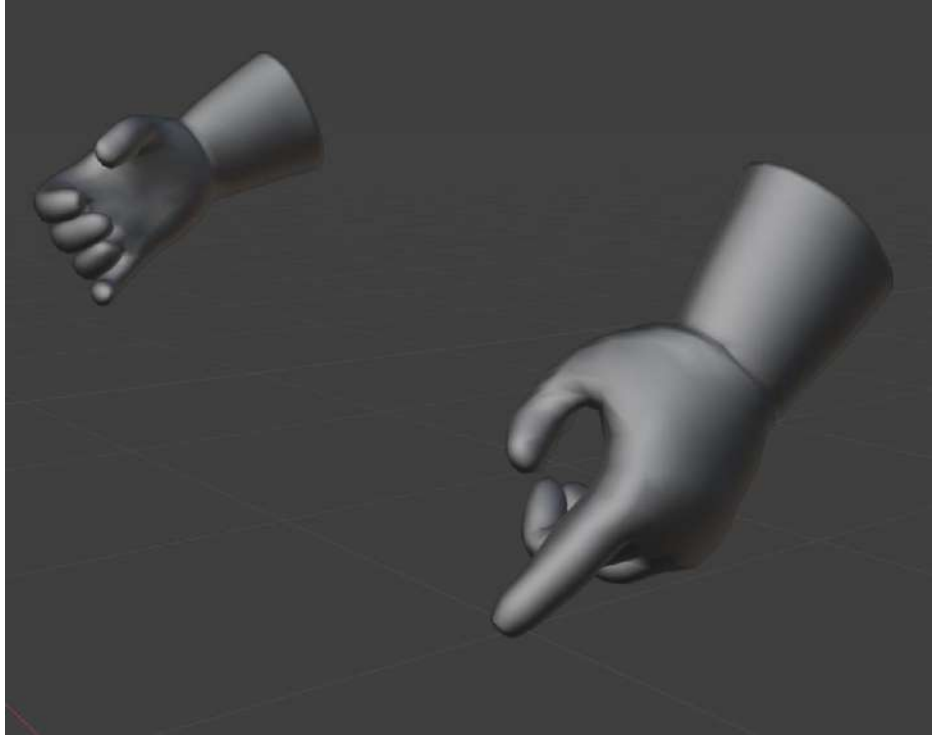
- Geometry: Online
- Material: Online
- Description:
  - Model was downloaded from CGTrader
  - In the render scene, a cone light asset was added into the light section of the flashlight to increase the intensity of the light it produced and create a visible beam.
- References:
  - Flashlight

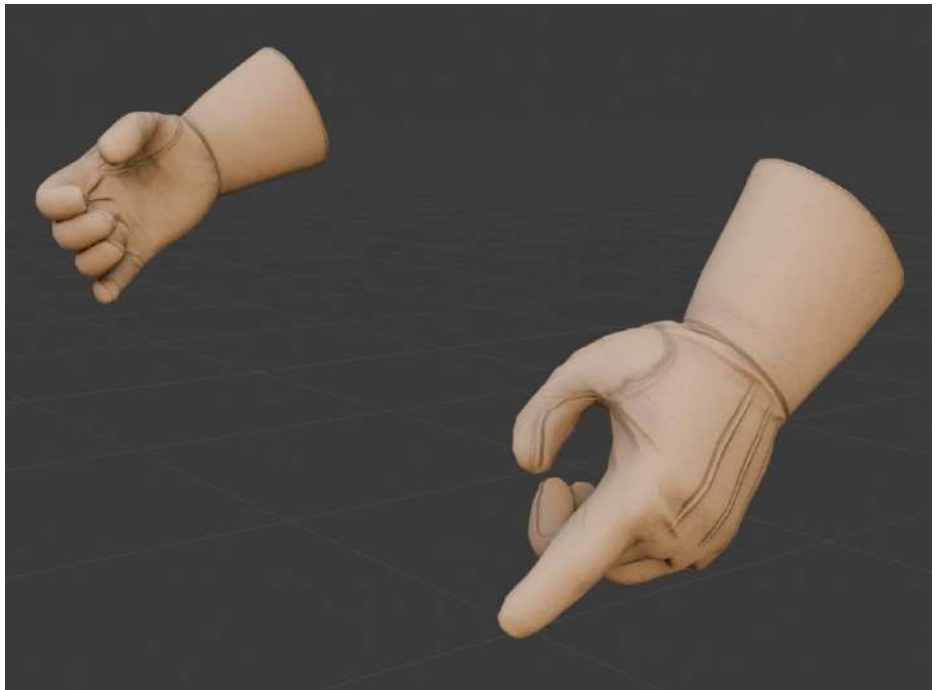
Object: Diver - Speargun

- Geometry: Online
- Material: Online
- Description:
  - Model was downloaded from CGTrader
  - It’s a speargun
- References:
  - Speargun

