SUIMONO 2.1

INTERACTIVE WATER SYSTEM FOR UNITY

OFFICIAL DOCUMENTATION

Based on Suimono version 2.1.2
Documentation last updated on 7/5/2016

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Introduction

What is Suimono?

Coming Soon

What's New in Version 2.x?

Please Note: As of Suimono version 2.1.0, iOS and Android support are being removed and are no longer being developed.

3D Waves and DX11 Tessellation
Version 2.0 brings dynamically generated 3D waves to Unity. Waves are generated based on surrounding geometry, and those with DX11 and Unity 4.0+ get access to full distance based wave tessellation.

Automatic Shoreline Creation
The new ShorelineObject will automatically create shoreline data from your scenes. You can use as many shoreline objects as you wish.

Improved Surface Rendering
New depth based light scattering and specular, as well as advanced foam and reflection controls.

Improved Underwater Effects
Many aspects of the underwater visuals have been improved, including fogging, under-surface reflections, and depth-blur effects.

Advanced Buoyancy system
Customize buoyancy forces across your game objects with custom force placement.

Updated UI and Automatic Presets
Suimono now uses a custom Editor GUI and a completely rewritten and automated preset system. Now you can save and copy your presets or make new ones at the press of a button.

FX Module and Objects
You can customize and place splash, ripples, boat wakes, and other particle effects anywhere in your scene. You can even add your own custom particle effects.

C# Codebase
Suimono Version 2.1.2 now has all code rewritten in C# for better compatibility in your projects.

Getting Help and Contact Information

This documentation has been written with the goal of giving Suimono users an in-depth overview of the various components of the system. There are various other resources online where you can find help about using Suimono. First if you have specific questions, please head over to the Tanuki Digital users forum and browse the posts, or make your own:

http://tanukidigital.com/forum/

There's also the Suimono 2.0 thread on the Unity Technologies forum:
http://forum.unity3d.com/threads/suimono-2-0-interactive-water-system.289311/

and of course if for any reason you would like to ask a question directly, please feel free to email us here:
konnichiwa@tanukidigital.com

Installation and Quick-Start

STEP 1. IMPORT BASE FILES INTO YOUR PROJECT

Go to: "Assets -> Import Package -> Custom Package…" in the Unity Menu and select the "Suimono_watersystem_v2.unitypackage" file. This will open an import dialog box. Click the import button and all the Suimono files will be imported into your project list.

A Note about Demo Content… The Suimono installer file contains a large number of files for the advanced demo scene. If you don't need this scene in your project, you can disable importing the demo content by unchecking the **SUIMONO - WATER SYSTEM 2/_DEMO** folder in the import dialog window before importing.

STEP 2. ADD THE SUIMONO MODULES TO YOUR SCENE

1) Drag the "Suimono_Module" prefab into your scene list.
2) Drag the "Suimono_Surface" prefab into your scene list. This is your water surface.
3) Add your main scene camera to the 'scene camera object' slot on the module.
4) Add your main scene directional light to the 'scene light object' slot on the module.
5) Go to your scene camera object and (if necessary) add the Underwater component by going to
   Component-->Image Effects-->Suimono-->UnderwaterFX

That's it for basic installation! You can now position "SUIMONO_Surface" anywhere in your scene that you like, and even rename the "Suimono_Surface" object to anything you wish. This object can also be scaled and rotated to fit your scene, but please see the scale note below!

A Note about Upgrades
Depending on what version of Suimono you are upgrading from there may be large structural changes between versions. Because of this it's usually recommended to uninstall Suimono completely before upgrading to a new major version. You can follow the instructions below to insure that Suimono is completely uninstalled from your project before attempting a new installation:

1) Remove the Suimono Module and any Suimono Surfaces from your scene.
2) Remove the UnderwaterFX from your camera.
3) Go to Project Settings --> Tags and Layers and remove any Suimono-specific layers in the list.
4) Remove the Suimono folder from your project.

A Note about Presets:
Saved Preset information is contained in text data files under **SUIMONO - WATER SYSTEM 2 / RESOURCES /**
If you have presets that you'd like to save make sure to backup these file before applying any updates, just to make sure your data isn't overwritten. You can then simply replace the new data files with your saved files.

Frequently Asked Questions

Material doesn't have a texture property '_FoamOverlay'... (etc)

This is an error caused by older versions of Suimono in Unity 5.3+ It's highly recommended to upgrade to the latest version of Suimono, either through the Asset Store or the TanukiDigital.com website.

Can I turn off the above water sound effects?

Yes, go to the Suimono Module and uncheck the 'Enable Above-Water sound' setting located under General Settings.

I get a yellow "Too many layers used to exclude objects from lighting" error in my console.

These errors occur because in Deferred rendering mode when a light object has too many layers excluded from it. In Suimono, this is most likely caused by the caustic light object. To fix this, under Suimono_Module, go to the Advanced Water Settings tab and adjust the Caustic Effects 'Render Layers' setting to include more of your game layers.

My water settings always reset when I press play/stop.

Suimono uses it's built-in preset system to help load and save settings. When you press play it loads water surface settings from the currently selected preset. In the SURFACE preset manager, if you click "NONE" it will respect your current settings when you pressed play. See" Working with Presets" later in this doumentation for more in depth preset instructions.

Can I setup water with my own custom cubemap/normalmap textures?

Yes, see "Using Custom Textures" later in this documentation for instructions on how to do this.

Can I setup water on my own custom mesh object?

Yes, see "Using Custom Meshes" later in this documentation for instructions on how to do this.

Performance Considerations

Suimono has been optimized to run on a variety of systems and setups. However occasionally there still may be negative performance issues depending on your scene and setup. Read some of the notes below to help maximize performance.

Scene Optimization

The options listed below will help optimize specific Suimono-functions in your scene, however the best optimization that can be done is to insure that your scene is well optimized from the start. This will mean different things depending on what you are doing in your project, however if there are performance issues in your scene already, Suimono will only magnify these issues with it's rendering features.

Surface LOD (Level-Of-Detail)

Suimono 2.1 comes with 4 different water mesh Level-Of-Detail (LOD) levels of varying mesh complexity. You can choose between high detail, medium detail, low detail, and single quad triangle levels.   Choosing a lower LOD level can help save some performance calculations in your scene.

These can be accessed on the Suimono Surface object under the Surface LOD setting. It's recommended to use the detail level based on the size of the water in your scene.   For example if your water surface is for a small pond, often using a low detail LOD level is perfectly fine, and will save on some resources.

Note that LOD levels are not available when using the custom mesh setting, nor when using the Infinite Ocean setting.

DX11 Tessellation

Running Unity in DX11 mode gives Suimono access to advanced shader instructions, such as tessellation. This feature adds in geometric data on your water surface automatically, giving you more realistic wave visuals and water interaction near the scene camera. However this comes at a cost in performance. You can turn down the tessellation settings on your surface object to improve the balance between performance and visuals, or turn tessellation off by turning them down completely.

Dynamic Reflections

The Dynamic Reflection system in Suimono creates great visual reflections on your water surface. However it does this by rendering the visible scene a second time from a different projection matrix position. In an already complicated scene having this second reflection render pass can become too complex to maintain adequate performance. If you experience performance problems it's recommended to adjust the number of game layers that are rendered in the Reflection function, as well as the distance and resolution it renders at. (see settings on the SuimonoSurface object)

Transparency

The Transparency system in Suimono calculates a second render of your scene before water surfaces are rendered. This scene data is used to combine transparency with other advanced composition abilities, such as depth and fog.   Because of this second rendering overhead you may find that Suimono performance degrades in a complicated scene. If you experience performance problems it's recommended to adjust the number of game layers that are rendered int he Transparency function, as well as the distance and resolution it renders at. (see settings on the SuimonoModule object).

Caustic Effects

Suimono renders caustic lighting underneath the water surface to simulate light-ray refraction effects. On some systems and at certain viewing angles caustics can be expensive performance-wise. Turning off the 'Enable Advanced Caustic FX' setting on the SuimonoModule can alleviate some performance related issues, at the expense of some more advanced caustics control (edge blending, surface-specific color etc). You may also adjust the game layers that are affected and the resolution to get more performance out of this function.

