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SUPPORTED UNITY VERSION

Unity 4 (only pro version) and Unity 5 (free and pro version)

SUPPORTED RENDERING PATH

VertexLit (only unity4), forward and deffered rendering.

SUPPORTED API

DirectX 9, DirectX 11, openGL.

WATER SUPPORT (MOBILE VERSION).

SUPPORTED UNITY VERSION

Unity 4 (only pro version) and Unity 5 (free and pro version)

SUPPORTED RENDERING PATH

VertexLit (only unity4), forward and deffered rendering.

SUPPORTED API

OpenGL ES 2.0, OpenGL ES 3.0+, DirectX 9, DirectX 11, openGL.

QUICK-START FOR PC PLATFORM.

The pc water prefabs (sea, lake, pool, river) you can find in the folder "RealisticWater / Prefabs / Water / PC"

1) Drag and drop any prefab into your scene.
2) If you need an infinite water (like the ocean), open prefab water in the hierarchy, select the object "River / Sea / Lake -> Water" and the script "MoveWaterToCamera" for “current camera” set your main camera or any object that you assigned to the camera . (Character, ship, etc.)

For more detailed settings (color, caustic, scale, etc.), read the description below.

QUICK-START FOR MOBILE PLATFORM.

The mobile water prefabs you can find in the folder "RealisticWater / Prefabs / Water / Mobile"

1) Drag and drop any prefab into your scene.
2) If you need an infinite water (like the ocean), open prefab water in the hierarchy, select the object "Sea -> Water", activate the script "MoveWaterToCamera" and for “current camera” set your main camera or any object that you assigned to the camera. (Character, ship, etc.)
3) For editor mode you should set the defered rendering. (otherwise in the editor mode, the image will flipped).
Editor->ProjectSettings->Player->SettingsForPC(The second tab)->OtherSettings->RenderingPath->Deffered(or LegacyDeffered).

For more detailed settings (color, caustic, scale, etc.), read the description below.

DEMO SCENES

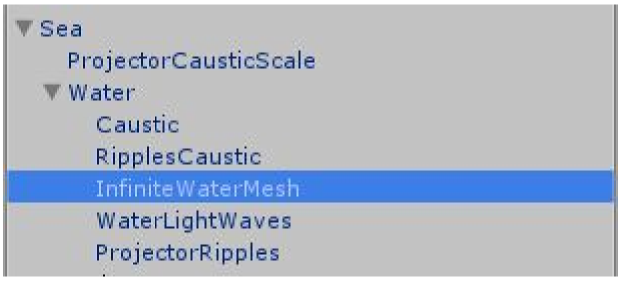
You can see a demo scenes in the folder "RealisticWater / Scenes".
For unity 5, you can install “speed trees” from the standard package of unity5. In this case, in the demo scenes are automatic placed trees for a terrain.

WATER DESCRIPTION.

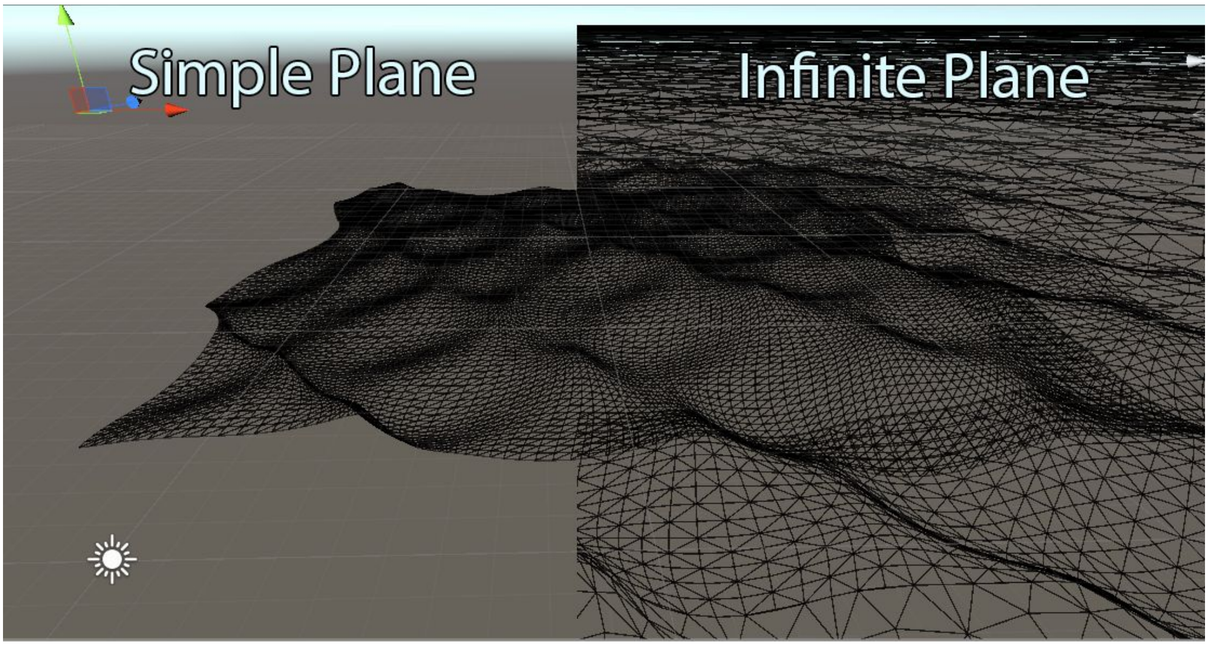
SUPPORTED FUNCTIONS:

- Infinite water.
- Buoyancy
- Dynamic ripples (with distorted splash effect)
- Underwater effect
- Procedural waves caustic (with wet sand)
- Realtime ripples caustic
- Realtime distortions.
- Dynamic reflections.
- Depth calculation
- Foam calculation
- Edge blenging (opacity and distortion blending)
- Dynamic waves
- Flow direction (in one direction only)
- Easy scaling of water / caustic

INFINITE WATER.

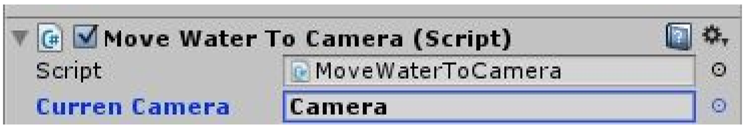


```
▼ Sea
    ProjectorCausticScale
  ▼ Water
      Caustic
      RipplesCaustic
      InfiniteWaterMesh
      WaterLightWaves
      ProjectorRipples
```



With the projection in space, you can use water to create an infinite ocean. The waves calculated in world space, so you can move the water in every direction. To create an infinite ocean, you need to set the camera.

For this in the prefab hierarchy "WaterPrefab -> Water” for the script “MoveWaterToCamera.cs" set the main camera. Also, you can set any gameObject instead of camera, for example your character. (with third person camera)



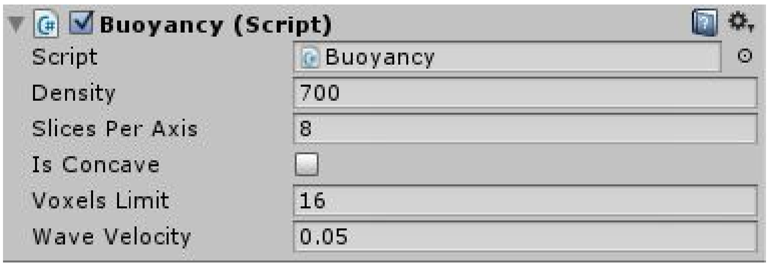
☑ Move Water To Camera (Script)

Script	MoveWaterToCamera
Curren Camera	Camera

Movement is only in the X and Z axis. The water will be at a constant height.

BUOYANCY

For buoyancy, you just need to attach the script "Buoyancy.cs" to any object.



☑ Buoyancy (Script)

Script Buoyancy

Density 700

Slices Per Axis 8

Is Concave □

Voxels Limit 16

Wave Velocity 0.05

Buoyancy based on Archimedes' principle, so you need to select the correct settings.
Script parameters:

Density - the density of the object (kg / cm ^ 3). If you want that your object was floating, set a value less than 1000. For example wood has a density of about 700. If the value is more than 1000, the object will sink.

Slices Per Axis - the higher the value, the more points with force. For example, for a simple cube 2 points is enough. For ships / boats such as 8-16 points. For floating logs enough 4 points. More points - more load, but it's better positioning accuracy in space.

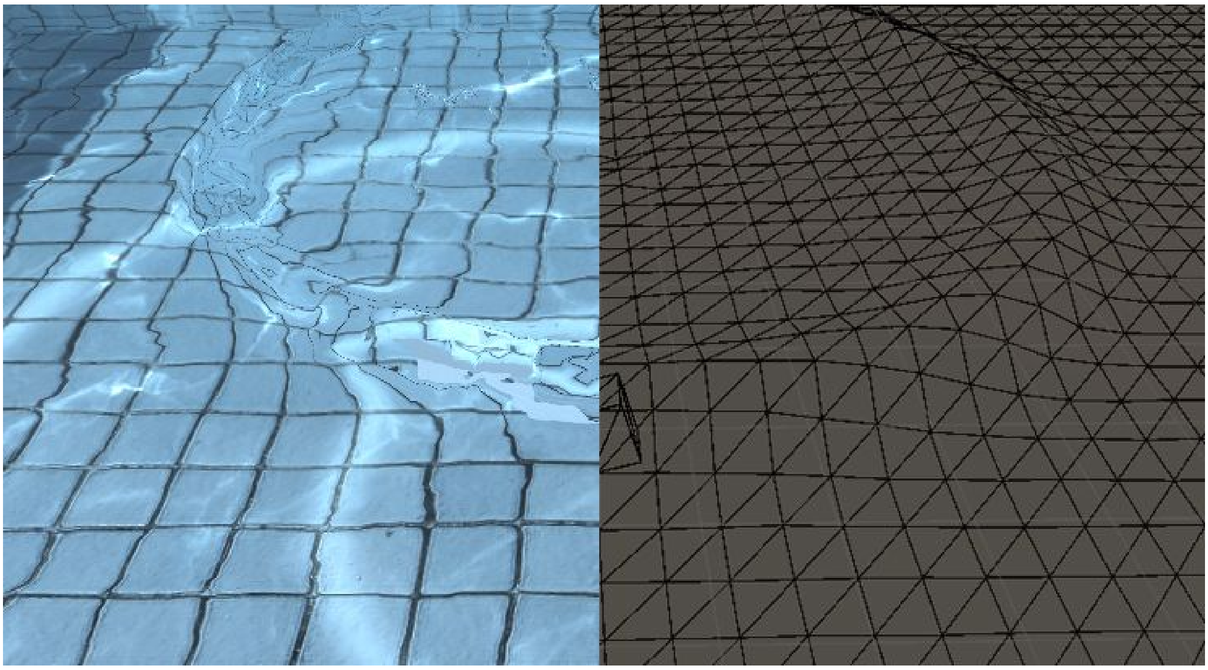
Is Concave It is necessary to adjust the floating calculation, when object is not convex.