Object: Diver - Gloves

- Geometry: Online
- Material: Online
- Description:
  - Model was downloaded from CGTrader
  - Advantage of this model is that it is rigged. I did not have time to learn rigging and this was needed to pose the hands into grips
  - The white material mapping for the gloves was painted brown in a paint software to try and match the color of the boots.
- References:
  - Gloves

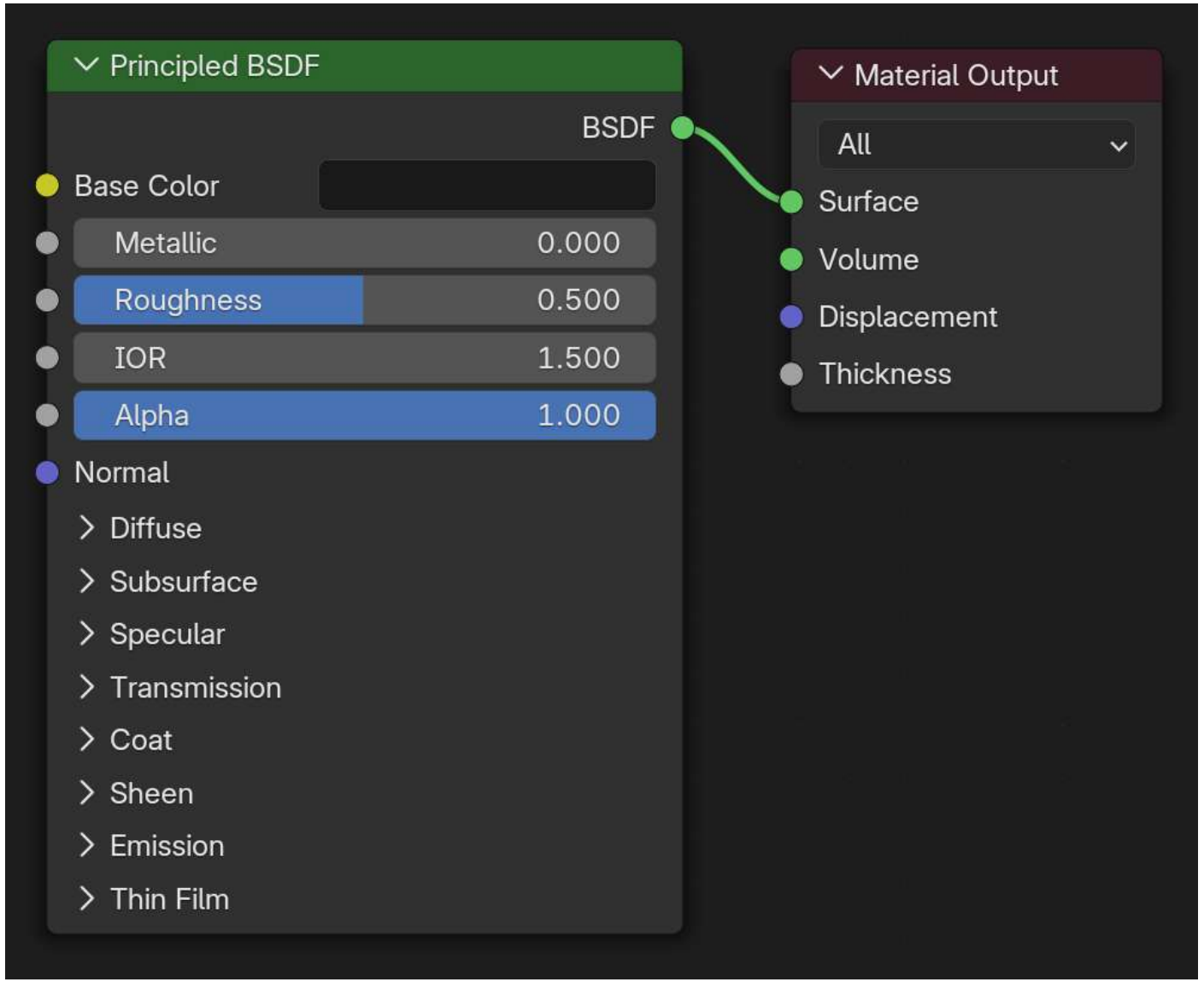




Object: Diver - Hose

- Geometry: Self
- Material: Self
- Description:
  - It’s a Bezier curve with some thickness made black.
- References:

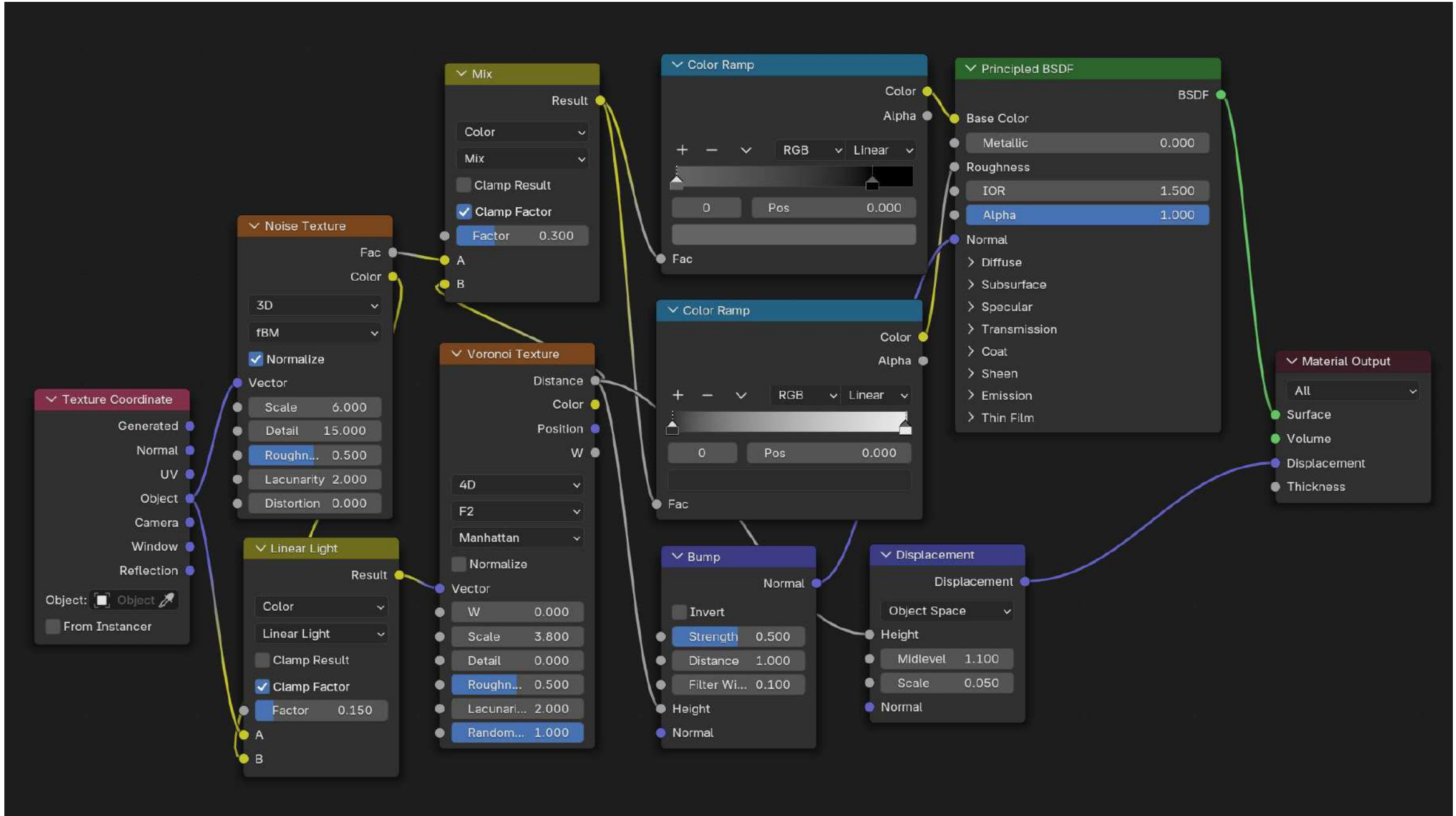
Material: Diver - Hose



Object: Rocks / Cliffs

- Geometry: Self
- Material: Self
- Description:
  - The cave was created by making a cube and removing one of the faces. This cube was then subdivided a lot. The shape was then formed in sculpting mode
  - The rock material provided the color and surface texture as well as the displacement mapping to make the edges rough and rock like
- References:
  - Rock Surface