Working with Presets

Suimono Version 2.0 includes an automated preset system that allows you to quickly edit and save specific water settings for yuor surface objects. these can be saved and edited both in editor mode and play mode, however it's strongly recomended to save and edit during play mode, as Unity prevents some features of Suimono from rendering properly in Editor mode. When you press play, the currently selected preset will load for your water surface.
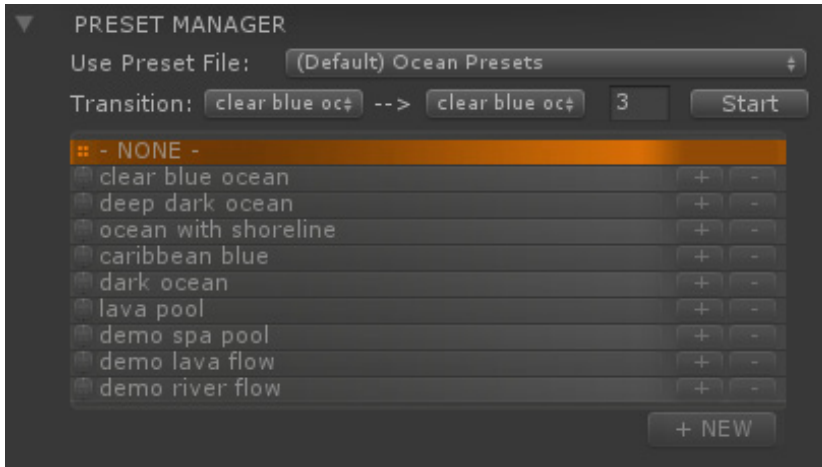
Saving a New Preset

To save a new preset, press the "+New" Button This will record a new preset with the current settings of your water surface, and add it to the bottom of the preset list. You can rename this preset by clicking on the small button to the left of the preset name. When done, press "ok" and to cancel the renam press the "x" button.

Updating an Existing Preset

If you already have a preset that you'd like to update, or to edit any of the existing presets, first click on the preset you want to edit. This loads in the current settings for that preset. Next make any changes in the surface settings that you wish and when ready press the "+" button to the right of the preset name. This will overwrite the preset with the current settings.

Deleting an Existing Preset

To delete a preset, click the "-" button to the right of the preset. This can be done from play mode or from editor mode. Please note, that this deletion is permanent, and it does not give you a warning.

Preset Transitions

Suimono has a built-in preset transition feature. This allows you to make a smooth transition from the first preset to the second preset at the given number of seconds. To initiate a transition while playing in the Unity Editor press the "start" button. To learn how to initiate a transition from code, take a look at the "Programming" section later in this documentation.

Multiple Preset Files and Backing Up Presets

You can select which preset file to load from or save to by changing the "Use Preset File" dropdown menu. All these data for these presets are contained in text files located under the Suimono "Resources" folder. IIf you have saved custom presets then it's recommended to periodically backup the files from this location, especially before doing a Suimono upgrade. If you have custom presets saved in these files you can replace them back in their folders after an update.

Code Access

Presets can be selected and adjust directly from code. See the "Accessing Presets from Code" section later in this documentation for more information.

Interaction - Adding Splash FX

You can add a number of built-in special visual fx to your game objects, such as splashes, ripples, and sound. These can be attached to a game object and told to activate at certain times, or you can place them directly in your scene either with activation rules or without. The FX_OBJECT system allows you to stack rules, and creat complex interactions for your scene.

SECTION I. ADD FX OBJECT

A. ADD AN FX_OBJECT PREFAB TO YOUR GAME OBJECT
In order for a game object to interact with Suimono water and waves, it needs to have a fx_object prefab attached to it. Go to the Suimono **Prefabs** folder and drag a **fx_object** prefab onto the object you want to have effects (it will become a child-object of that object). Position the fx object where you want the effect to emit from.

B. CHOOSE EFFECT AND SETTINGS
Click on the **Particle Effect** menu-header and choose an effect from the **Particle Effect** drop-down menu, such as "fx_splash". You can then edit how the effect is displayed by changing the settings below...

> **Emit Number** - (random range) How many particles will be emitted at one time.
> **Particle Size** - (random range) Size of the emitted particles.
> **Emission Speed** - Repeating emission rate (in seconds). The lower the number the faster the emission.
> **Directional Speed** - Will add force to the particle along the Y-axis at the specified speed. A setting of "0" turns this off.
> **Emit At Surface** - Will force the particle to admit at the water surface, regardless of the fx_object Y-position.
> **Tint Color** - Changes the overall Color and Alpha of the particle effect.
> **Clamp Rotation** - keeps the particles at the default emitted rotation.
> **Distance Range**- The range in world-units where the fx_object will activate. Outside this range the object is dormant.

C. SET ACTIVATION RULES
In order for an fx_object to initiate an effect, it must meet the set activation rules that you provide. For example you can set a rule to activate when underwater, or to activate when the fx_object (or parent objct) is traveling at a certain speed. You can stack multiple rules together to create complex behaviors. When no activation rules are in place the effect will always emit.

> **ADD A NEW RULE**   - Press the **+ ADD NEW RULE** button to add a new rule to the bottom of the stack, and then select an appropriate rule from the drop-down menu.
> **ADD QUALIFIER**   - Some rules require extra qualifier data to be entered, for example the Object Speed Is Greater rule needs a value added to it in order to operate properly.
> **DELETE A RULE**   - To remove a rule from the list, click the **-** button to the left of the rule.

SECTION II. ADDING SOUND EFFECTS

In addition to the particle effects above, you can also initiate a sound using the same rule system above. This can play either along with a particle effect, or you can have the sound play by itself without emitting any particles.

CHOOSE SOUND AND SETTINGS
Click on the **Audio Effect** menu-header and choose an audio effect using the **Select Audio Sample** panel. You can then edit how the sound effect is played by changing the settings below...

> **Audio Volume Range** - (random range) How loud will the audio effect be played. The right side is full volume.
> **Audio Pitch Range** - (random range) Adjust the pitch of the audio. The middle is default pitch, while higher pitch is to the right and lower pitch is to the left.
> **Audio Repeat Speed** - Speed at which the audio sample will repeat (in seconds).

SECTION III. ADDING CUSTOM EFFECTS   coming soon...

Interaction - Adding Buoyancy

Suimono ships with a built-in buoyancy system that allows you to add water and wave interaction to any of your scene objects. You can add a single buoyancy objects to a game object to add basic buoyancy / floating effects, or you can add multiple buoyancy objects to create more advanced floating interaction as in the case of a boat object.

SECTION I. SET BUOYANCY AND VERTICAL MOVEMENT

A. ADD A BUOYANCY PREFAB TO YOUR GAME OBJECT
In order for a game object to interact with Suimono water and waves, it needs to have a buoyancyObject prefab attached to it, as well as a Unity rigidbody. To add buoyancy to an object, go to the Suimono **Prefabs** folder and drag a **buoyancyObject** prefab onto the object you want to have buoyancy (it will become a child-object of that object).

B. ADJUST CENTER OF BUOYANCY
The location of the buoyancy object will determine the center of buoyancy of the parent object. You can adjust this simply by changing the base-position of the buoyancy object. So for example if you have a small ball object, the center of buoyancy should be in the center of the object. Or if you have a character object the center of buoyancy may be the lungs/chest area. You can also fine-tune the center of buoyancy by using the **Buoyancy Offset** setting.

C. SETUP VERTICAL FORCES
The amount of vertical force can be adjusted on a per-object basis. There are a few attributes which allow you can control the amount of buoyancy that gets applied to the parent object by adjusting the **Buoyancy Strength** attribute. You may also find it necessary to adjust the mass and drag settings on the object rigidbody in order to help fine-tune buoyancy results.

SECTION II. WAVE INTERACTION AND LATERAL MOVEMENT

Note: These features have temporarily been turned off in version 2.1.1

In addition to the typical vertical buoyancy motion above, objects can also inherit the lateral wave motion of a Suimono water surface. This adds a further dynamic where objects can be carried with the motion of the water surface.

To enable these lateral forces on your object, enable the **Inherit Force** option. The bouyancy will then be affected by the wave direction and flow amount of the surrounding water surface. You can then control the amount of lateral motion that is applied by using the settings below.

