# Thank you

Thank you very much for choosing *Crest Ocean System* 4.8 for HDRP!

When upgrading *Crest*, make a backup of your project and remove the existing Crest files before installing the new package.

Please follow *@crest_ocean* on Twitter for news and updates, and drop in to the Crest Discord server `https://discord.gg/g7GpjDC` to say hello!

Crest began life as open source software hosted here: `https://github.com/wave-harmonic/crest`. This may be a useful resource for issue searching/posting, for looking at experimental development branches, looking at commit history for files, and misc.

**Note**: Unity 2019.4.9 and HDRP 7.3.1 or later are required. The most recent version of each is recommended due to the large volume of fixes and improvements that Unity are making.

# Documentation

There is a getting started video available on YouTube here: `https://youtu.be/FE6l39Lt3js`. There are additional tutorial videos on this channel covering other aspects of *Crest*.

Refer to *userguide.pdf* alongside this document for full documentation, including detailed setup steps.

# Support

There are a number of channels to get support. First and foremost, you can contact us directly via email: support@waveharmonic.com.

Another support channel is the *Crest* Discord: `https://discord.gg/g7GpjDC`.

Finally issues can be searched and posted on the *Crest* GitHub: `https://github.com/wave-harmonic/crest`.

# Notes

- Some of the example scenes require a new layer to be added to your project called Terrain. *Crest* is unable to add this layer to your project automatically, so it will throw an error if this layer is not found.

# Release Notes

## 4.8

- Change minimum Unity version to 2019.4.9

- Add new Gerstner component *ShapeGerstner* with better performance, improved foam at a distance, correct wave direction and spline support (preview). See notes in the *Wave conditions* section of the user guide.

- Add new spline tool component *Spline* which can be wave splines for new gerstner system (preview). See notes in the *Wave conditions* section of the user guide.

- Add orthographic projection support to ocean surface

- Add weight control for *Underwater Environmental Lighting* component

- Add option on *AnimWaveSimSetting* to disable ping pong for combine pass. See notes in performance section of user guide.

- Calculate sub-surface light scattering from surface pinch, to enable other fixes/improvements. May require retweaking of the scattering settings on the ocean material.

- Improve error reporting when compute shaders fail

- Change shader level target for combine shader to 3.5 which might fix some issues on Quest

- Fix dynamic wave sim stablity by reducing *Courant number* default value

- Remove warning when camera not set which was displaying even when it shouldn't

- Change ocean depth cache populate event option to Start

- Fix for multiple gaps/cracks in ocean surface bugs

- Fix *Follow Horizontal Motion* for foam override

- Fix normals not being flipped for underwater with flow enabled

- Fix meniscus shader not being enabled

## 4.7

- Improve underwater XR multi-pass support (still not 100%)

- Improve underwater XR single pass instance performance

- Improve underwater performance when using dynamic scaling

- Disable underwater culling if underwater effect is not used

- Underwater effect uses stencil buffer instead of depth buffer again

- Add foam override shader and material to remove foam

- Add camera property to *OceanRenderer*. *ViewerHeightAboveWater* will use camera transform

- Add option to add downhill force to buoyancy for some floating objects

- Improve platform support by improving texture compatibility checks

- Minor underwater performance improvement

- Fix Unity 2020.2 / HDRP 10 support

- Fix shadows not following scene view camera

- Fix *Follow Horizontal Motion* not working

- Fix *Strength* on *Crest/Inputs/Foam/Add From Texture* being ignored

- Query system - fixed ring buffer exhausted error on some Linux and Android platforms

- Fix shadow data breaking gizmos and GUI

- Fix underwater copy ocean material parameters option not working correctly when unchecked

- Fix underwater anti-aliasing artefacts around objects (HDRP 10+ required. See underwater documentation)

## 4.6

- Change minimum Unity version to 2019.4.8

- Improve foam texture

- Add height component that uses *UnityEvents* (under examples)

- Add shadow LOD data inputs

- Add support for disable scene reloading

- Disable horizontal motion correction on animated waves inputs by default

- Add more dynamic waves debug reporting options

- Improve performance by reducing work done on scripted shader parameters every frame

- Make some shader parameters globally available

- Add reflections to ocean surface underside from water volume

- Fix precision artefacts in waves for mobile devices when far away from world centre

- Fix spectrum editor not working in play mode with time freeze

- Fix build error

- Fix *UnderwaterEnvironmentalLighting* restoring un-initialised values

- Fix precision issues causing very fine gaps in ocean surface

- Fix some memory leaks in edit mode

- Fix underwater surface colour being added to transparent parts of ocean surface when underwater

