Arctic Adler (TideMesh) — User Manual

Version **1.0** — Last updated: October 1, 2025

Contents

1 Setup

A drop-in setup—no code required.

Add the Ocean

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1. Create or open a scene.
2. Drag the `Ocean` prefab into the Hierarchy and set it at (0,0,0).
3. Click **Play** to see animated waves.

Change Ocean Look

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1. Select the `Ocean` object in the Hierarchy.
2. In the **Inspector** under *WaveManager* find the style box.
3. Pick a **Style Preset** from the dropdown menu (updates during play).

Change Wave Size

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1. Select the `Ocean` object in the Hierarchy.
2. In the **Inspector** under *WaveManager* find the *Water Preset (Spectral)*.
3. Pick a **Spectral Preset** from the dropdown menu (updates live after a short delay).
4. (Optional) Expand the *Wave Height*, *Choppiness*, *Pattern size*, or *Animation Speed* foldouts. Each foldout has four layers that you can alter.

Make Objects Float

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1. Add any 3D object (e.g., a cube or boat).
2. Add a **Rigidbody** to the object (Unity built-in).
3. Add the package's **Buoyant Body** script to the objects component list in the inspector.
4. Click **Play**; the object will bob on the waves.
5. (Optional) Configure floating points. Find the Buoyant Body script in the inspector of the object you want to alter and find the Grid generator box. Then choose a Gen layout, set *Rows*, *Columns*, and *Layers*, then click *Replace Grid* (updates live).

2 Advanced Settings (Wave Spectrum)

This section covers how to adjust each wave spectrum layer beyond the spectrum presets and how to save a configuration. Each preset consists of four wave layers that have their own corresponding height, choppiness, lateral size and marching speed, which can be found in the ocean object under *WaveManager*. These can be altered in the inspector by opening the foldout menus for each category. The layers are populated in the same order from layer one to four in each foldout. After making your changes you need to recompile the scene in order to see your changes. Keep in mind if you change from a spectral preset to another your changes will be overwritten so be careful. To save the current configuration just press the button *Create from current*, which can be found when choosing *Custom* in the wave preset dropdown menu. A name has to be provided in order to save into custom. You can delete a saved configuration by pressing Delete selected. Multiple custom presets are supported.

The typical ranges signify the values that give some what realistic Oceans. Changing any of the parameters beyond these values in the positive scale is acceptable but may cause unwanted visual artifacts. To enable fast wave configuration I suggest setting all wave heights initially to zero and altering one height map at a time as the changes can be hard to see with multiple layers visible at the same time. The pattern size is calculated as (UV / Pattern size) so a smaller pattern scale will increase the wavelength giving you longer waves and a larger one will decrease wave length. I would not increase the Pattern size beyond 1 as it will be very small and any values near one are mostly used for surface definition rather than wave shape. Keep in mind most of the value found in the table below depend on other values so changing the pattern size will affect wave height and the same goes for choppiness.

The Water Preset also includes a Wave Layer foldout in which you can alter the energy spectrum values themselves. To understand how they work look at the Energy Spectrum section.

Wave Parameters

Parameter	Description	Inspector Label	Typical Range
Wave Height	Vertical amplitude	Wave Height	`0 - 16.0`
Choppiness	Crest sharpness	Choppiness	`0 - 0.4`
Pattern Size	Wavelength / Feature size	Horizontal Scale	`1 - 0`
Animation Speed	Visual wave speed	March Speed	`0 - 3`

Table 1: Wave controls for each Layer from longest to shortest as (X, Y, Z, W) respectively

3 Energy Spectrum

Each wave layer $L_0 \ldots L_3$ contains two spectra, written L_nA and L_nB. The layer is generated from the *A* spectrum; the *B* spectrum is only used as a fallback when the *A* values would go out of bounds (to fill gaps or clamp extremes). In normal use you only need to edit the *A* spectra and leave *B* at their defaults. After changing spectrum values, rebuild (or re-enter Play Mode) to see the update.