Force Amount - The amount of lateral force that is applied to an object. The higher this number the more force is applied and the faster your object will move

Force Height Factor - (0.0 - 1.0) This controls how force is applied over the height of the wave. For example when an object is higher up on the wave, more force will be applied, compared to the base of a wave. This setting controls the difference between base and top forces. When this setting is at 0 there will be no difference between base/top forces.
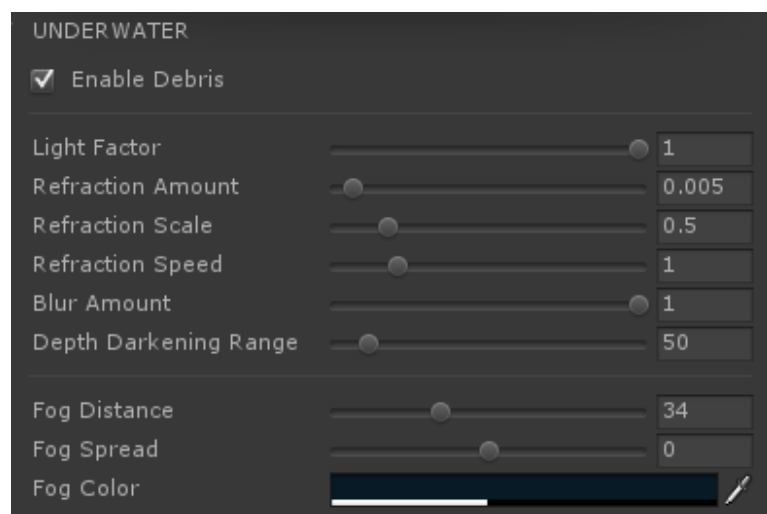
Underwater Rendering

Note: Underwater and Transition Effect Rendering requires the Underwater FX component be added to your camera.

Underwater rendering is initiated automatically when the tracked scene camera goes below the wave height of a Suimono Water Surface. The rendering of the underwater visuals are determined by the settings on that specific water surface, so you can have different underwater rendering for different water surfaces.

UNDERWATER RENDERING SETTINGS

Underwater rendering is enabled by default, and is controlled by the **SUIMONO_Surface** object under the **Underwater** settings panel. For a full description of each setting, please refer to the "Underwater" section of the Components Reference later in this documentation.

If you wish to turn off underwater rendering you can do so on the **SUIMONO_Module** object by unchecking the **Enable Underwater FX** option.
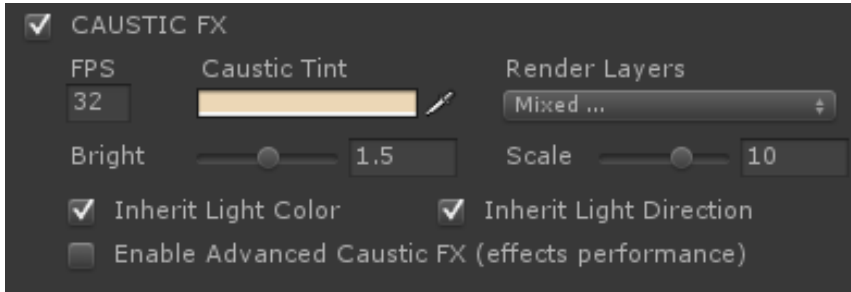
SCREEN TRANSITION EFFECTS

Transition Effect refer to a watery screen "wipe" effect and also water droplets that appear automatically when you move from underneath a water surface to above a water surface.

If you wish to turn off the transition effects you can do so on the **SUIMONO_Module** object by unchecking the **Enable Transition FX** option. Currently transition effects can only be enabled and disabled globally for all surfaces. In a future update there will be the option of enabling/disabling these effects on a per-surface basis.

Caustics Handling

Suimono displays underwater "caustic" effects, which mimic the refraction and dispersal of light rays entering a water surface that subsequently get concentrated and projected against underwater objects. The effect adds a good deal of dynamism and immersion to underwater scenes. The Suimono caustic system uses a Unity light with an animated occlusion texture to cast the effect against scene objects.

NOTE: For more realistic caustic rendering, based on light angle and color, you should place your main scene directional light in the SuimonoModule "Scene Light Object" slot. If Suimono doesn't have a link to your scene light object then caustics will be projected at 90 degrees, and won't adjust to different lighting conditions.

SECTION I. AUTOMATIC CAUSTIC EFFECT SETUP

A. TURNING CAUSTICS ON AND OFF
The caustics system is enabled in your scene by default. Most caustic settings can be accessed by going to the Suimono_Module object under 'Advanced Water Settings. The caustics system can be turned on or off using the "Caustic Effect" check-box option. Alternatively, you can enable/disable caustics for specific water surface by going to the Suimono Surface object and clicking the "enable caustic effects" option.

B. CAUSTICS BRIGHTNESS AND SCENE LIGHTING
In darker scenes (or at night for example) it may be desirable to turn-down the brightness of the caustic effect. You can do this manually by changing the "Caustic Tint" color, to either be a different hue or a different brightness value. Suimono will also modulate the brightness of the caustics based on the overall lighting in your scene, however this is turned off by default. To enable this, drag your main scene light object onto the "Scene Light Object" slot.

C. SCENE LAYER SELECTION
It may be desirable to exclude certain game object layers from displaying caustics (for performance reasons). You can pick which game layers render caustics by selecting them in the "Use These Layers" drop-down menu.
NOTE: In deferred rendering you can only specify up to 4 exclusion layers without Unity showing caution errors.

D. ADVANCED CAUSTIC FX
Enabling the 'Advanced Caustic FX' option allows some additional controls over the caustic lighting, on a per-surface basis. This will allow you to adjust the color of the caustics on the surface level, as well as adjusting the edge falloff.

SECTION II. PERFORMANCE CONSIDERATIONS
Performance of the caustic function can be demanding in some scenes and on some computer configurations. To increase performance, you can reduce the number of project layers the caustics display on, or you can disable the advanced caustic effects option.

Shoreline Handling

In Suimono 2.1.1 there is a new method for generating shoreline data, via the usage of the new ShorelineObject component. This component generates a depth map of your scene, then passes this data to the water surface which utilizes it to generate different shoreline effects, such as waves and foam.

You can have as many ShorelineObjects in your scene as you feel necessary. In some cases it may be desireable to setup multiple objects, for example a large sene with multiple islands may have a single shorelineObject for each island terrain.

SECTION I. SETTING UP SHORELINE OBJECTS

A. Add a ShorellineObject to your scene
Drag a **ShorelineObject** object from the /PREFABS folder into your scene. Drag the SuimonoSurface object you want this ShorelineObject to effect onto the object's **Attach To Surface** slot.

B. Position ShorelineObject
Click the DebugMode checkbox in order to see a preview of the depth generation. Now position and/or rotate and scale the shoreline Object to completely encapsulate the terrain and objects you want shorelin generated against.

C. Adjust Depth Settings
With the preview showing you can adjust the **Depth Range** setting which displays as the red channel on the preview. The Depth corresponds to where 3d waves will generate on this surface.

Secondly you can adjust the **Shore Range** setting which displays as the green channel in the preview. This corresponds to where foam will generate on the surface.

Finally you can change which project layers get factored into depth calculation. Typically this should be set to layers that contain objects underneath your water, such as your terrain layer, however you usually want to avoid objects that will be moving around your scene (boats for example).

When you are happy with the settings, un-check the Debug Mode setting.

SECTION II. ADJUSTING SURFACE SHORELINE SETTINGS

With your shoreline objects setup and positioned, you can adjust the settings on your SuimonoSurface object. Note that these adjustments are only visible while your scene is playing. It's recommended to play your scene, adjust the shoreline settings and then save a new preset with these settings once you're satisfied witht he visuals.

Using Custom Textures

Suimono uses it's own built-in textures by default. However if you would like to replace the textures on your water surface with your own custom textures, you can do so by following the instructions below.

SECTION I. REPLACING TEXTURES ON A SINGLE WATER SURFACE

A. USING A CUSTOM CUBEMAP FOR REFLECTIONS
Suimono is setup to use dynamic reflections by default, but if you'd like to use cubemap reflections instead, either for performance reasons, or to fit into your current scene better, follow the instructions below to setup a specific water surface with your custom cubemap texture.

1) On your SUIMONO_Surface game object, disable the **Enable Dynamic Reflections** option.
2) On your SUIMONO_Surface game object, switch the **Fallback Mode** to be **Custom Cubemap**.
3) Drag your custom cubemap texture onto the texture slot.

B. USING A CUSTOM NORMAL MAP / HEIGHT MAP FOR WAVES
Suimono calculates it's waves by using both an RGB Normals Texture for lighting information, as well as a greyscale Height Texture for the 3D wave offset information. These two textures should be authored so they correspond with each other. By default Suimono uses three different sets of textures in order to generate a combined wave effect.