Material: Rocks / Cliffs



Object: Sand

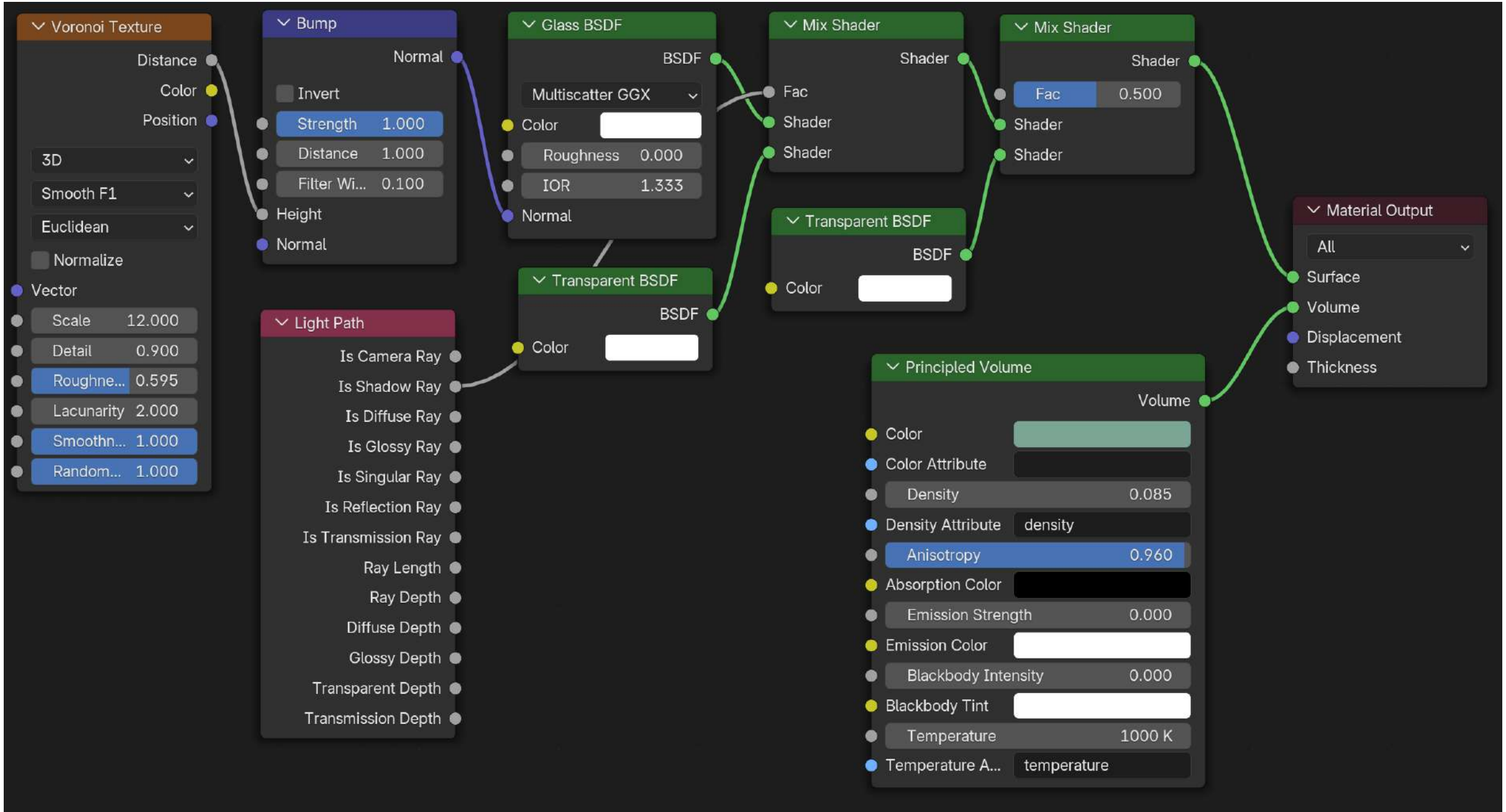
- Geometry: Self
- Material: Self
- Description:
  - The sand is a simple subdivided plane. The subdivisions are necessary to provide enough resolution for displacement mapping
  - The sand material combines wave and noise textures to create the small noise of sand particles and larger displacements of undulations in the sand
- References:
  - Sand