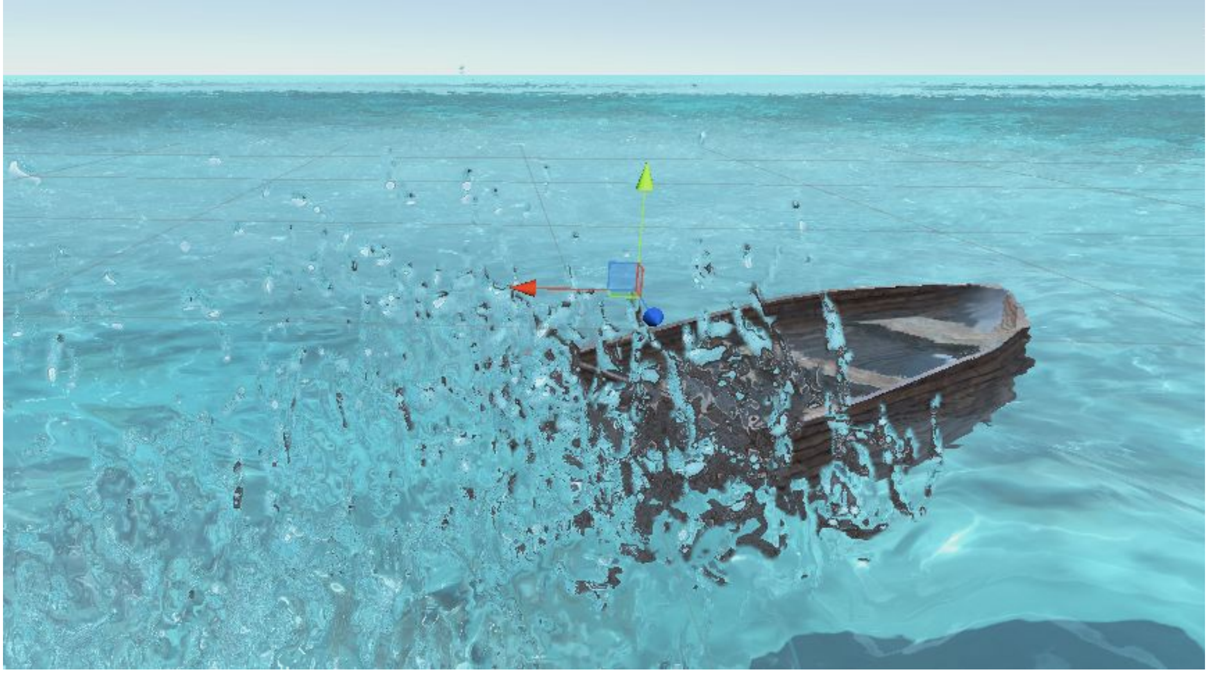
Voxels Limit - limitation of power points for an object

Wave Velocity - Multiplier of velocity vector along the x axis and z. The higher value, the more object will accelerate by waves.

Also, script worked with unity physx. So you need to add collider and rigidbody. Otherwise they will added automatic.
Script react on the rigidbody mass. By default mass is 1 kg.

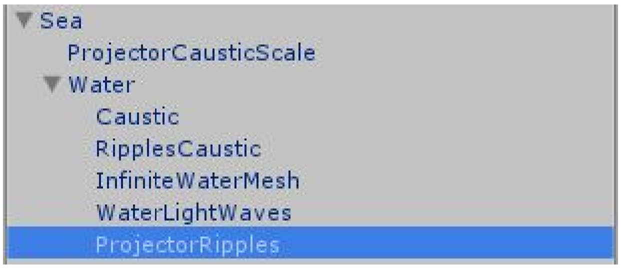
DYNAMIC RIPPLES (WITH DISTORTED SPLASH EFFECT)





Ripple calculated on the cpu. (To optimize in another thread). The result written into a texture. This allows use a vertex shaders to change the height of the waves and for rendering caustics ripples.

Calculate the ripples for the infinite ocean is almost impossible. So the calculation occurs in a small area. In the current demo scene used calculation of waves for 20-meter plane. Also should added collider with 20 meters.
If you need change ripples area size, you should change the scale and offset of gameobject with name “ProjectorRipples” in the water prefab hierarchy “waterPrefab->water->ProjectorRipples”.

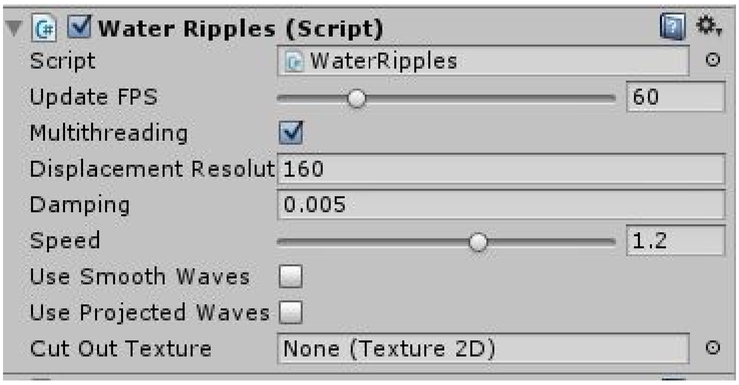


```
▼ Sea
    ProjectorCausticScale
  ▼ Water
      Caustic
      RipplesCaustic
      InfiniteWaterMesh
      WaterLightWaves
      ProjectorRipples
```

For unity4 with default size 20 meters offset is (-10, 0, -10) and scale is (20, 1, 20). Where offset is center of area size.
For unity5 ofsset is (-0.5, 0, 0.5) and scale is (1, 1, 1). Because in unity5 It calculates different. It calculated like that: scale of main prefab * current scale of “ProjectorRipples”.

For example, if you want set the area size 10 meters, you need set offset (-5, 0, -5) and scale (10, 1, 10). It’s for unity4.
For unity5 you can just decrease main prefab scale, also you can decrease the “ProjectorRipples” in proportion to the prefab scale.

For dynamic ripples using the script "WaterRipples.cs" in the prefab “waterPrefab->Water”



☑ Water Ripples (Script)

Script	WaterRipples
Update FPS	60
Multithreading	☑
Displacement Resolut	160
Damping	0.005
Speed	1.2
Use Smooth Waves	□
Use Projected Waves	□
Cut Out Texture	None (Texture 2D)

Script parameters:

UpdateFPS - The update time for the calculation of ripple wave.

Multithreading - Calculation of ripple in the main thread or another thread. Recommended to use multithreading (If you have more then 2+ cpu cores), this allows you to release the "main thread" from the calculations!

Displacement Resolution Resolution of calculated ripples texture. The higher, the better detail, but the higher the load. Increasing the resolution to 2 times, the load increases by 4 times!
If the resolution changed, also changed the speed of the waves. So you need to also change the "speed" setting.

Damping The damping of the wave amplitude over life time.

Speed - The speed of wave propagation.

Use Smoth Waves It allows you to smooth sharp waves. (like a texture gaussian blur)

Use Projected Waves It is only necessary if you use the infinite ocean. When the mesh water moves behind the camera, the ripples should be static relative to the world space.
Note: If "Use Projected Waves" checked you should use CutOutTexture!

CutOutTexture It allows to blur the border of calculated area.

Script has the public api methods to work with ripples.

Vector3 RippleCreator.GetOffsetByPosition(Vector3 position)
Allow you get wave position in world space (with ripples + gerstner waves).

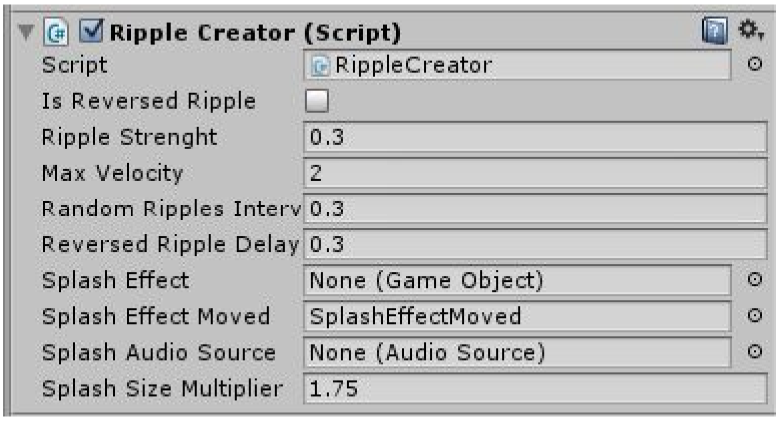
void RippleCreator.CreateRippleByPosition(Vector3 position, float velocity)

Allow you create point ripple in the water with velocity (positive or negative)

For example, if you want to make ripples in the water by mouse click.

```
if (Input.GetMouseButtonDown(0))
    {
        var ray = Camera.main.ScreenPointToRay(Input.mousePosition);
        RaycastHit hit;
        if (Physics.Raycast(ray, out hit))
        {
            waterRipples.CreateRippleByPosition(hit.point, 0.3f);
        }
    }
```

To easy create a ripple, you can use the script "RippleCreator.cs"



☑ Ripple Creator (Script)

Script RippleCreator

Is Reversed Ripple □

Ripple Strenght 0.3

Max Velocity 2

Random Ripples Interv 0.3

Reversed Ripple Delay 0.3

Splash Effect None (Game Object)

Splash Effect Moved SplashEffectMoved

Splash Audio Source None (Audio Source)

Splash Size Multiplier 1.75

For example, if you want to create a simple ripple from objects. (a boat, a log in the water, bullet shot, moving people, etc.)

Just add the script and collider on your object which should create a ripple.

Script parameters:

IsReversedRipple Used when you need to flip the front ripples. (e.g. shot out of the water).

RippleStrength Ripple wave strength

MaxVelocity The maximum height limit. Current wave height calculated based on the object speed (oldPosition - currectPosition). If the object is moving fast (like a motor boat), the wave can be huge.

RandomRipplesInterval Adds random ripple fluctuations (random.Range (0, current)). It allows you to add more heterogeneity and realism.

ReversedRippleDelay Delay before will calculated antiphase wave
SplashEffect Splash effect when an object collides with water. (Effect is there \Assets\RealisticWater\Prefabs\Water\PC\Splash\SplashEffect.prefab)

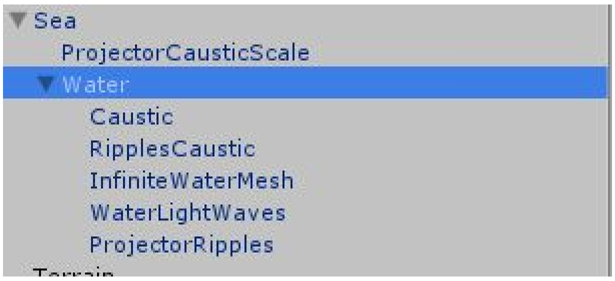
SplashEffectMoved Splash effect for moved objects. If you use a particle system, then size of particles will changed relative to speed. (effect is there \Assets\RealisticWater\Prefabs\Water\PC\Splash\SplashEffectMoved.prefab)

SplashAudioSource Sound effect when an object collides with water.

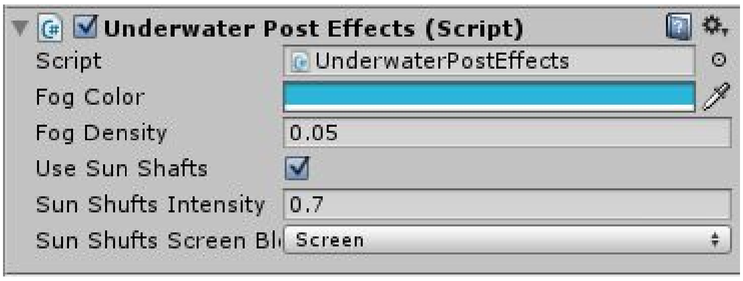
SplashSizeMultiplier Size multiplier for “SplashEffectMoved” particles.

UNDERWATER EFFECT

For underwater effect using the script “UnderwaterPostEffects.cs”



- Sea
  - ProjectorCausticScale
  - Water
    - Caustic
    - RipplesCaustic
    - InfiniteWaterMesh
    - WaterLightWaves
    - ProjectorRipples
- Terrain



☑ **Underwater Post Effects (Script)**

Script	UnderwaterPostEffects
Fog Color	🟦
Fog Density	0.05
Use Sun Shafts	☑
Sun Shufts Intensity	0.7
Sun Shufts Screen Bl	Screen

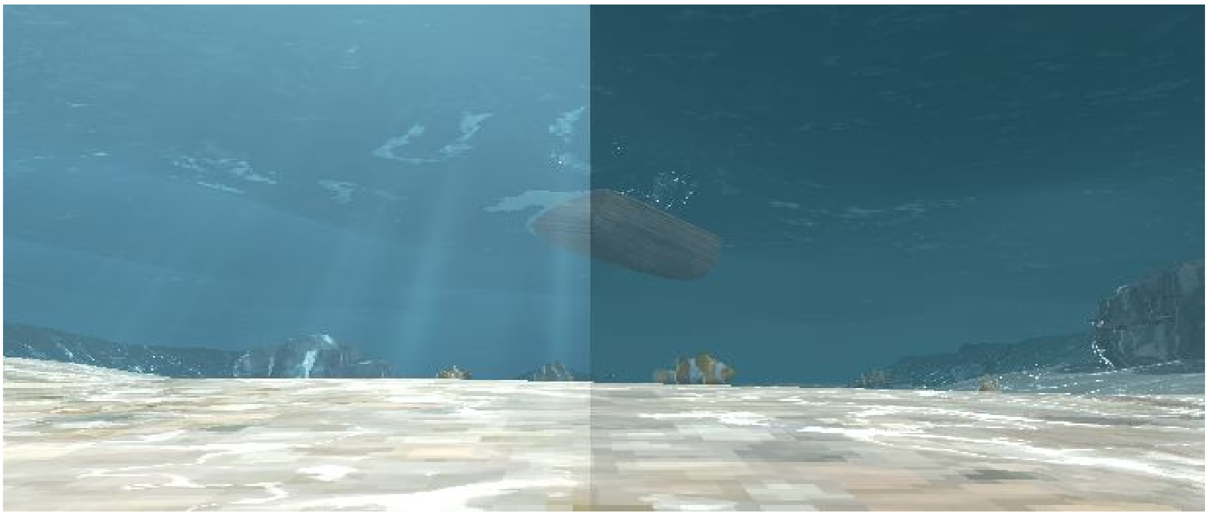
Note, the script uses the standart script and shader "sun shaft" (PostEffects->SunShafts). So, when using the underwater effect, make sure that you do not delete the standart folder and the editor folder included in the water pack.