1) On your SUIMONO_Surface game object, enable the **Custom Textures** option.
2) Drag your custom RGB Normal texture onto the **Normals** texture slot.
3) Drag your custom Greyscale Height texture onto the **Heightmap** texture slot.

Using Custom Meshes

Suimono uses it's own built-in water surface mesh by default. However the water mesh can be replaced by your own custom mesh in order to render water areas of a specific shape, or river systems for example. If you would like to replace the mesh on your surface with your own custom mesh, you can do so by following the instructions below.

A NOTE ABOUT INFINITE OCEAN SETTING
The infinite Ocean setting built into Suimono has been tuned to work specifically with the built-in mesh that comes with Suimono. It's recommended to not use custom meshes with this setting as it is likely to break the ocean rendering.

SECTION I. PREPARING YOUR MESH

OPTION A - IMPORT A CUSTOM MESH INTO UNITY
Suimono can use any mesh object imported into Unity. This can be made in the external 3D authoring program of your choice but ther are a few points to keep in mind when authoring and importing these meshes.

UV Layout - Suimono expects meshes to have their UV coordinates layed out onto the mesh in a top-down
planar orientation. Using other UV layouts will likely break proper rendering of the water surface.
Normals and Tangents - Suimono surfaces require normals and tangents to be imported/calculated on the mesh
object. Suimono shaders will not render properly otherwsie.

OPTION B - USE A 3RD-PARTY TOOL TO CREATE A MESH INSIDE UNITY
You can also use 3rd-party Unity tools to author custom meshes. The river objects included in the Advanced demo were created directly in the scene using ProBuilder, however any mesh-building tool should work.

Save Custom Mesh as an Object
Once you have a custom mesh object in your scene, you need to save it as a mesh object in your project before you can use it with Suimono. In the Suimono **SCRIPTS** folder there is a script file called **utility_SaveMesh** which will save a scene mesh as a project mesh. Simply attach this component to your mesh object, enter a name in the **Use Name** field, and press the **Save Asset** option. A new mesh object should be created in the Suimono **MESH** folder.

SECTION II. REPLACE THE DEFAULT SUIMONO MESH

A. IMPORT A CUSTOM MESH INTO SUIMONO
Once you have a custom mesh saved in your project from section I. you are ready to use this mesh in Suimono.

1) On your **SUIMONO_Surface** object click on the **Custom Mesh** option.
2) Drag your custom Mesh onto the **Mesh** slot.

Programming and Functions

NOTE: AS of Suimono Version 2.1.2 all components have been rewritten in C#!   Suimono components are now contained under the **Suimono.Core** namespace. Make sure to update your code accordingly!

A number of Suimono functions can be accessed via code in order to perform advanced functions outside of the built-in Suimono functionality. The below guide will give you a number of examples of how to access raw system data for use in your coding projects.

INTRODUCTION I. Referencing the Suimono Module object

Most of the functions listed below first require you to locate the main **SUIMONO_Module** object that is located in your scene. It's best to locate this object once and store a reference to it that you can continually access later. In the below example code, we make a global variable reference, and then do a search to locate the module in the Start() function. Note that in c# (Suimono 2.1.2 and higher) you need to locate the Suimno Module under the Suimono.Core namespace.

```
Suimono.Core.SuimonoModule moduleObject;

void Start(){
        moduleObject = GameObject.Find("SUIMONO_Module").gameObject.GetComponent<Suimono.Core.SuimonoModule>();
}
```

Once you've stored this reference to the SUIMONO-Module object, you can then use it later in your code to access built-in functions and variables. The code examples below assume that you've already made this reference elsewhere in the same script file.

INTRODUCTION II. Referencing the Suimono Surface object

Some of the functions listed below first require you to locate a specific **SUIMONO_Surface** object that is located in your scene. It's best to locate this object once and store a reference to it that you can continually access later. In the below example code, we make a global variable reference, and then do a search to locate the surface in the Start() function. Note that in c# (Suimono 2.1.2 and higher) you need to locate the Suimno Object under the Suimono.Core namespace.

```
Suimono.Core.SuimonoObject surfaceObject;

void Start(){
        surfaceObject = GameObject.Find("SUIMONO_Surface").gameObject.GetComponent<Suimono.Core.SuimonoObject>();
}
```

Note: In the above example we are pretending to find a specific game object called "SUIMONO_Surface" in our scene. You may need to alter the code in quotes to locate a specific object in your scene that has a different name. Also if you have multiple SUIMONO_Surface objects with the same name, you should give them each uniquely identifying names.

Once you've stored this reference to the SUIMONO_Surface object, you can then use it later in your code to access built-in functions and variables. Some of the code examples below assume that you've already made this reference elsewhere in the same script file.

Programming and Functions

NOTE: AS of Suimono Version 2.1.2 all components have been rewritten in C#!   Suimono components are now contained under the **Suimono.Core** namespace. Make sure to update your code accordingly!

FUNCTION SuimonoGetHeight();

public float SuimonoGetHeight(Vector3 position , string returnMode);

Access specific water surface data at a specific point in world-space. This function calculates and returns the given function name at the given Vector3 position.

```
Vector3 testPosition;
float waterHeight;

testPosition = this.transform.position;
waterHeight = moduleObject.SuimonoGetHeight(testPosition,"height");
```

returnMode : String
You can specify different a returnMode depending on the type of data you're looking for. Below are the currently available calculations that are currently built-in to Suimono. If you're looking for a calculation that can't be extrapolated from below send us an email and let us know.

"height" - Returns the height position of a wave in relation to the water position.
"surfaceLevel" - Returns the overall world-height position of a wave.
"baseLevel" - Returns the world-height position of the water surface.
"object depth" - Returns the depth of the passed position. A returned value of 1.0 will be 1.0 units below a wave.
"isOverWater" - Checks whether the given position is above a water surface. 1.0 = yes, 0.0 = no.
"isAtSurface" - Checks whether the given position is near the surface. 1.0 = yes, 0.0 = no.
"direction" - the direction in degrees that the water surface is flowing.
"speed" - the speed that the water surface is flowing.
"wave height" - Returns a normalized wave height value. 1.0 = the highest a wave can be, 0.0 is the base water height.
"transitionDepth" - Returns the transition depth of the camera.
"underwaterEnabled" - Returns whether local underwater effects are enabled, where 1.0=on and 0.0=off. (new in 2.1)
"causticsEnabled" - Returns whether local caustic effects are enabled, where 1.0=on and 0.0=off. (new in 2.1)

Programming and Functions

NOTE: AS of Suimono Version 2.1.2 all components have been rewritten in C#!   Suimono components are now contained under the **Suimono.Core** namespace. Make sure to update your code accordingly!

FUNCTION SuimonoGetHeightAll();

public float[ ] SuimonoGetHeightAll(Vector3 position);

Access all water surface data at a specific point in world-space. This function is very similar to SuimonoGetHeight() except that instead of calculating only one function at a time, this function calculates all available functions and returns them in an accessible float array. This is much more performance friendly if you need to access multiple variables at the same time.

```
Vector3 testPosition;
float waveHeight;
float waterHeight;
float isOverWater;
float[] heightData];

testPosition = this.transform.position;
heightData = moduleObject.SuimonoGetHeightAll(testPosition);

waveHeight = heightData[1];
waterHeight = heightData[2];
isOverWater= heightData[4];
```

Returned Data Array - float[]

The returned data is stored in a float array. You can access each individual calculation by specifying the corresponding position in the array. Below are the currently available calculations that are currently built-in to Suimono. If you're looking for a calculation that can't be extrapolated from below send us an email and let us know.

[0] = **"height"** - Returns the height position of a wave in relation to the water position.
[1] = **"surfaceLevel"** - Returns the overall world-height position of a wave.
[2] = **"baseLevel"** - Returns the world-height position of the water surface.
[3] = **"object depth"** - Returns the depth of the passed position. A returned value of 1.0 will be 1.0 units below a wave.
[4] = **"isOverWater"** - Checks whether the given position is above a water surface. 1.0 = yes, 0.0 = no.
[5] = **"isAtSurface"** - Checks whether the given position is near the surface. 1.0 = yes, 0.0 = no.
[6] = **"direction"** - the direction in degrees that the water surface is flowing.
[7] = **"speed"** - the speed that the water surface is flowing.
[8] = **"wave height"** - Returns a normalized wave height value. 1.0 = the highest wave point, 0.0 is the base water height.
[9] = **"transitionDepth"** - Returns the transition depth of the camera.
[10] = **"underwaterEnabled"** - Returns whether underwater effects are enabled, where 1.0=on and 0.0=off. (new in 2.1)
[11] = **"causticsEnabled"** - Returns whether local caustic effects are enabled, where 1.0=on and 0.0=off. (new in 2.1)

Programming and Functions

NOTE: AS of Suimono Version 2.1.2 all components have been rewritten in C#! Suimono components are now contained under the **Suimono.Core** namespace. Make sure to update your code accordingly!