Spectrum Parameters

Table 2: Component reference

Name	What it does (visual effect)	Typical use / hint
Scale	Overall energy multiplier for this spectrum. *Tip:* Balance with *Choppiness* per layer.	Higher = taller waves.
Angle (deg)	Mean travel direction of the waves. *Tip:* Offset angles across layers to avoid uniform motion.	$-180°$ to $180°$.
Spread Blend	Width of directional spread (narrow ↔ wide). *Tip:* Higher values add side energy/cross-chop.	0 (beam)–1 (broad).
Swell	Bias toward low frequencies (longer waves). *Tip:* Use more on large layers; less on ripples.	0–1; higher = smoother swell.
Alpha	JONSWAP energy scale. *Tip:* Adjust sparingly; changes overall energy.	Use default ≈ 0.0081 unless needed.
Peak Omega	Peak angular frequency (controls period). *Tip:* Lower for longer swell; start around 0.7.	Lower = longer period/swell.
Gamma	Peak enhancement (sharpness around the peak). *Tip:* Increase gently to avoid ringing.	1–7; higher = narrower, more “peaky”.
Short Waves Fade	Damps high frequencies / tiny ripples. *Tip:* Raise to smooth the surface; lower for sparkle.	0–1; higher = fewer fine ripples.
Length Scale	World-space domain size for this spectrum. *Tip:* Match to scene scale to avoid tiling.	Larger = larger features, fewer repeats.

Quick Tips

- Want longer, smoother swell? Decrease *Peak Omega* or increase *Swell*.
- Want more “peaky” chop? Increase *Gamma* slightly and reduce *Short Waves Fade*.
- Nudge *Angle* per layer to avoid all waves moving in the same direction.

4 Ocean Configuration

The ocean is a camera-relative grid of reusable tiles ("pool"). As you move, tiles that cross the *Close Distance* behind the camera are returned to the pool and recycled ahead; tiles entering the *Activation Distance* in front are pulled from the pool and activated. *Lateral Padding* widens the active area to the sides so quick turns or strafes don't reveal gaps. *Cone Cos Threshold* limits activation to a view cone using the cosine of the angle to the camera's forward vector (1.0 = only straight ahead; 0.0 = full 180° around you). *Pool Size* must be large enough to cover all tiles that can be active at once given your activation distance and padding—too small causes popping/holes, too large wastes memory. A good workflow is: raise Padding until edges never show, then increase Pool Size until popping disappears, and finally trim values to the lowest that look stable.

Ocean Layout — Grid

Table 3: Grid layout controls

Name	What it does	Tips / Range
Pool Size	The number of tiles available to be activated. Make sure there is enough tiles based on the activation distance	0 to 2000
Activation Distance	Distance ahead of the camera where new tiles are spawned/refreshed.	0 to 3000
Close Distance	Distance on which tiles are always rendered even behind the camera	0 to 150
Lateral Padding	Extra border at the front sides of the camera to avoid missing tiles	0 to 5000
Cone Cos Threshold	View-cone culling using cosine of angle to view direction.	0 to 1

5 Ocean Physics

The cubemap reflection size and update interval can be found in the inspector under *waveManager* under the foldout Physics. This includes the wave depth which affects the energy spectrum during creation and the cubemap size and update period. The descriptions for each can be found below.

Table 4: Physics & reflections controls

Name	What it does	Tips / Range
Water Depth	Sea depth. effects energy spectrum.	0 to 5000 meters
Cubemap Size	Resolution of the realtime reflection cubemap.	4 to 512
Cubemap Update Interval	Frames between reflection probe updates. Is quite expensive so be careful	0.1 to 5 seconds

6 Advanced Settings (Lighting)

This section covers how individual lighting components can be changed. The lighting components can be found in the ocean object under the *waterMaterial* in the form of a list of foldouts. Each style preset changes these parameters so be careful when configuring your own not to overwrite them by changing the style preset. You can save your current lighting parameters by pressing *Create from current*, which can be found by choosing the custom style preset in the style box in *WaveManager*. You can have multiple custom styles saved which can be found as a list when custom is chosen in the style preset. Deleting a style is as easy as pressing *delete selected* when the current style you want to delete is chosen. All parameter changes are applied during run time so you can use this to your advantage to play with the parameters in real time to find the configuration you like. Below is the list of parameters, their descriptions and ranges.

Lighting Parameters

Table 5: What each control does and how to use it (cont.)