Script parameters:

FogColor - underwater color.

FogDensity - color density of underwater.

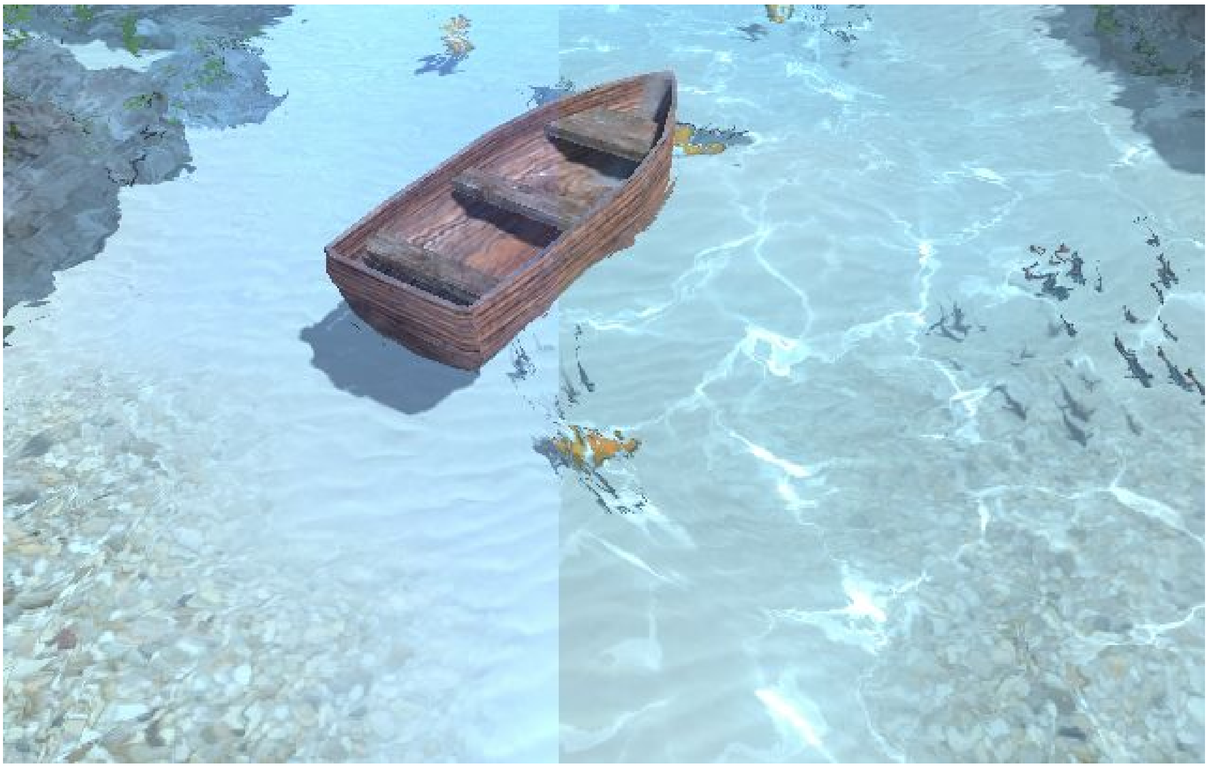
UseSunShafts allow to add water sun shafts



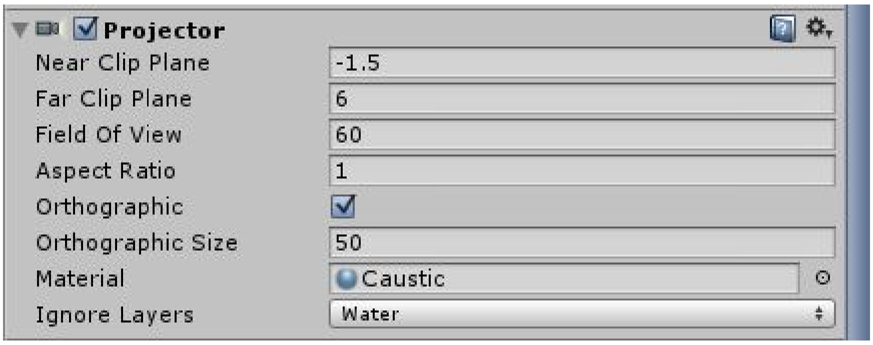
SunShaftIntencity The brightness of the sun rays.

SunShaftScreenBlendMode Lets change the blend mode (additive or screen)

PROCEDURAL WAVES CAUSTIC



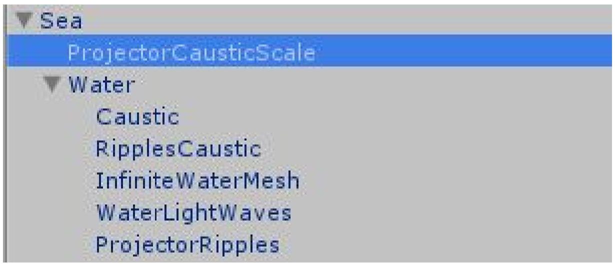
Caustic (light refraction on the surface) created using a shader, so you can easy adjust the size / brightness / speed / density and other parameters of the caustic. It allows you to add realistic results without expensive caustic calculation based on real waves.
Caustic rendering used a projector to draw on the surface. So if you want to change size of area, you should change settings of the projector.



☑ Projector

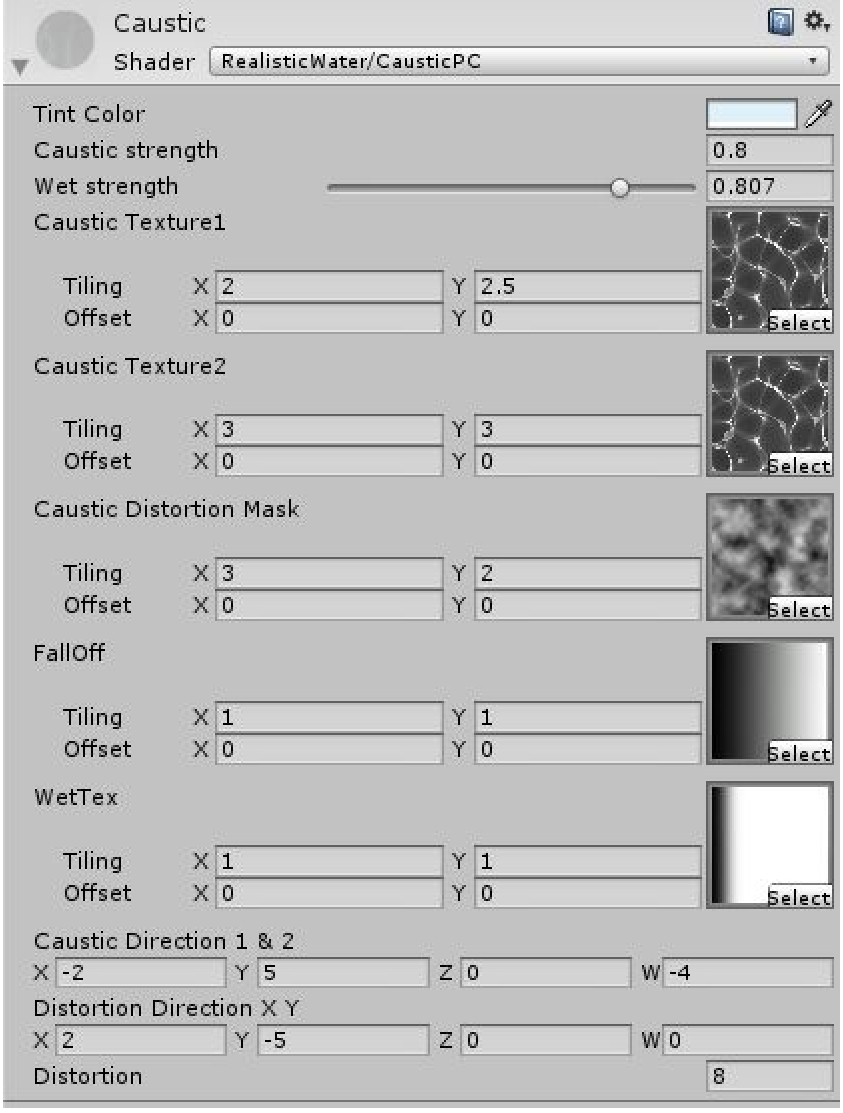
Near Clip Plane	-1.5
Far Clip Plane	6
Field Of View	60
Aspect Ratio	1
Orthographic	☑
Orthographic Size	50
Material	Caustic
Ignore Layers	Water

Also, if you want to change caustic scale, then you need to change scale of “ProjectorCausticScale” in the prefab hierarhy “waterPrefab -> ProjectorCausticScale”.



- Sea
  - ProjectorCausticScale
  - Water
    - Caustic
    - RipplesCaustic
    - InfiniteWaterMesh
    - WaterLightWaves
    - ProjectorRipples

Caustic shader and material settings:



Caustic

Shader RealisticWater/CausticPC

Tint Color

Caustic strength 0.8

Wet strength 0.807

Caustic Texture1

Tiling X 2 Y 2.5

Offset X 0 Y 0

Caustic Texture2

Tiling X 3 Y 3

Offset X 0 Y 0

Caustic Distortion Mask

Tiling X 3 Y 2

Offset X 0 Y 0

FallOff

Tiling X 1 Y 1

Offset X 0 Y 0

WetTex

Tiling X 1 Y 1

Offset X 0 Y 0

Caustic Direction 1 & 2

X -2 Y 5 Z 0 W -4

Distortion Direction X Y

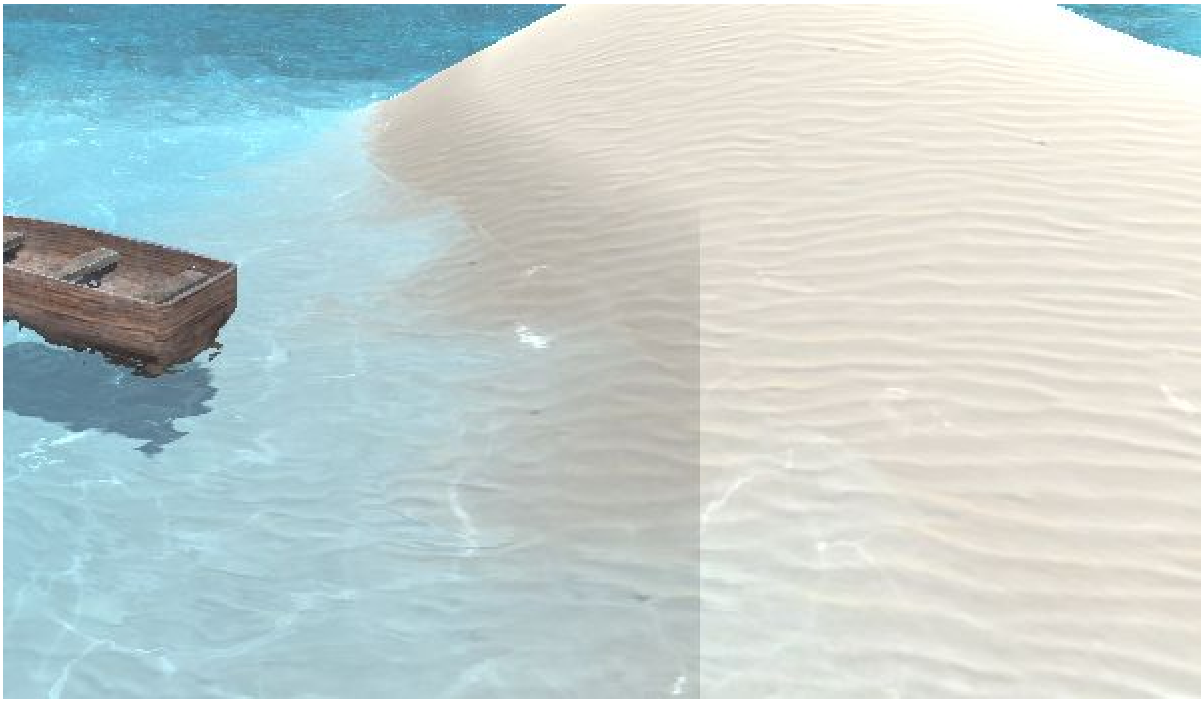
X 2 Y -5 Z 0 W 0

Distortion 8

Tint Color - caustic color.