Material: Sand

Object: Water

- Geometry: Self
- Material: Self
- Description:
  - Volumetric material effects were used to create the water scattering in the render
  - The anisotropy was tuned to help create the glow halo effects for the flashlight and lure. Also needed to create the “god rays”
- References:
  - Water

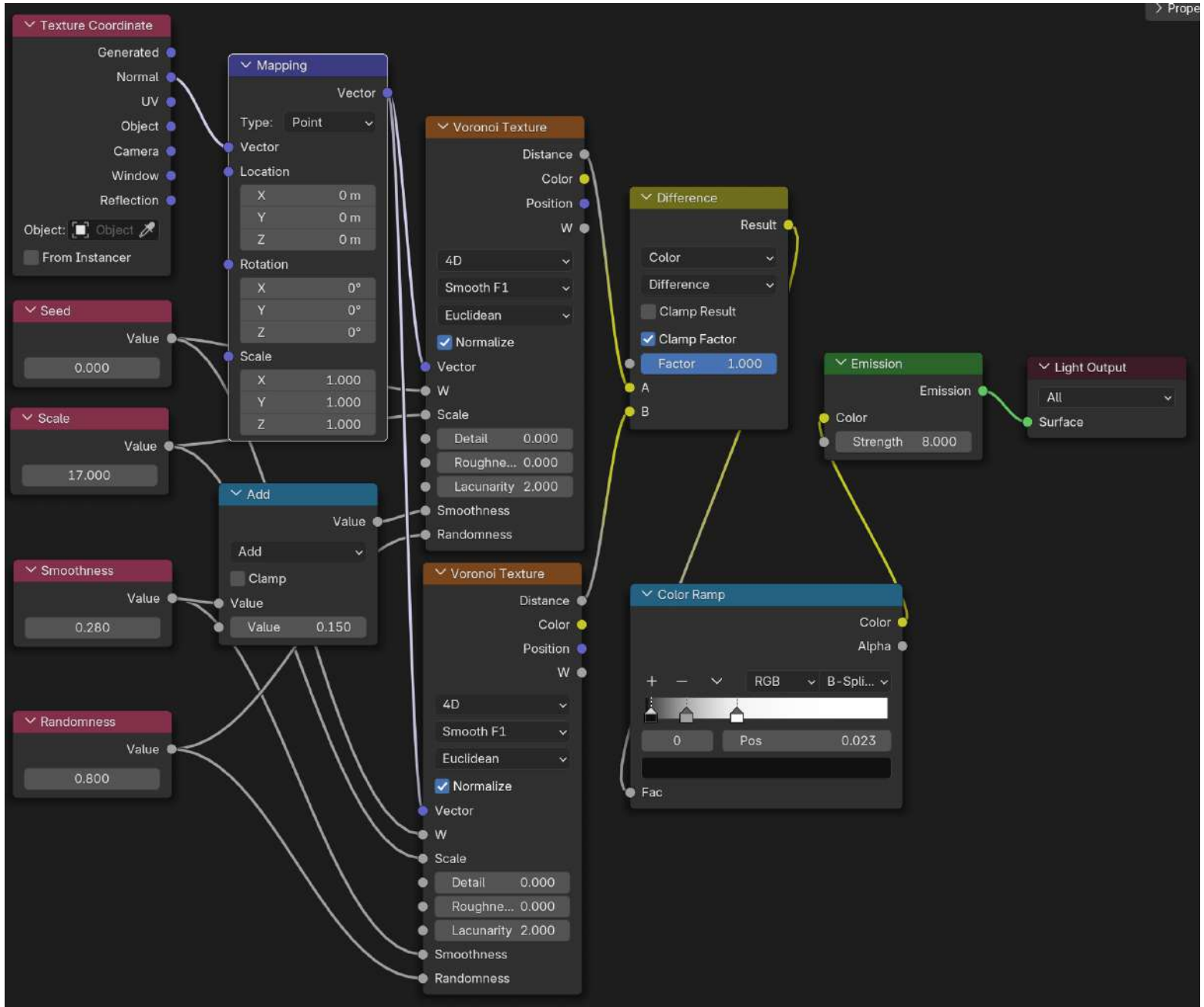