Name	What it does	Tips / Range
Reflections · Rim · Subsurface		
Cubemap Strength	Strength of environment probe reflections.	0 to 1
Rim Tint	Color at grazing angles based on Rim Strength.	Color (RGB)
Rim Strength	Rim intensity.	0 to 1
Subsurface Strength	Light transmission in thin water.	0 to 1
Crest Tint Strength	Extra tint applied on bright crests.	0 to 1
Foam		
Foam Strength	Master amount of foam overlay.	0–1
Depth Fade (m)	Depth over which underwater geometry fades out.	0.01–10 m
Depth Strength	Intensity of the depth-edge tint/boost near intersections.	0–0.6
Depth Color	Tint color applied near intersections (contact seam).	Color (RGB)
Contact Foam Strength	Intensity of the contact-ring foam at object–water intersections.	0.02–1.0
Contact Inner (m)	Inner radius of the contact foam band.	0.00–0.20 m
Contact Outer (m)	Outer radius of the contact foam band.	0.05–1.00 m
Contact Edge Foam Color	Color used to tint the contact foam band.	Color (RGB)
Foam Slope Strength	Amount of slope/curvature-driven foam (whitecaps).	0–3
Foam Slope Threshold	Threshold at which slopes start producing foam.	0–5
Foam Slope Width	Softness of the slope-foam threshold; higher = wider band.	0–2
Tessellation (performance)		
Tessellation	Base tessellation factor. Very performance intensive	1 to 1024
Max Tess Distance	Furthest distance tessellation is applied. Suggested distance 100 to 200 meters	(0 - 1000 m).
Pixels Per Edge	Screen-space quality per patch edge.	Raise until popping gone (4 - 64).
Frustum Guard Width	Margin outside frustum to avoid cracks.	Small buffer is enough (0 - 200).

Table 6: What each control does and how to use it

Name	What it does	Tips / Range
Color Ramp (Height)		
Low-Wave Color	Base water color	Color (RGB)
High-Wave Color	Tint applied near crests and high points.	Color (RGB)
Horizon Fog Color	Color mixed at far distances for aerial perspective.	Color (RGB)
Aerial Fog Density	How strong the fog is	0 to 1
Height Color Strength	Intensity of height-based color ramp.	0 to 2
Height Threshold	Center point of the height ramp (shifts where "mid" lies).	
Height Blend Power	Sharpness of the low/high transition.	0 to 4
Normals & Surface Detail		
Detail Normal Strength	The scale of high-frequency normal detail.	0 to 4
Normal Blend	Mix between base and detail normals	0 to 1.
Detail Tiling	UV scale for the detail normal.	1 to 32
Diffuse & Scatter		
Diffuse Strength	"Body" brightness not from reflections.	0 to 2
Crest Scatter Intensity	Forward scattering on thin crests.	0 to 10
Facing Scatter Intensity	View-dependent haze toward the light.	0 to 0.5
Ambient Lighting Strength	How much ambient/probe light fills water.	0 to 1
Specular / BRDF		
Specular Strength	Mirror-like highlight intensity.	0 to 5
Sun Angular Radius (deg)	Apparent size of the sun disc. (5 to 50 deg).	0 to 1
Sun Glint Strength	Intensity of sun sparkle field.	0 to 100.
Sun Glint Width	Width of the sun's glint	0 to 0.6
Sun Glint Gate (deg)	Limits glint based on sun's height Increase to make the sun glints less at noon	0 to 1
Spec Anisotropy	Stretches highlights along wind/slope direction.	-0.9 to 0.9

7 Buoyancy Physics (Buoyant Body)

The `Buoyant Body` component applies distributed buoyant and drag forces at a set of sampling points called ”floaters”. Each point samples the ocean height, surface normal, and flow and then the script computes a spring–damper buoyant force and a horizontal current drag, and sums these into forces/torques on the attached **Rigidbody**.

Core Physics

Table 7: Main physical controls

Name (Inspector)	What it does / guidance	Typical range
Heave Time Constant (s)	Submergence lag filter. 0 disables (instant response); 0.2–0.5 gives natural bobbing and reduces jitter. Does not look good on small objects	0–0.8
Slope Lift Factor	Blends force direction between world *Up* (heave-only) and the water *Normal* (adds upslope lift). 0 = vertical only.	0–1
Added Mass Fraction	Extra “virtual” mass (as a fraction of the rigidbody mass) to mimic fluid added-mass. Increase if objects feel too twitchy.	0–1 (default 0.5)
Damping Zeta	Dimensionless damping ratio of the heave spring. 1 is critically damped, < 1 bouncy, > 1 overdamped.	0.2–2
Normal Smooth (s)	Exponential smoothing time for water normals. Helps stabilize lift on noisy surfaces. 0 disables.	0–0.5
Flow Smooth (s)	Exponential smoothing time for water flow velocity. 0 disables.	0–0.5
Current Drag	Resists relative *horizontal* motion between the body and water. Raise for more “anchored” behavior in currents.	0–3
Fluid Density (kg/m^3)	Water density; controls buoyant strength. Fresh $\approx$ 1.000, sea $\approx$ 1.025.	0.9–1.05
Max Depth / Pt (m)	Per-point immersion clamp to prevent runaway forces if deeply submerged.	0.5–5
Up (vector)	The global “up” direction used when blending force direction and drawing gizmos. Leave at $(0, 1, 0)$ unless using custom gravity.	unit vector