Caustic Strength - brightness of caustics. Also, the brightness also depends on the directionLight intensity.

Wet strength - imitation of wet sand. Value 1 is no wet.
You can see the difference if the value of 0.8



Caustic Texture1 and Caustic Texture2
Textures caustics needed to generate the final caustic (the first texture used as uv coordinates of the second texture)

Caustic Distortion Mask Noise texture needed to simulate the distortion of caustics.

FallOff Fadeout texture for caustic by height. Where alpha channel is opacity of caustic.

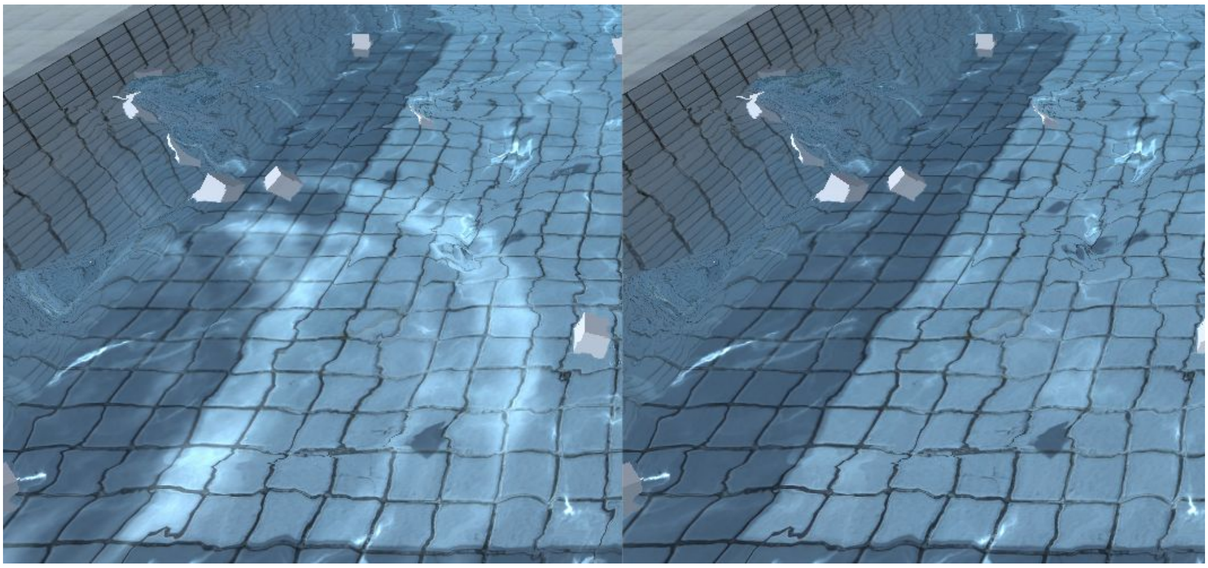
WetTex Fadeout texture for wet surface by height. Where rgb is color of wet surface and alpha channel is opacity.

Caustic Direction Move direction of caustic textures. Where ‘x’ is left/right move and ‘y’ is top/down for first caustic.
For second caustic texture ‘z’ is left/right move and ‘w’ top/down.

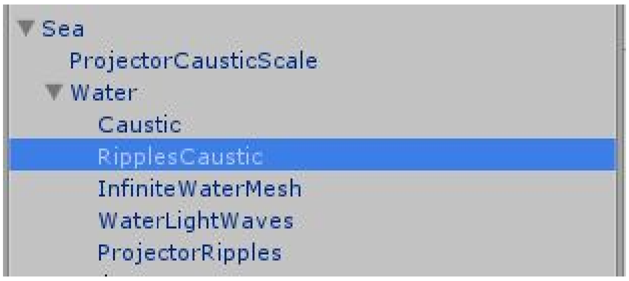
Distortion Direction Used only x and y values, where ‘x’ is left/right move and “y” is top/down move for distortion mask texture.

Distortion caustic strength of distortion.

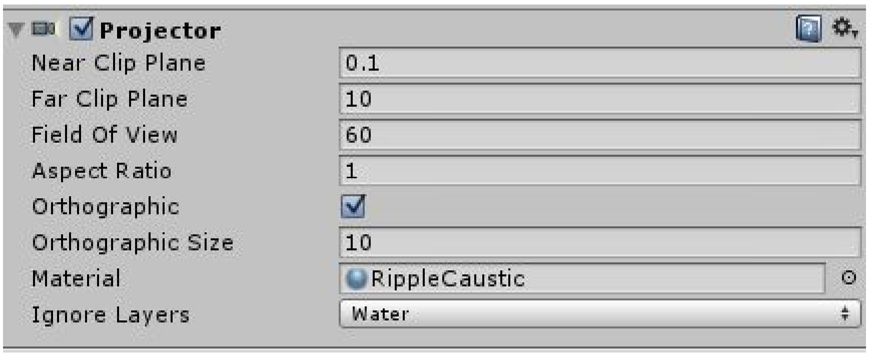
REALTIME RIPPLES CAUSTIC



Realtime ripples caustic works using a projector. So if you want to change size of area, you should change settings of the projector.



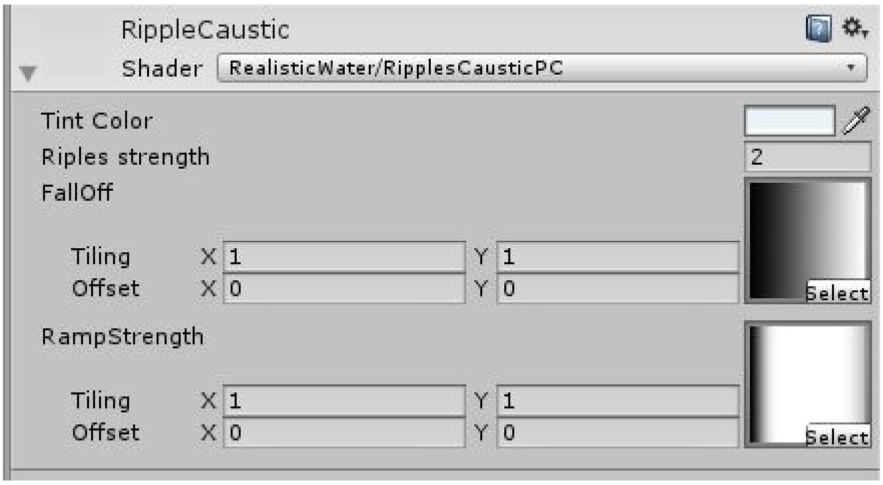
```
▼ Sea
    ProjectorCausticScale
  ▼ Water
      Caustic
      RipplesCaustic
      InfiniteWaterMesh
      WaterLightWaves
      ProjectorRipples
```



Projector ☑

```
Near Clip Plane        0.1
Far Clip Plane         10
Field Of View          60
Aspect Ratio           1
Orthographic           ☑
Orthographic Size      10
Material               RippleCaustic
Ignore Layers          Water
```

Ripples caustic shader and material settings:



RippleCaustic
Shader RealisticWater/RipplesCausticPC

Tint Color
Riples strength 2
FallOff
Tiling X 1 Y 1
Offset X 0 Y 0
Select
RampStrength
Tiling X 1 Y 1
Offset X 0 Y 0
Select

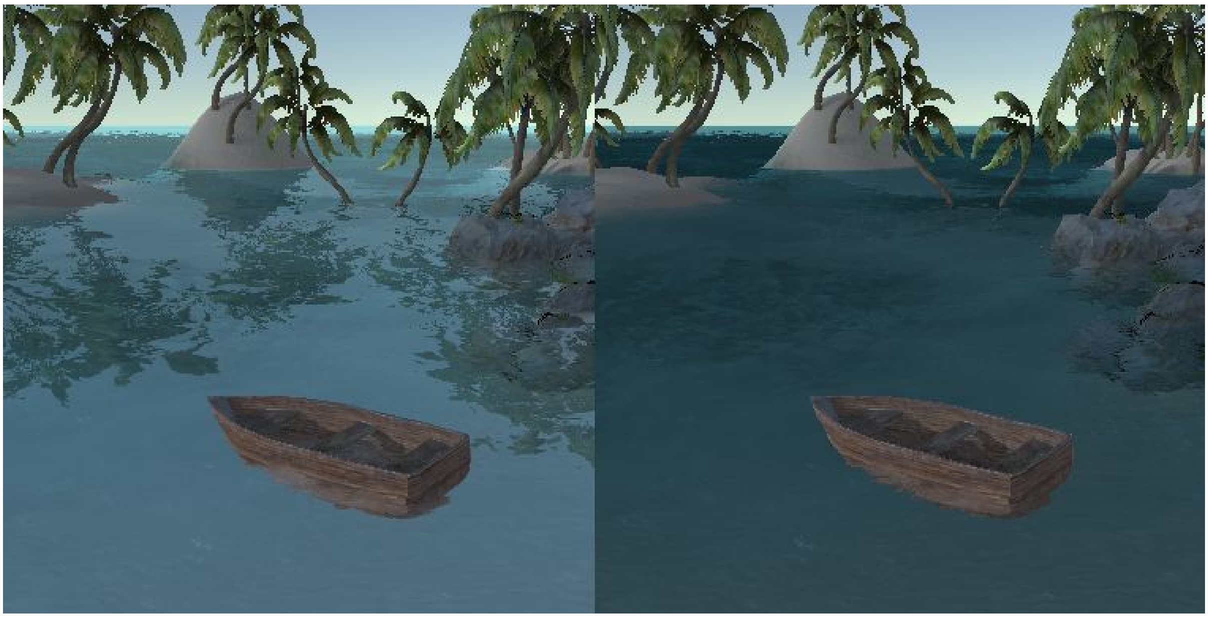
Tint Color - ripples caustic color.

Ripples Strength - brightness of ripple caustics. Also, the brightness also depends on the directionLight intensity.

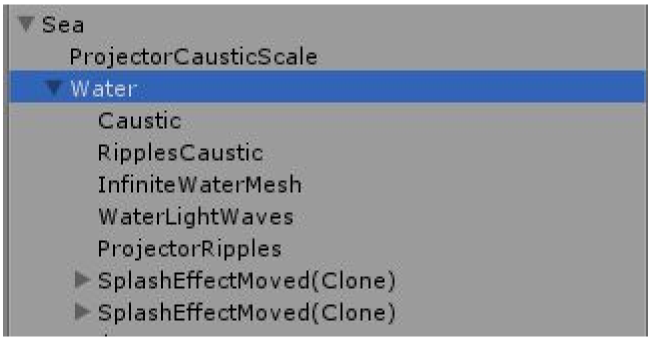
FallOff Fadeout texture for ripples caustic by height. Where alpha channel is opacity of caustic.

RampStrength Texture brightness correction. It is necessary to recalculate the linear brightness by distance of caustics in the quadratic brightness. Finally, caustic look more realistic.