Material: Water



Object: Caustics

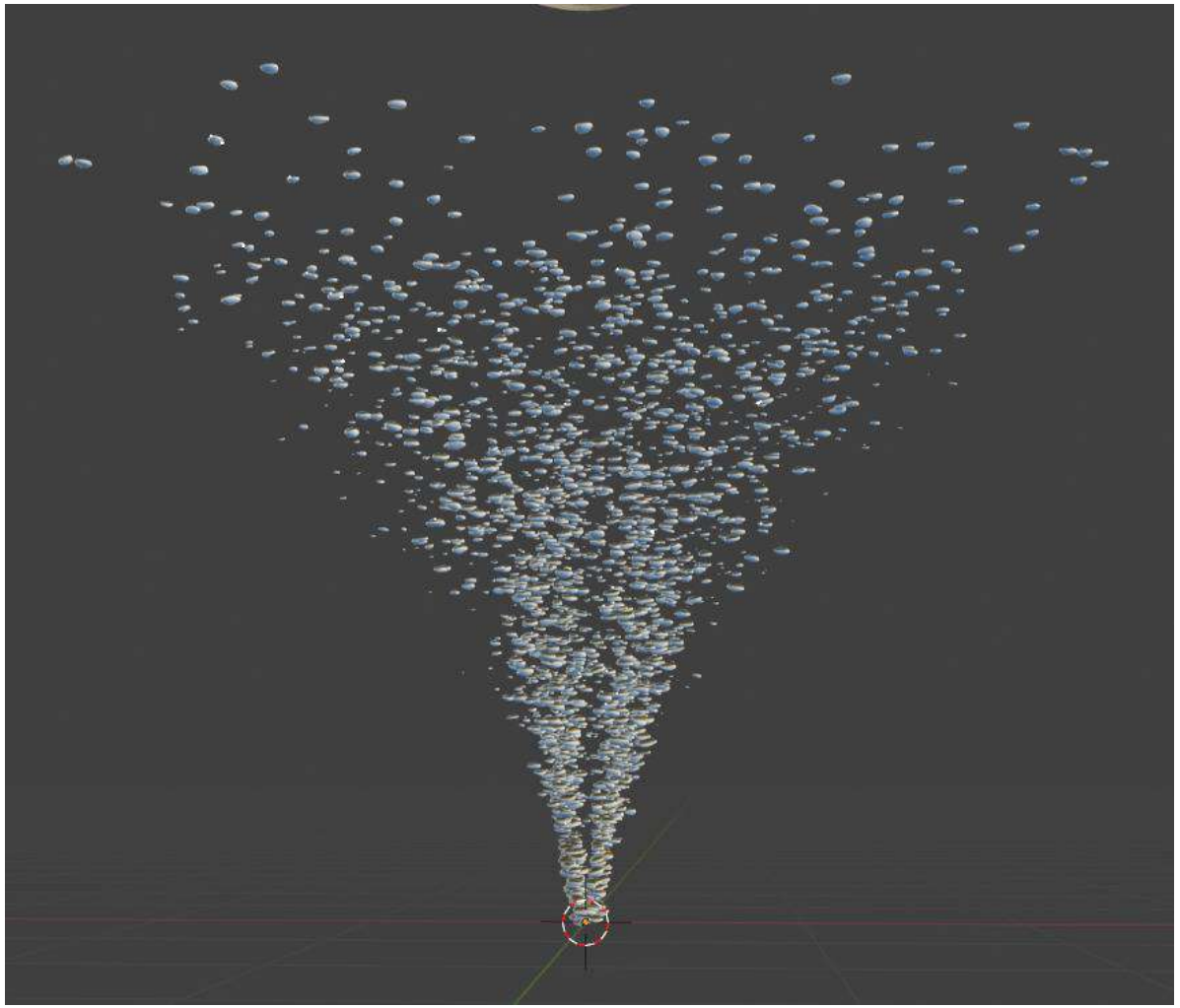
- Geometry: Self
- Material: Self
- Description:
  - A clever combination of Voronoi Noise textures are placed on top of a cone light source to create the caustic light patterns
  - Watch the reference video, it’s really good
- References:
  - Caustics

