

## Thank you

Thank you very much for choosing *Crest Ocean System* 4.7 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/crest-ocean/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 2019.4.8 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](mailto: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/crest-ocean/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

### 4.7

- 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 Game Object *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!