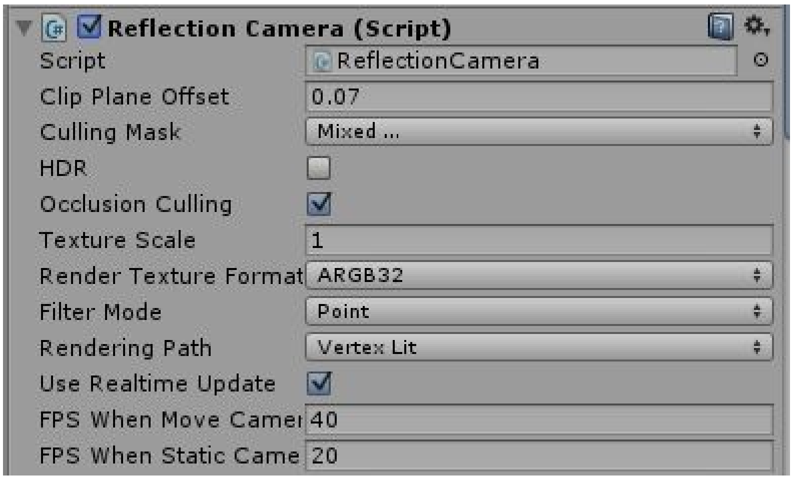
DYNAMIC REFLECTIONS



For reflections using the script “ReflectionCamera”



```
▼ Sea
    ProjectorCausticScale
  ▼ Water
      Caustic
      RipplesCaustic
      InfiniteWaterMesh
      WaterLightWaves
      ProjectorRipples
    ▶ SplashEffectMoved(Clone)
    ▶ SplashEffectMoved(Clone)
```



☑ **Reflection Camera (Script)**

Script	ReflectionCamera
Clip Plane Offset	0.07
Culling Mask	Mixed ...
HDR	□
Occlusion Culling	☑
Texture Scale	1
Render Texture Format	ARGB32
Filter Mode	Point
Rendering Path	Vertex Lit
Use Realtime Update	☑
FPS When Move Camer	40
FPS When Static Came	20

If you don’t need reflections, you can remove the script(in this case shader will ignore the reflections)
The script creates an additional camera of reflections on the opposite side of the water.

Script parameters:

This is standart parameters for camera.
Clip Plane Offset
Culling Mask
HDR
Occlusion Culling
Rendering Path

Additional parameteres:
Texture Scale [0-1] Scale resolution of texture reflection (For example ‘1’ - the current screen resolution, ‘0.5’ - half the size, etc.)
The smaller the resolution, the faster the calculation, but the lower quality.

Render Texture Format Format of texture reflection. To optimize can try to use eg "TextureFormat.RGB565" (or other formats that can support your platform), it will save memory and speed up the calculation of the texture.

Fliter Mode Texture filtering.

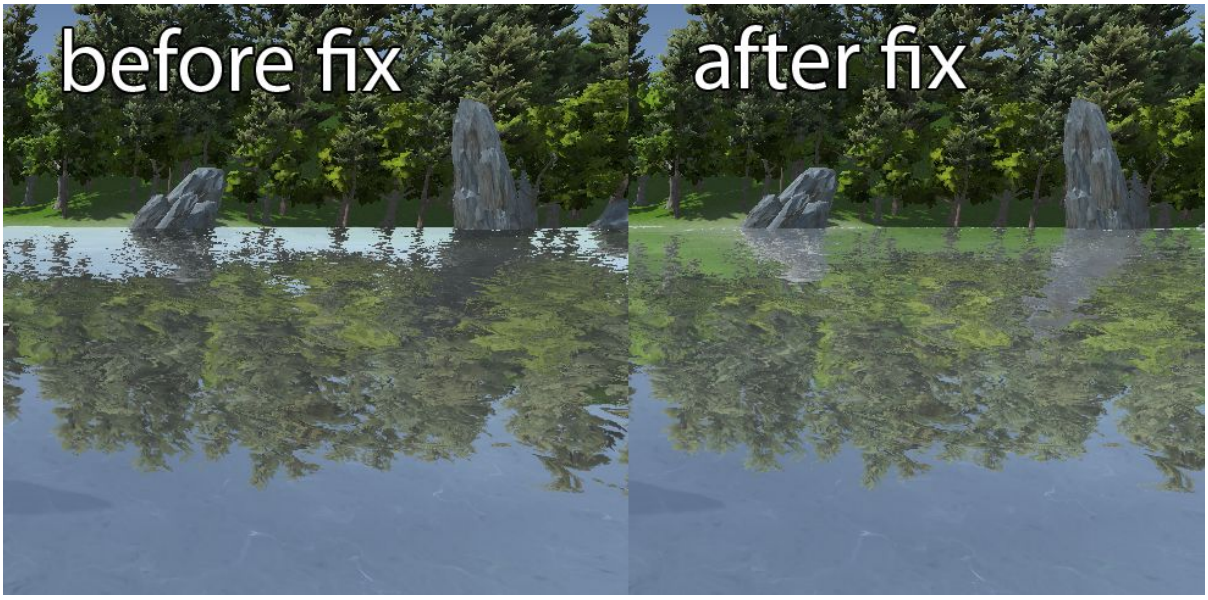
Use Realtime Update Allows you to select the update mode of the camera. Either refresh the texture of each frame, or you can choose fps for updates.
Note: “FPS When Move Camera” and “FPS When Static Camera” no effect if “Use Realtime Update” is true.

FPS When Move Camera For optimize, you can choose a separate fps for calculating reflections (since it is an expensive calculation).

Current parameter set the FPS for the reflection camera, if the main camera moved.

FPS When Static Camera parameter set the FPS for the reflection camera, if the main camera is static.

When the camera is under the terrain can be a problem with terrain polygons culling.
You can apply this fix.



Solution:
1) Download the archive "builtin shaders" Unity for your version from the download page https://unity3d.com/ru/get-unity/download/archive
2) Open the folder builtin_shaders \ DefaultResourcesExtra \ TerrainShaders \ Splats
3) Copy the shaders to any folder of your project. If you unity4, then copy the "AddPass" and "FirstPass"
If you unity5, then copy the "Standard-AddPass", "Standard-Base", "Standard-FirstPass".
4) Open each of the copied shader in your project and add the line "Cull Off" after the block
Tags {
...
}

You should have something like this

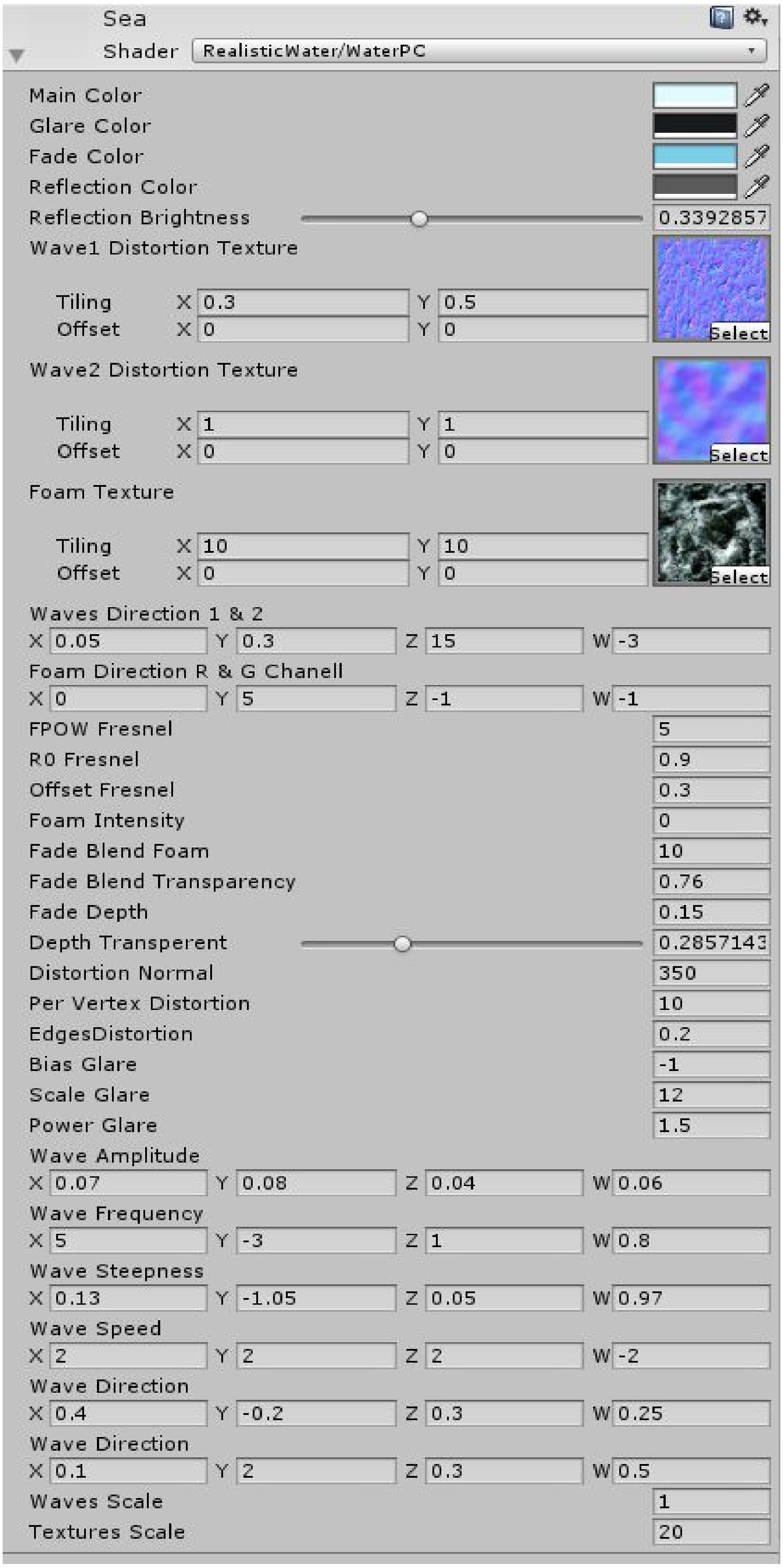
```
Tags {
"SplatCount" = "4"
"Queue" = "Geometry-99"
"IgnoreProjector" = "True"
"RenderType" = "Opaque"
}
Cull Off

CGPROGRAM
```

5) For the script “ReflectionCamera.cs” set the rendering path as forward or deffered.

Note. If you have a third-party plugin that changes the terrain, change him shader.

WATER SHADER FEATURES:



Sea

Shader RealisticWater/WaterPC

Main Color

Glare Color

Fade Color

Reflection Color

Reflection Brightness 0.3392857

Wave1 Distortion Texture
Tiling X 0.3 Y 0.5
Offset X 0 Y 0

Wave2 Distortion Texture
Tiling X 1 Y 1
Offset X 0 Y 0

Foam Texture
Tiling X 10 Y 10
Offset X 0 Y 0

Waves Direction 1 & 2
X 0.05 Y 0.3 Z 15 W -3

Foam Direction R & G Chanell
X 0 Y 5 Z -1 W -1

FPOW Fresnel 5

R0 Fresnel 0.9

Offset Fresnel 0.3

Foam Intensity 0

Fade Blend Foam 10

Fade Blend Transparency 0.76

Fade Depth 0.15

Depth Transperent 0.2857143

Distortion Normal 350

Per Vertex Distortion 10

EdgesDistortion 0.2

Bias Glare -1

Scale Glare 12

Power Glare 1.5

Wave Amplitude
X 0.07 Y 0.08 Z 0.04 W 0.06

Wave Frequency
X 5 Y -3 Z 1 W 0.8

Wave Steepness
X 0.13 Y -1.05 Z 0.05 W 0.97

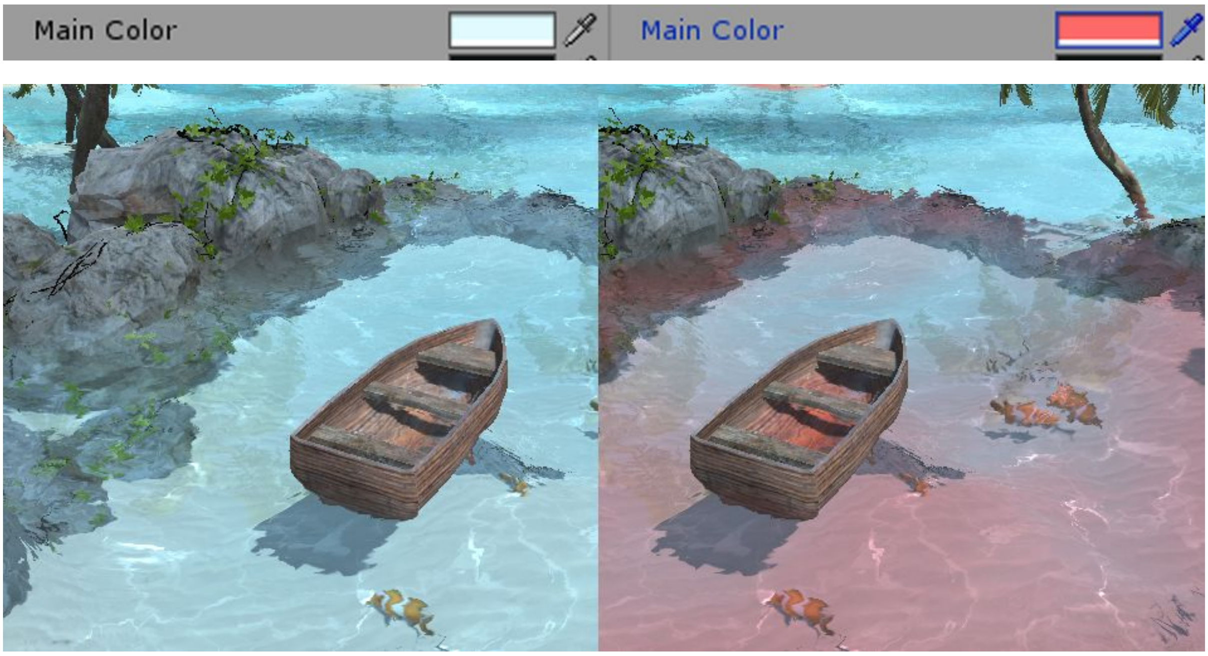
Wave Speed
X 2 Y 2 Z 2 W -2

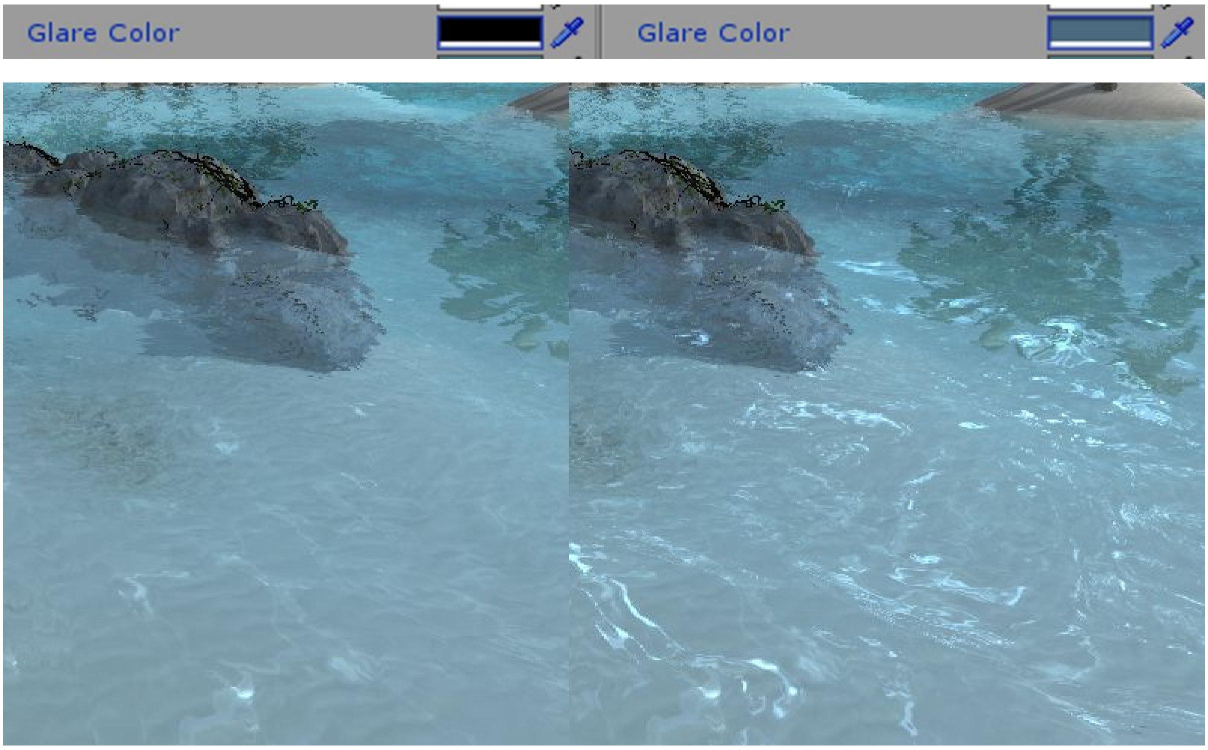
Wave Direction
X 0.4 Y -0.2 Z 0.3 W 0.25