Material: Caustics

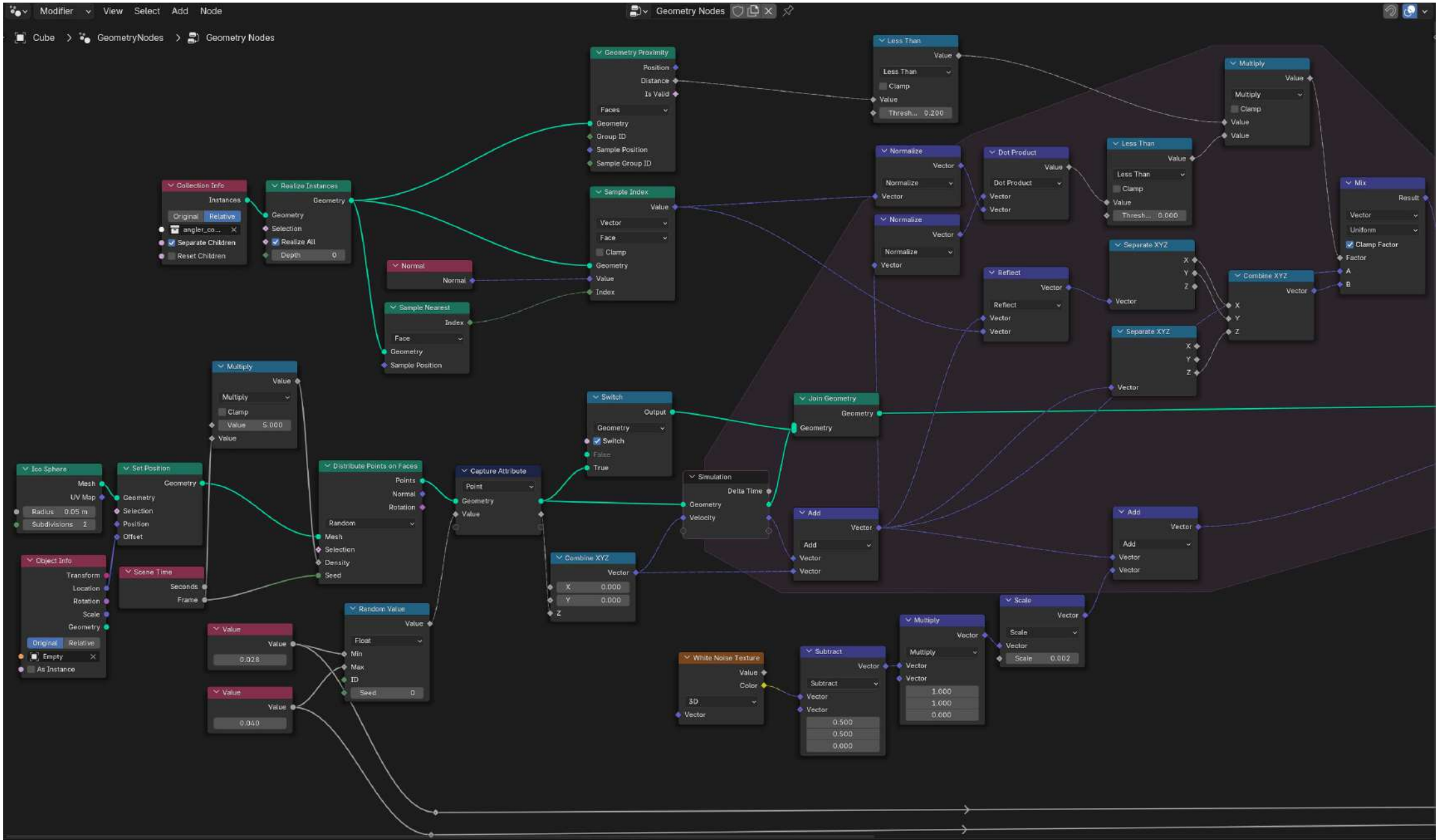


Object: Bubbles

- Geometry: Self
- Material: Self
- Description:
  - Geometry nodes was used to simulate bubbles for the divers breath
  - Note: If referencing the tutorial, a White Noise Texture worked a lot better than the Noise Texture for adding velocity randomness
- References:
  - Bubbles



Geometry Nodes: Bubbles



Geometry Nodes: Bubbles (cont.)