- Fix sample height warning for XR multi-pass

- Fix underwater caustics not working in build due to stripping

- Fix shadows breaking VR/XR single pass instanced

- Fix deprecated XR API call warning

- Fix underwater breaking camera when ocean is disabled during run-time

- Fix ocean falloff parameters allowing bad values

## 4.5

- Add soft/volume shadows support

- Add light/shadow layer support

- Remove caustics strength scaling by sun light and sea depth

- Remove ocean depth cache updating every frame in edit mode

- Add option to ocean input to allow it to move with ocean surface horizontally (was always on in last version)

- Allow save depth cache to file in edit mode

- Validate OceanRenderer transform component

- Validate enter play mode settings

- Improve feedback in builds when spectrum is invalid

- Improve spectrum inspector

- Fix underwater effect for MSAA

- Fix many cases where gaps would appear with underwater effect

- Fix underwater effect rendering at top of viewport in certain cases

- Fix shader errors for HDRP 8.2

- Fix undo/redo for spectrum inspector

- Fix dynamic waves crashing when flow or depth sim not enabled

- Fix culling issues with turbulent waves

- Fix precision issues causing gaps in ocean surface

- Fix shadow sampling not following camera after changing viewpoint

- Fix shadow sampling not following scene camera

- Fix caustics and shadows not being correctly aligned

- Fix material being allocated every frame in edit mode

## 4.4

- XR: add single pass instanced support to underwater effects

- Gerstner waves from geometry shader - allow wave scaling using vertex colour

- Performance: Fix for ocean depth cache populating every frame erroneously

- Usability: disable inactive fields on ocean components in Inspector

- Validation: improve lighting settings validation

- Fix for buffer overrun in height query system which caused crashes on Metal

- Fix for height query system breaking down at high frame rates when queries made from FixedUpdate

- Fix height queries when Scene Reload is disabled

- Fix various null reference exceptions in edit mode

- Fix for small wavelengths that could never be disabled

- Fix popping caused by shallow subsurface scattering colour

- Fix some null exceptions if OceanRenderer is not enabled in scene

- Fix mode (Global/Geometry) not applying in edit mode for ShapeGerstnerBatched component

- Fix global keywords not being local in underwater shader

- Fix ocean material keywords not applying to underwater

- Fix underwater breaking when dynamic scaling is used

- Fix caustics occasionally appearing on underside of surface

- Fix caustics briefly being too intense when switching cameras with adaptive exposure

- Fix indirect lighting controller multipliers not being applied

- Fix primary light intensity not reducing when primary light goes below the horizon

- Fix null exceptions when primary light is unset

- Clean up validation logging to console when a component is added in edit mode

**4.3**

- Add Submarine example scene created by the Digital Wizards team (Aldana Zanetta and Fernando Zanetta).

- Ocean now runs in edit mode

- Realtime validation in the form of inspector help boxes

- Fix *Segment registrar scratch exhausted* error that could appear in editor

- Fix underwater effect rendering when using baked occlusion culling

- Fix gaps appearing in underwater effect for very turbulent water

- Fix underwater raising exception when switching cameras

- Fix caustics rendering short of ocean surface when underwater

**4.2**

- Clamp reflection ray to horizon to avoid picking up below-horizon colours.

- Use sampler settings for normal map textures to allow changing filtering settings. Turned on anisotropic sampling to reduce blurring.

- Fix for a few cases where a crack or line is visible at the horizon.

- Fix for caustics showing above surface.

- Fix foam normals which were not working.

- Scale caustics intensity by lighting, depth fog density and depth.

- Show proxy plane in edit mode to visualise sea level.

- Fix leaked height query GUIDs which could generate 'too many GUIDs' error after some time.

- Validate ocean input shader, warn if wrong input type used.

- Fix for cracks that could appear between ocean tiles.

- Fix for null ref exception in SRP version verification.

- Warn if SampleHeightHelper reused multiple times in a frame.

- Metal - fix shader error messages in some circumstances.

- Fix for erroneous water motion if Flow option enabled on material but no Flow simulation present.

- Fix sea floor depth being in incorrect state when disabled.

## 4.1

- Automatically pick the *sun* light if no *Primary Light* is specified.

- Fix flow not affecting displaced waves.

- Fix flow not working in *Whirlpool* example scene in standalone builds.

- Fixed caustics effect when underwater and added distortion.

- Add support for local patch of Gerstner waves, demonstrated by GameObject *GerstnerPatch* in *boat.unity*

- Darkening of the environment lighting underwater due to out-scattering is now done with scripting. See the *UnderwaterEnvironmentalLighting* component on the camera in *main.unity*.

- Remove object-water interaction weight parameter on script. Use strength on material instead.

- Fix garbage allocations.

- Fix PS4 compile errors.

- Better retention of foam on water surface under camera motion.

- Multiple fixes to height query code that could produce 'flat water' issues or use incorrect wave data.

## 4.0

- First release!