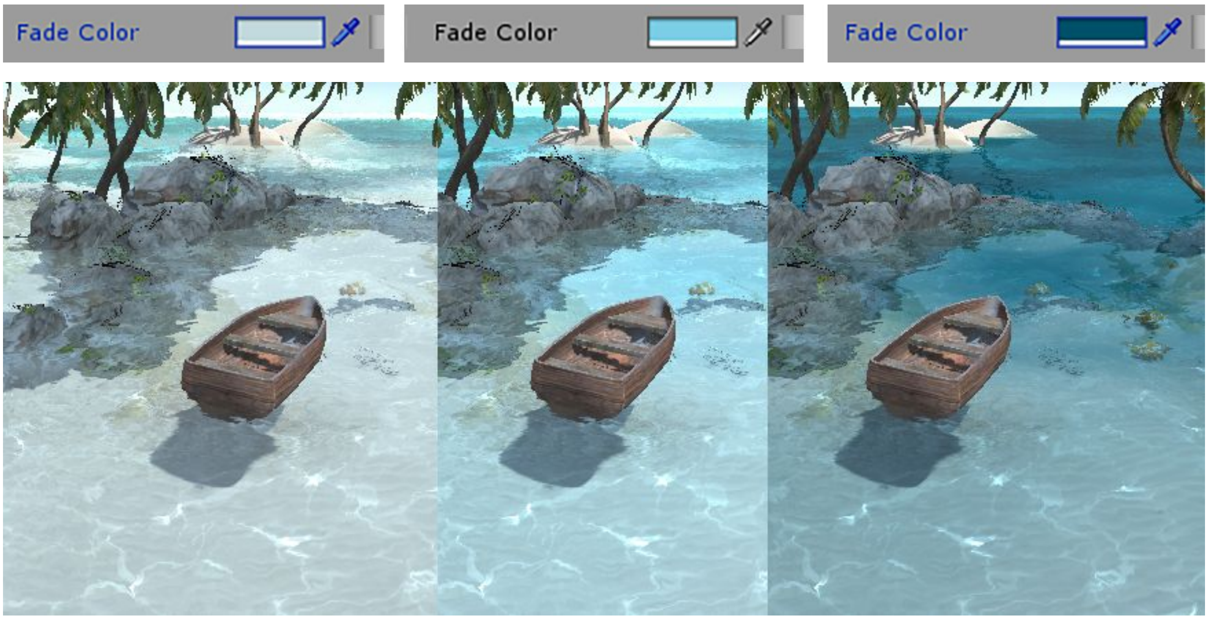
Wave Direction
X 0.1 Y 2 Z 0.3 W 0.5

Waves Scale 1

Textures Scale 20


Main Color
Main Color

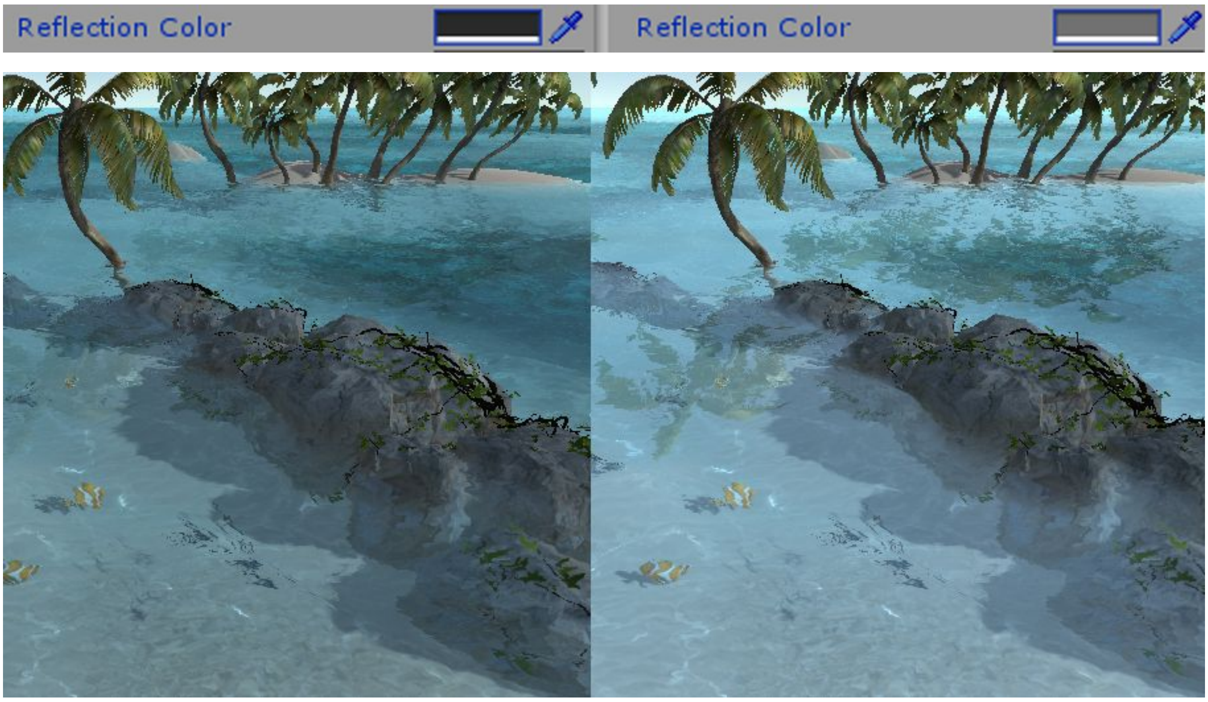

Glare Color
Glare Color



Fade Color

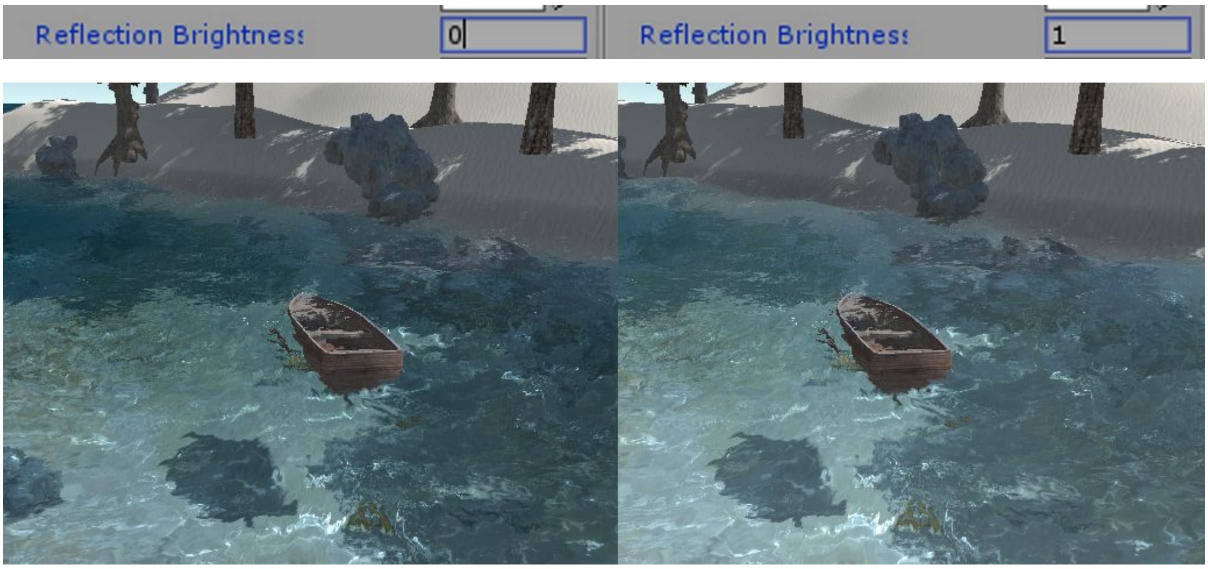
Fade Color

Fade Color



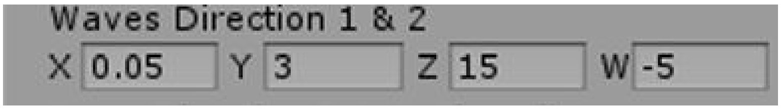
Reflection Color

Reflection Color



Reflection Brightness 0

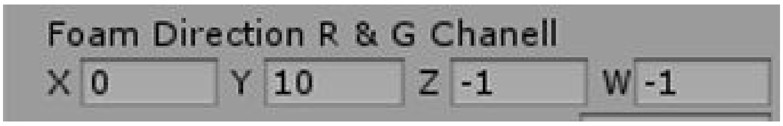
Reflection Brightness 1



Waves Direction 1 & 2

X 0.05 Y 3 Z 15 W -5

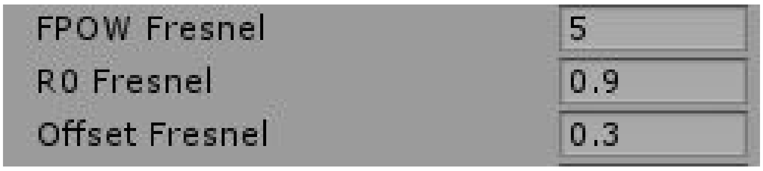
Water flow direction, where ‘x’ is top/down move, ‘y’ is left/right move, ‘z’ is speed of the waves animation (wave texture1), and ‘w’ is speed of the waves animation (wave texture2).



Foam Direction R & G Chanell

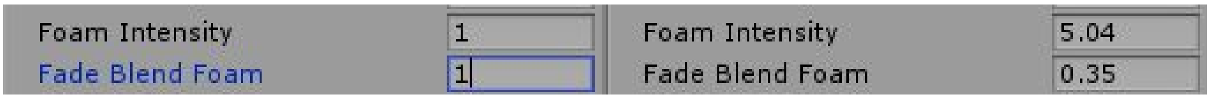
X 0 Y 10 Z -1 W -1

Foam direction, where ‘x’ is top/down move, ‘y’ is left/right move and ‘z’ and ‘w’ unused.



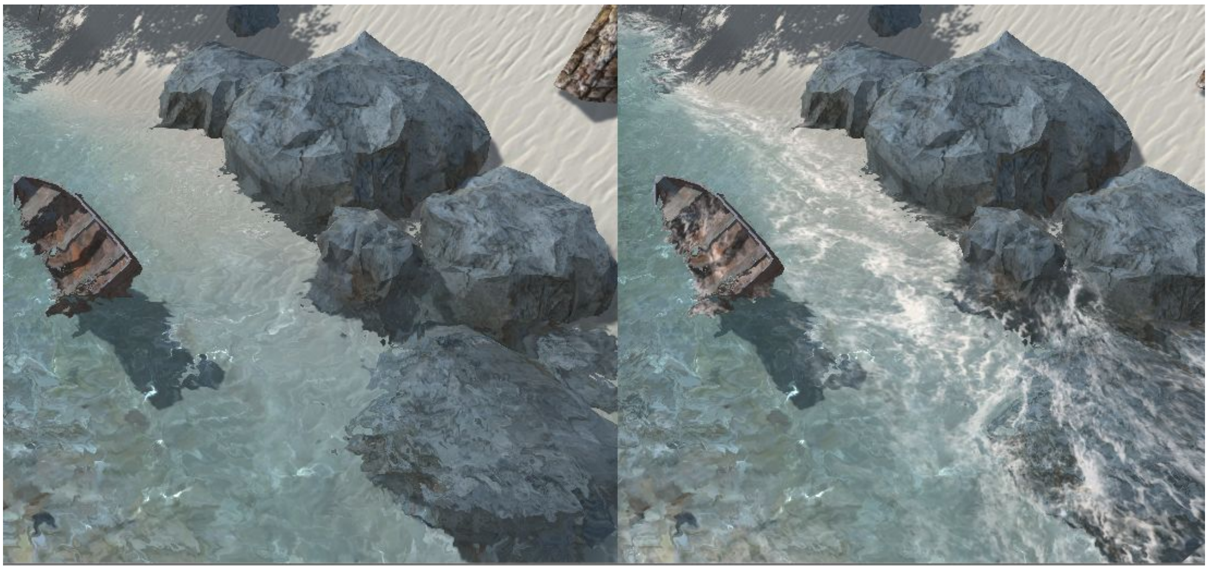
FPOW Fresnel	5
R0 Fresnel	0.9
Offset Fresnel	0.3

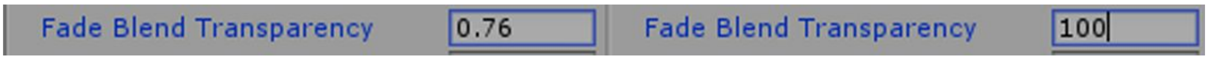
Fresnel settings for reflection.



Foam Intensity 1
Fade Blend Foam 1

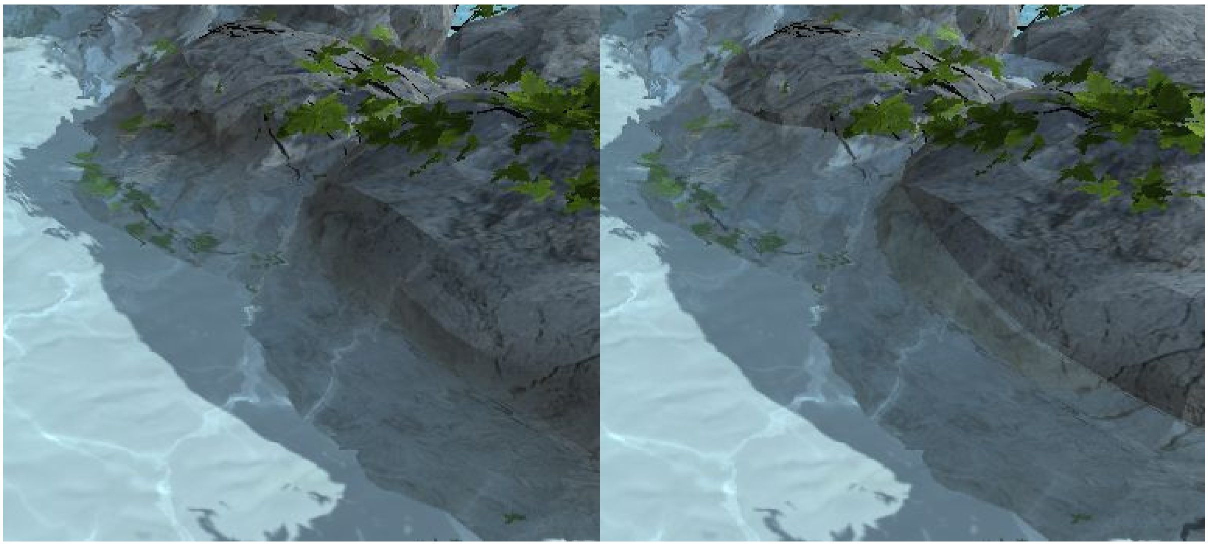
Foam Intensity 5.04
Fade Blend Foam 0.35