FUNCTION SuimonoConvertAngleToVector();

public Vector2 SuimonoConvertAngleToVector(float convertAngle);

This is a helper-function which allows you to convert data given in degrees, into a 2D Unity Vector2 direction. Specifically in Suimono it's helpful to convert the flow direction of a water surface from the input data into a direction that can be used against a 3D object.

```
float waterDirDegrees;
Vector3 testPosition;
Vector2 waterDirVector;

testPosition = this.transform.position;
waterDirDegrees = moduleObject.SuimonoGetHeight(testPosition,"height");
waterDirVector = moduleObject.SuimonoConvertAngleToVector(waterDirDegrees);
```

Programming and Functions

NOTE: AS of Suimono Version 2.1.2 all components have been rewritten in C#!   Suimono components are now contained under the **Suimono.Core** namespace. Make sure to update your code accordingly!

ACCESSING PRESETS FROM CODE
It's possible to access the built-in Suimono preset system from code. This can be useful to specifically set water settings at different times from inside your running project.

FUNCTION SuimonoSetPreset();
public void SuimonoSetPreset(string **foldername** , string **presetname**);

This will explicitly set a preset on the specified Suimono surface object, using the given folder and file names.

```
string useFolder = "Built-In Presets";
string usePreset = "Blue Ocean with Waves";

surfaceObject.SuimonoSetPreset(useFolder,usePreset);
```

ACCESSING THE SUIMONO TRACKING CAMERA
NOTE: **In order to set the tracking camera in code the Module's 'Camera Mode' needs to be set to 'Manual Select Camera'.**

In some cases it's desirable to access and change the Suimono tracking camera variable while your scene is playing, instead of just setting it at the beginning from the inspector. After accessing the Suimono Module above you can directly access and change the camera that Suimono uses to track around the scene.

```
Transform useCamera;

void LateUpdate () {
    if (moduleObject != null){
        if (useCamera != null){
            moduleObject.manualCamera = useCamera;
        }
    }
}
```
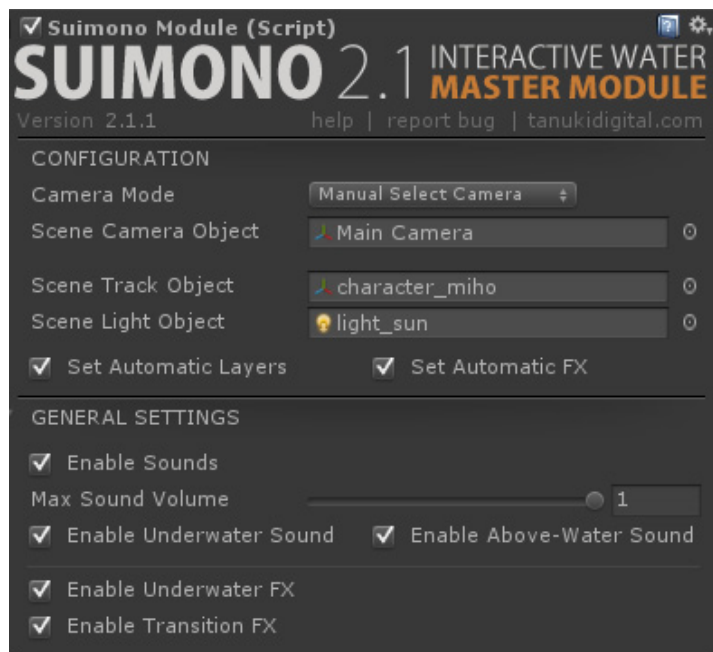
manualCamera (Transform) - Get or set the current camera tracked by the Suimono system.

Programming and Functions

CHANGING WATER SPEED AND DIRECTION

Coming Soon!

COMPONENTS REFERENCE - SUIMONO MODULE

The Suimono Module component is the "MASTER" Module for all other Suimono Water Surfaces and components.

It handles all the behind the scenes calculations of the Suimono system. It also supplies a few global variables and settings which are applied to all Suimono Surface Objects.

It's required to have one SuimonoModule object in each scene that you want to run Suimono in.

Camera Mode New in Version 2.1.1	Sets the Suimono Camera Mode between either Automatic detection or manual selection. When set to automatic it will locate the current scene camera with the 'MainCamera' tag.
Scene Camera Object	(in Manual Mode) Suimono tracks the camera object specified here in order to determine when to switch between underwater, and above water scenes. By default (if this field is left blank).
Scene Track Object	By default, this will use the same object as the Scene Camera Object, but you can also assign a separate object to track for other effects, like the automated caustic's system. For example in a third person game, where the player object and camera are actually in different positions it's helpful to assign the player object here instead of the camera.
Suimono Light Object	Add your main scene directional light here. This helps to calculate more realistic scene-based caustic effects using the light color and direction.

GENERAL SETTINGS

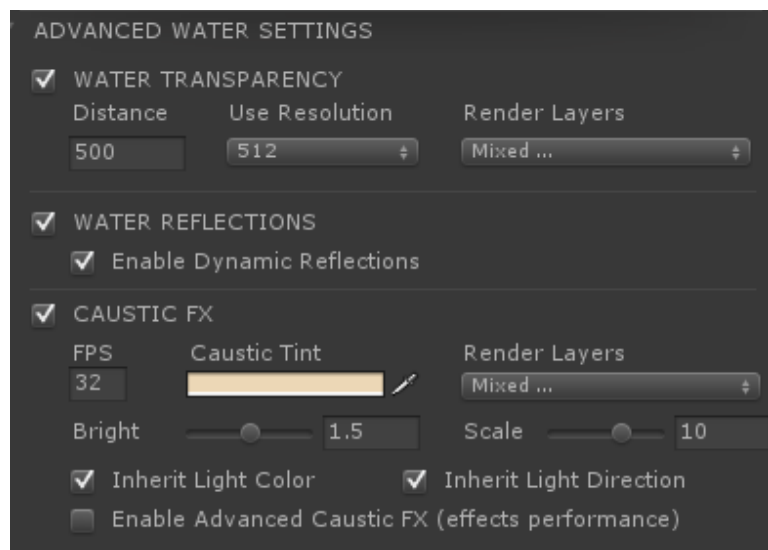|	
Enable Sounds	Enables / disables all Suimono splash sounds.
Max Sound Volume	Set the Suimono Splash sounds to be louder or softer. 1 is full sound while 0 is off.
Enable Underwater Sound	Enable / disable underwater sound effects.
Enable Aboverwater Sound	Enable / disable underwater sound effects.
Enable Underwater FX	Enable / disable underwater switching and FX for all Water Surfaces in the scene.
Enable Underwater FX	Enable / disable water transition FX for all Water Surfaces in the scene.

COMPONENTS REFERENCE - SUIMONO MODULE (continued...)

ADVANCED WATER SETTINGS

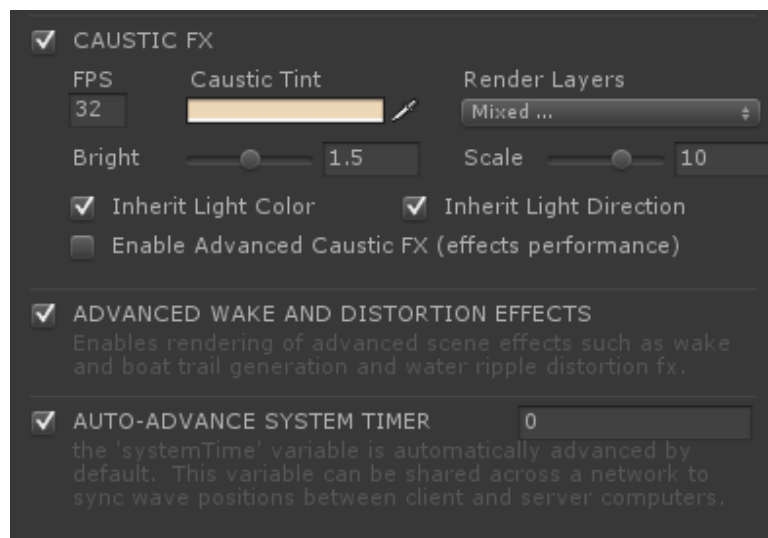|	
Water Transparency	The Transparency function captures your scene before water surfaces are rendered in order to overlay transparent effects. If transparency is disabled then all water surfaces will revert to a corresponding opaque color.
Distance	This renders transparency only to a certain distance from the camera. This is useful for optimizing the performance impact of the transparency function.
Use Resolution	Choose the resolution that th transparency is captured at. A lower resolution will perform better, but will come will contain resolution artifacts as well.
Render Layers	Set the specific game layers to render in transparency. You should choose any objects that would be underneath the water surface.
Water Reflections	Enable/Disable Reflections for all surfaces.
Enable Dynamic Reflections	Will enable/disable the use of Dynamic reflections on all water surfaces in your scene. This setting will override any individual surface reflections settings you may have set. Specific reflection settings and optimizations can be done on each Surface object.