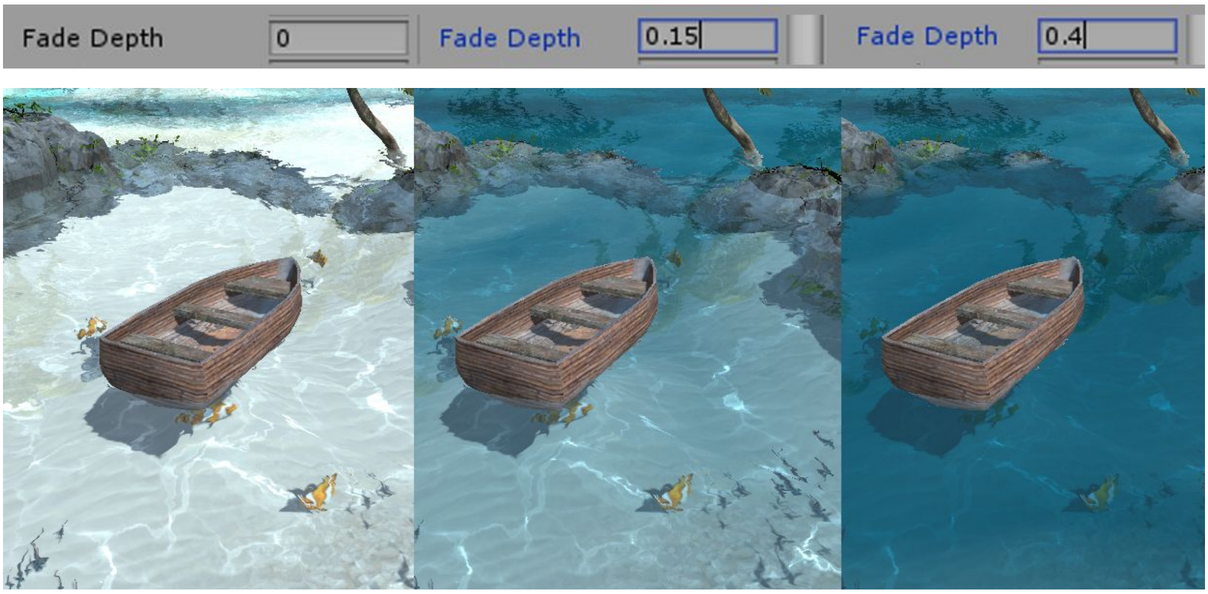




Fade Blend Transparency 0.76

Fade Blend Transparency 100

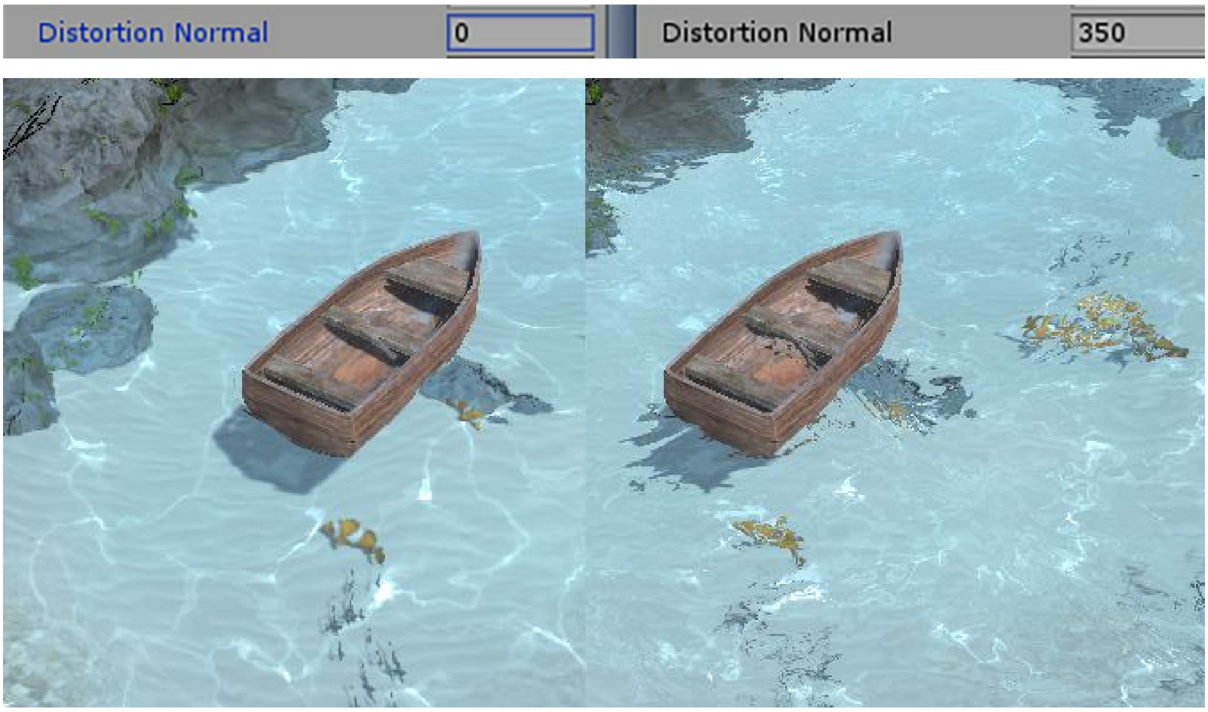




Fade Depth 0

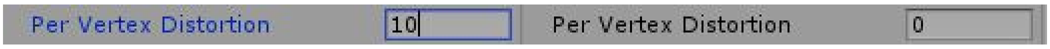
Fade Depth 0.15

Fade Depth 0.4



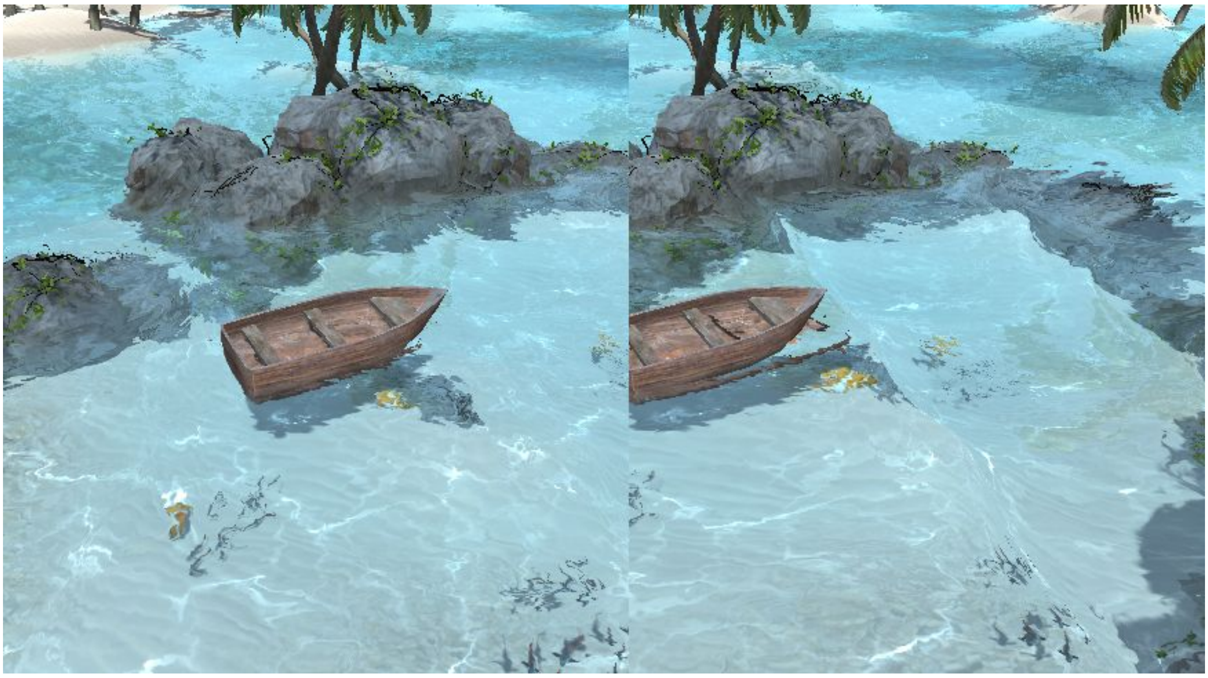
Distortion Normal 0

Distortion Normal 350

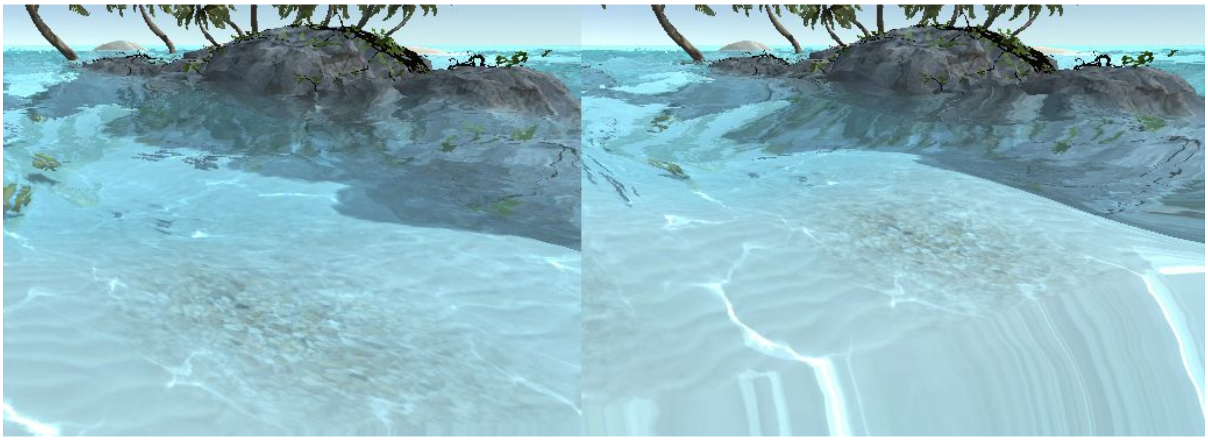


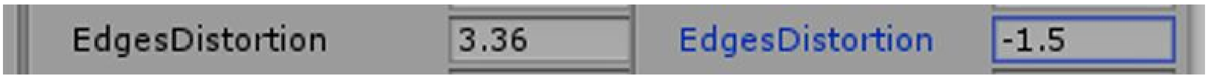
Per Vertex Distortion 10

Per Vertex Distortion 0



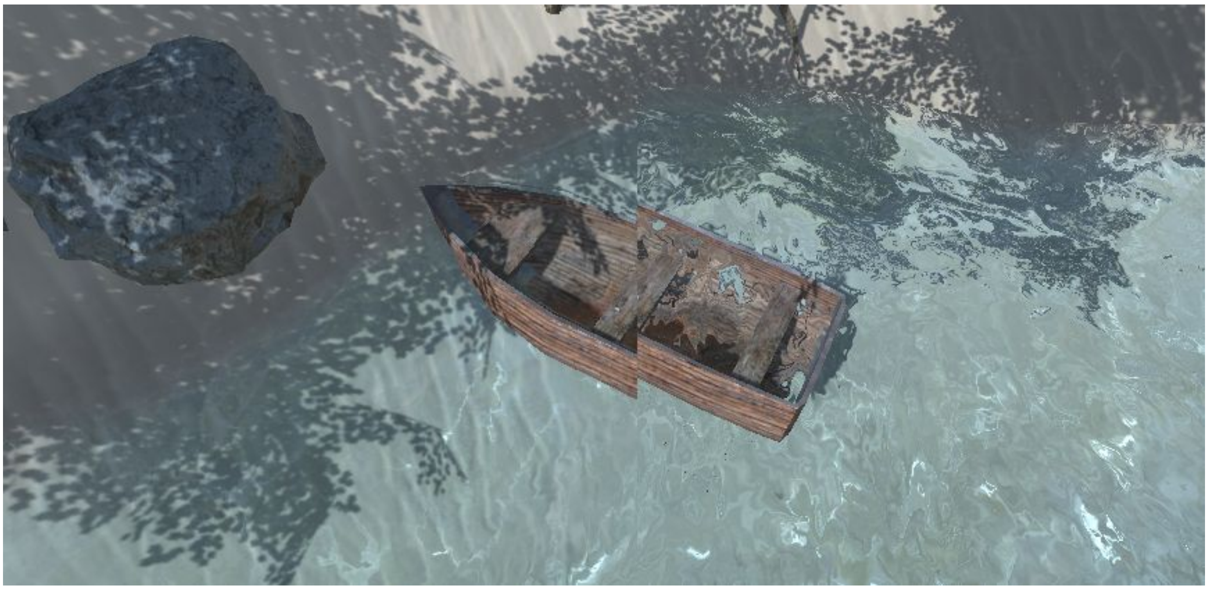
Note: If you set too low the “per vertex distortion”, the camera’s border will be distorted . Do not set value too low.

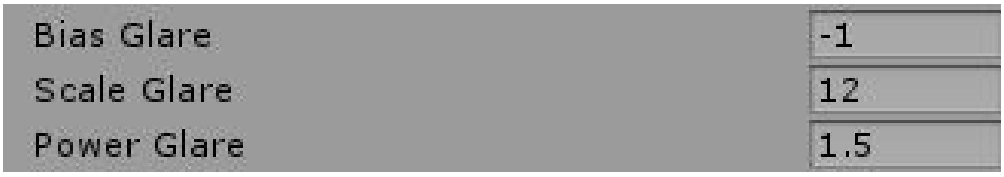




EdgesDistortion 3.36

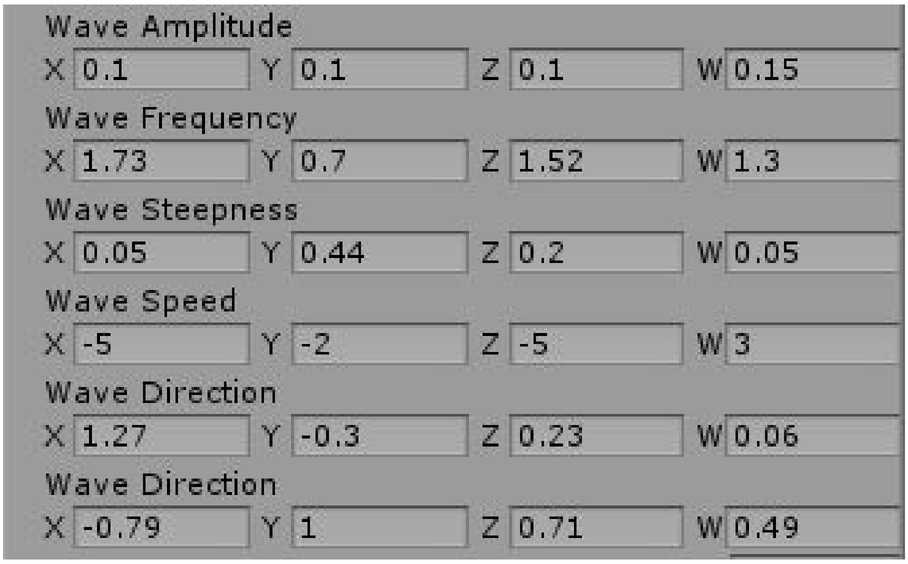
EdgesDistortion -1.5





Bias Glare	-1
Scale Glare	12
Power Glare	1.5

Glare fresnel settings.



Wave Amplitude
X 0.1 Y 0.1 Z 0.1 W 0.15

Wave Frequency
X 1.73 Y 0.7 Z 1.52 W 1.3

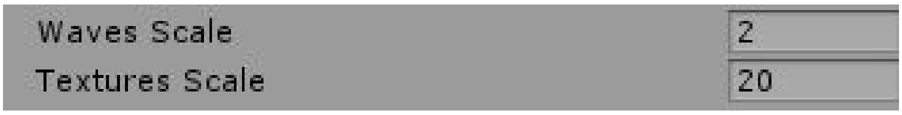
Wave Steepness
X 0.05 Y 0.44 Z 0.2 W 0.05

Wave Speed
X -5 Y -2 Z -5 W 3

Wave Direction
X 1.27 Y -0.3 Z 0.23 W 0.06

Wave Direction
X -0.79 Y 1 Z 0.71 W 0.49

Waves settings, where ‘x’ and ‘y’ settings for first wave, and ‘z’ and ‘w’. This is the same settings as in the standard Unity water4.



Waves Scale 2
Textures Scale 20

Gerstner waves scale (not ripples) and water scale (textures, distortions, flow, etc).
The current scale settings of the waves and the water does not depend on the prefab scale (mesh). Therefore, you can easily change the prefab scale (mesh) or water scale.