COMPONENTS REFERENCE - SUIMONO MODULE (continued...)

ADVANCED WATER SETTINGS (continued...)

Caustic FX	The Caustic FX function casts caustic fx on all specified object layers underneath your water surface.
FPS	At what rate does the caustic texture cycle. A slower fps will give a slower animation rate.
Caustic Tint	Choose the resolution that th transparency is captured at. A lower resolution will perform better, but will come will contain resolution artifacts as well.
Render Layers	Set the specific game layers to render caustics. You should choose any objects that would be underneath the water surface.
Inherit Light Col	If the scene light object is specified, this setting will adjust the caustic color by the light input.
Inherit Light Dir	If the scene light object is specified, this setting will adjust the caustic direction by the light input.
Enable Advanced Caustic FX	Enable/Disable the rendering of advanced caustic composition effects, editable on each Surface. Includes specific color tinting and edge fade blending. This feature causes a performance impact and is recommended to be disabled if you are experiencing performance trouble.
Advanced Wake and Distortion Effects	Enables/Disables generation of wake and surface distortion effects (splashes/ripples etc.). These are rendered in a separate render buffer. This function isn't generally too hard on performance but should be disabled if you experience trouble.
Auto-Advance System Timer	Enables/Disables auto advancing timer. This should generally be left enabled, but is useful in a server-->client setup to specifically control timing over a network. Disabling this and advancing the Suimono timer from the server can help synchronize water visuals to the client computers.

SUIMONO MODULE LIB

The SUIMONO_Module game object has a secondary component called Suimono_Module_Lib. This is essentially a library component populated with the default normal maps and texture ramps that are provided to the water surface objects by default. It also contains references to the various shader files in the Suimono system. In normal use you won't need to worry about these object libraries, as they are mainly included simply as a convenience to some underlying sub systems, and insure proper behavior on exporting builds.

COMPONENTS REFERENCE - SUIMONO SURFACE - Overview

The Suimono Surface Object drives the actual water surface rendering.

It includes a number of options to control the functions and visuals of the water surface. Each water surface in your scene should have it's own SuimonoObject component applied to it.

Mode	Simple / Advanced. If set to simple, Suimono displays a truncated list of customization options.
General Settings	Controls overall general settings such as scale, flow direction and speed.
Wave Settings	Control 3D wave scaling and height.
Shoreline Settings	Control dimension and frequency of shoreling wave effects.
Water Surface	Control various surface visuals including specular, and reflection calculations as well as surface and depth color spread.
Foam & Edge	Set edge and height foam properties.
Underwater	Change underwater blur, fogging, color and other settings.
Preset Manager	Automated preset loading and saving.

CHILD OBJECT - Suimono_Object   Required

TThis is the main water surface module and holds the mesh, collider, and renderer for the water surface. This is object is required for all Suimono water surfaces.
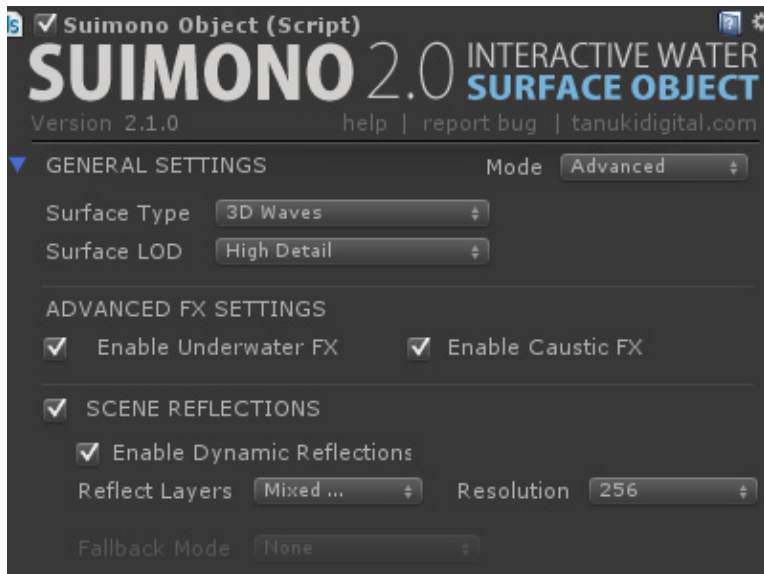
CHILD OBJECT - Suimono_ScaleObject   Optional

The Suimono_ScaleObject is an optional object which calculates an expanded ocean view while in Infinite Ocean mode.

**CHILD OBJECT - cam_LocalReflections**   Optional

The Reflection_Object is an optional object which calculates realtime reflection texture and feeds it to the main water shader. This process is inherently performance heavy, and can either be disabled or removed completely.

COMPONENTS REFERENCE - SUIMONO SURFACE - General Settings

Mode	Enable **Advanced** (default) or **Simple** editor mode. Simple mode gives quick access to the most useful color and attributes, and is recommended for those new to Suimono.
Surface Type	**Infinite 3D Ocean** - adds 3D wave and tessellation functions to the water surface, and handles scaling and movement automatically for an infinite ocean effect. In Scene view this setting does not expand to the horizon until you press play. Also note, that this surface type cannot be rotated!
	3D Waves - adds 3D wave and tessellation functions to the water surface.
	Flat Plane - Use only flat plane based water. Best used for calm stretches such as pond.
Ocean Scale	Manages the scale of the near ocean plane, making it larger or smaller accordingly. Useful to adjust how far in the distance the hi-res ocean blends into the lo-res ocean. For high values you may need to increase tessellation values to compensate with more mesh detail.
Surface LOD	You can choose the mesh Level-of-detail which controls the triangle density of the water surface mesh. Higher detail levels will look better with 3d waves, but are more performance intensive.
	High Detail - 5000 tris, **Medium Detail** - 512 tris, **Low Detail** - 32 tris, **Single Quad** - 2 tris
Enable Underwater FX	Enable/Disable underwater FX on this water surface.
Enable Caustic FX	Enable/Disable caustic FX on this water surface.
Scene Reflections	Enable/Disable dynamic scene reflections on this water surface. When disabled, reflections will fallback to a static cubemap texture for reflections.
	Reflect Layers - Choose which game layers are rendered in the reflection.
	Resolution - Choose the resolution size of the reflection rendering. Higher values are crisper, but degrade performance.
	Fallback Mode - Choose an alternative reflection method when dynamic reflections are disabled.
	NONE - turns off reflections for this surface
	Skybox - uses scene skybox for reflections (image based skyboxes only)
	Cubemap - define a cubemap texture to use as reflections.
	Color - use a solid color for reflections.

COMPONENTS REFERENCE - SUIMONO SURFACE - Tessellation DX11
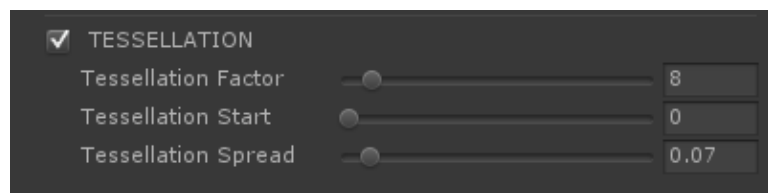
Tessellation allows low resolution water meshes to display more realistic wave effects by "filling-in" extra mesh detail (at the cost of some performance overhead)/

This effectively turns a low-resolution / high-performance mesh, into a high-resolution/ high-performance mesh.

**Tessellation Factor**   Amount of Tessellation detail applied to the mesh.

Tessellation Start   Relative to the view camera, position at which tessellation reaches it's max detail level.

Tessellation Spread   Relative to the view camera, how far does tessellation get applied. It's useful to set your spread distance first, and then to increase the Tessellation Factor until you have the detail amount you want.

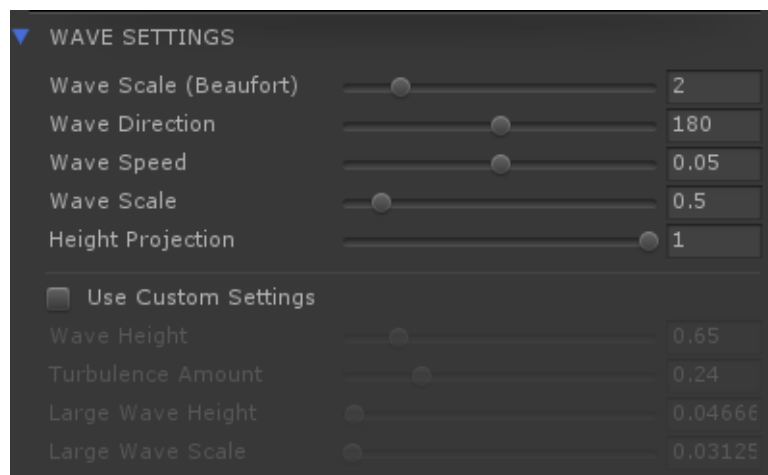## COMPONENTS REFERENCE - SUIMONO SURFACE - Customization
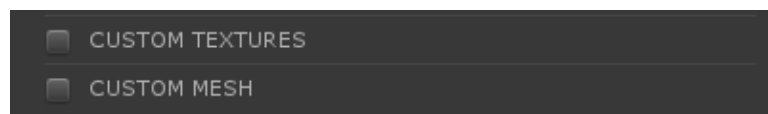
Custom Textures   Replace the wave surface height and normal textures on this water surface.
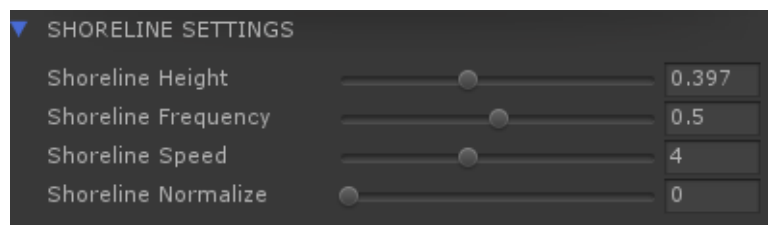
Custom Mesh   Change this water surface to use a custom mesh object.

# COMPONENTS REFERENCE - SUIMONO SURFACE - 3D Wave Settings

Wave Scale (Beaufort)   Controls the height of waves based on Beaufort Wave/Wind scale.
Wave Direction   Controls the flow direction of water waves, foam, and distortion. Set in degrees from 0 - 360.
Wave Speed   Wave flow speed, based on the flow direction.
Wave Scale   Overall frequency of waves.
Height Projection   The Amount of height displayed by the 3d waves. A value of 0 will be a flat surface.

Use Custom Settings   Overrides the Beaufort model above to allow more direct wave customization.
Wave Height   Set the height of waves.
Turbulence Amount   Set the turbulence (or chaoticness) of the wave rendering.
Large Wave Height   Set the height of large rolling waves.
**Large Wave Scale**   Set the frequency scale of large rolling waves.

Note: Shoreline Settings are influenced by a depth texture calculated by a scene ShorelineObject. If you don't have a ShorelineObject setup in your scene you will not see shoreline wave effects.

Shoreline Height   Sets the height value of waves as they move toward the shoreline
Shoreline Frequency   Sets the scaling factor of shoreline waves, the higher the noumber the more waves will generate.
ShorelineSpeed   Sets the speed at which shoreline waves move toward the shore.
Shoreline Normalize   Normalizes the height of deep and detail waves down to 0 as they approach the shoreline.

# COMPONENTS REFERENCE – SUIMONO SURFACE – Water Surface
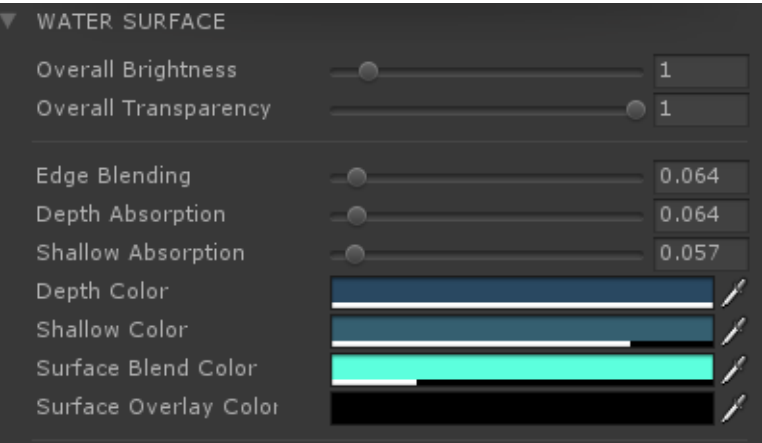
|	
Overall Brightness	Brighten or darken the overall water surface.
Overall Transparency	Overall Transparency of the water surface.
Edge Blend	Fades the depth rendering to transparent at the surface edge.
Depth Absorption	Controls the overall depth color spread of water surface, effectively making the water surface more or less transparent over it's depth. There are two depth color values (see below).
Shallow Absorption	Controls the depth color spread of shallow water areas, effectively making the water surface more or less transparent over it's depth. There are two depth color values (see below).
Depth Color	Changes the water surface color based on the depth value above.
Shallow Color	Changes the water surface color based on the shallow value above.
Surface Blend Color	Tints the water surface (rgb) by the alpha value (a).
Surface Overlay Color	Tints the water color by overlaying a value (rgb) over the top, by the alpha value (a).
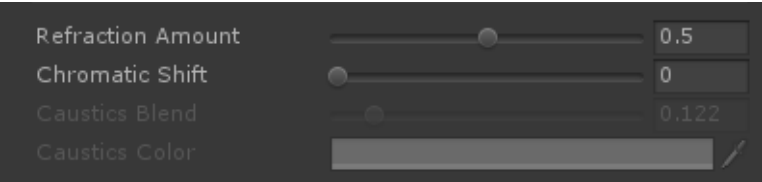
Refraction Amount	Amount of distortion the water calculates (based on wave amounts).
Chromatic Shift	Emulates caustic wavelength distortion effects due to water refraction.
Caustics Blend	Amount of edge fading for caustics (requires Advanced caustic effects to be enabled on Module).
Caustics Color	Surface-specific caustic color tinting (requires Advanced caustic effects to be enabled on Module).

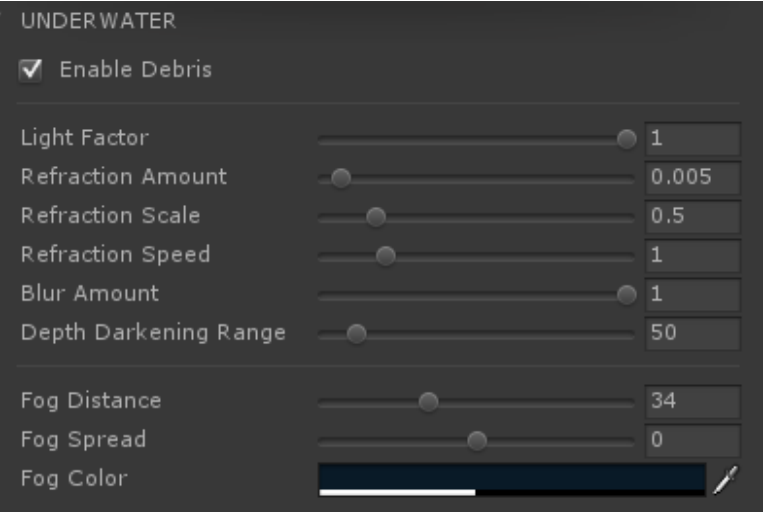## COMPONENTS REFERENCE - SUIMONO SURFACE - Water Surface (cont...)
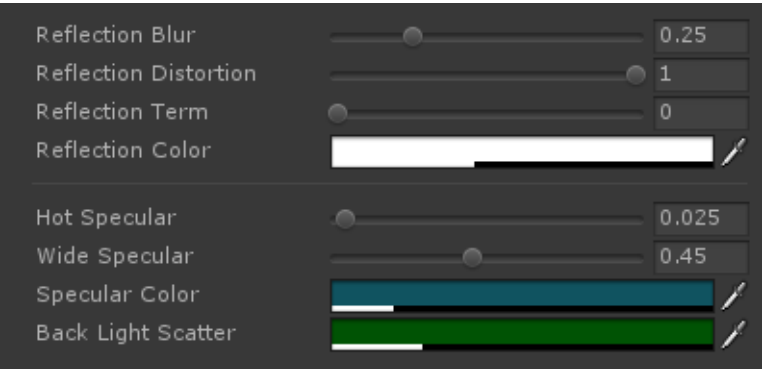
Reflection Blur	Sets how much blur is applied to reflection calculation.
Reflection Distortion	Sets the amount of refractive distortion applied to reflections (based on wave settings).
Reflection Term	Reflective coefficient of the water surface. Higher values make a more mirror-like surface.
Reflection Color	Color applied to reflections (rgb) tinted by the alpha value (a).
Hot Specular	light reflective specular coefficient. Inherits light color.
Wide specular	Secondary 'dull' specular coefficient.
Specular Color	Color of Wide Specular contribution.
Back Light Scatter	Color of back-light contributed to water (based on wave settings).

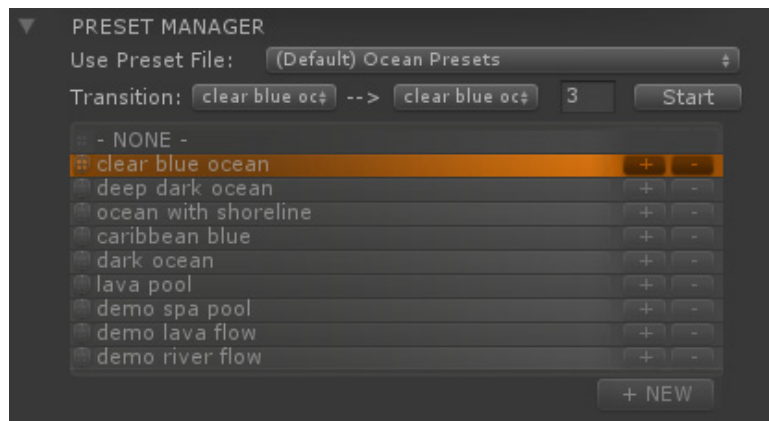## COMPONENTS REFERENCE - SUIMONO SURFACE - Foam & Edge
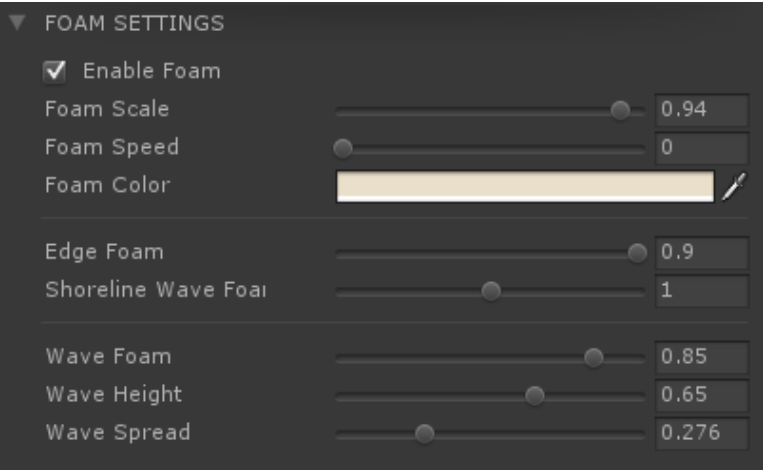
Enable Foam	Enable/Disable foam rendering.
Foam Scale	Controls the visual scale of the foam and how large it appears.
Foam Speed	Overall Speed of the foam in relation to the Flow Speed. Setting this to 1.0 moves the foam at the same speed as Flow Speed. Setting this to 0makes the foam stand still.
Foam Color	Color tint and alpha value for all foam.
Edge Foam	How much foam get's applied to the edge of intersecting objects.
Shoreline Wave Foam	How much foam get's applied to shoreline waves.
Wave Foam	Height Foam for waves. Controls amount of foam contribution
Wave Height	The vertical distance in which the height wave foam fades in.
Wave Spread	Controls how much of the wave gets foam contribution.

COMPONENTS REFERENCE - SUIMONO SURFACE - Underwater
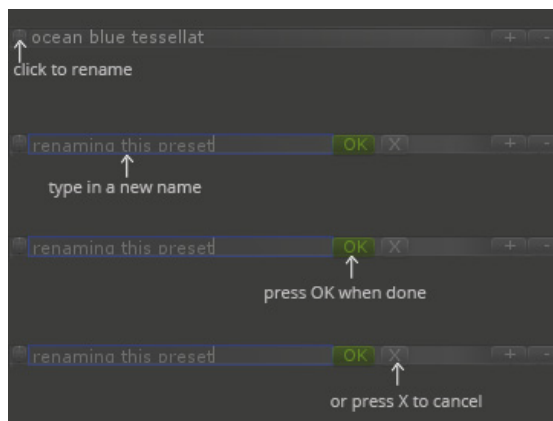

Enable Debris	Applies underwater debris particle effects on this water surface.
Light Factor	Overall Brightness shift for underwater view.
Refraction Amount	How much refraction is applied to the overall underwater view. This is sometimes a controversial effect because t is not in any way based on reality. Being immersed in a water volume would never show you a refraction effect in real life physics terms, however this is a very interesting artistic device to give players an illusion of being immersed in water.
Refraction Scale	The overall scale of the Refraction effect.
Refraction Speed	The scrolling speed of the Refraction effect.
Blur Amount	Depth blur of the underwater environment.
Depth Darkening Range	Depth setting (in meters) that the underwater scene darkening fades in.
Fog Distance	The fade distance of the underwater fog. Controls the distance at which the fog is initiated.
Fog Spread	Controls the perceived thickness of the underwater fog. How dense does it appear and how much distance before the fog becomes opaque?
Fog Color	Tint Color of alpha strength of the underwater fog specifically for this water surface. This also effects the color of the Backscatter lighting effect when above the water surface.

COMPONENTS REFERENCE - SUIMONO SURFACE - Presets

Automatic Preset Manager

Renaming a Preset

The preset manager is a panel for completely automating the saving and loading of presets.

Use Preset File
You can select presets from multiple preset files.
These files are located under the Suimono 2 - Water System 2 / resources folder.

Transition a Preset
You can transition from one preset to another at the specified time interval. Select the "from" preset at the right and the "to" preset at the left, then specify the given number of seconds the transition should occur, and press start.

Select a Preset
You can apply a new preset simply by clicking on it's name in the list.

Add a new Preset
Click the "+ New" button at the bottom of the list. This will create a new preset with the current values and settings in your SuimonoObject.

Delete a Preset
Click the "-" button at the far right of the preset. Warning: there is no confirmation, presets are deleted immediately.

Rename a Preset
Click the small button to the immediate left of the name. Then fill in the new name and press th OK button. You can press the X button to cancel instead. See the above image for details.

Update a Preset
Click the "+" button to the far right of the preset name. This will over-write any settings in this preset with your current settings.

Duplicating a Preset
There isn't a specific button for duplicating a preset, however you can click on the preset you want to make a copy of and this will load those settings into memory. then you can click the "+ New" button at the bottom and this will write those settings to a new preset, essentially making a duplicate. You can then edit the settings as you see fit and press the"+" button next to your new preset to make small adjustments.

COMPONENTS REFERENCE - SUIMONO MODULE - FX MODULE

This component registers all particle fx used in Suimono (such as splashes, boat wakes, etc). You can even create your own particle fx and add them into the registry.

MORE DETAILS COMING SOON!

COMPONENTS REFERENCE - FX OBJECT

FX Objects can be placed anywhere in your scene or attached as child objects to other objects. You can select both a particle effect (see the fx module) and/ or an audio effect and then supply rules on how and when they operate.

MORE DETAILS COMING SOON!

COMPONENTS REFERENCE - CAUSTIC OBJECT

MORE DETAILS COMING SOON!