Sampling / Points

Name	What it does / guidance	Typical range
Points	The list of `FloatOnWaves` children used as samplers. Use *Grid Generator* to (re)create them.	—
Default Point Radius	Initial radius for newly created points; each point’s buoyant area is πr^2. *Auto Calibrate* will set this for you.	0.05–0.5 m
Auto Calibrate Radii	When enabled, radii are computed from **Rigidbody mass**, **Fluid Density**, **Design Draft**, and # of points.	on/off
Design Draft (m)	Target static submergence used by Auto Calibrate. Increase for heavier-looking sit in the water.	0.2–1.0

Debug / Gizmos

Grid Generator (Floaters)

Name	What it does
Draw Normals & Normal Ray Length (m)	Renders per-point surface normals in the Scene view (green = aligned with Up).
Show Point Labels / Show Floater Balls	Labels and spheres for each floater for quick inspection.
Confirm Replace Grid	Ask for confirmation before the grid generator deletes/rebuilds points.
Sample Timeout (s)	How long a sample is trusted before it's considered "stale" (reduces its influence to avoid pops when temporarily unsampled).

The generator places `FloatOnWaves` children under your object based on the object's bounds. Use the layout that best matches your hull or raft.

Name	What it does / guidance
Gen Layout	Choose the distribution pattern: **Rect Grid**, **Two Rails**, **Perimeter Rect**, or **Polar Grid**.
Gen Use Collider Bounds	Prefer tight, physics-relevant extents from colliders; falls back to renderer bounds if off or no colliders.
Gen Y Offset	Vertical offset for single-layer placement. **Gen Layers** > 1 evenly spans from bottom to top of bounds instead.
Gen Layers	Number of vertical layers of floaters (e.g., catamarans, stacked pontoons).
Gen Margin Frac X/Y/Z	Shrinks the bounds before placing points to avoid edges. Fractions of half-extent; 0–0.45.
Replace Grid	Deletes existing direct children floaters and creates a new set from the current settings (asks if "Confirm Replace Grid" is on).

Common options **Layout: Rect Grid**

Uniform rows/columns across the (shrunk) bounds; good for rafts, flat decks, and simple hulls. *Tip:*

Name	What it does
Rows (`genRows`)	Number of points along the shorter X/Z axis.
Columns (`genCols`)	Number of points along the other horizontal axis.

Start with 3×3 or 3×4 and enable Auto Calibrate.

Layout: Two Rails

Places two longitudinal rails along the longer side of the bounds and distributes points along them; ideal for boats with two chines/keels or catamarans. The script automatically chooses X or Z as "length"

Name	What it does
Segments (`genCols`)	Number of points along each rail (min 2).
Rail Inset Frac	Inset of each rail from the side, as a fraction of *half* the width. 0 hugs the sides; 0.15 is a good start.

based on which bound is longer.

Layout: Perimeter Rect

Distributes points around the rectangle's perimeter; useful for rigid rafts or frames where support is around the edges.

Name	What it does
Perimeter Count	Total number of points around the rectangle (min 3).

Layout: Polar Grid

Concentric rings (ellipse-aligned to the bounds) with optional center point; great for round pontoons, discs, or radial craft.

Name	What it does
Ring Count	Number of concentric rings (outermost included).
Outer Ring Points	Points on the outermost ring; inner rings scale proportionally.
Equal Area Rings	If on, ring radii are spaced so each ring covers equal area (denser near center). Off = equal radial spacing.
Inner Gap (frac)	Leaves a central hole as a fraction of the outer radius (0 = no hole).
Include Center	Adds a single floater at the center (ignored if hole is large).
Stagger Alternate Rings	Offsets every other ring by half a segment to reduce alignment artifacts.

Quick Workflow

1. Add **Rigidbody** and **BuoyantBody** to your object.
2. Pick a **Gen Layout**, adjust the layout-specific fields, and click *Replace Grid*.
3. Leave **Auto Calibrate Radii** *on*; set *Design Draft* close to how deep you want the object to sit.
4. In Play, tune *Damping Zeta* and *Heave Time Constant* for feel. Use *Slope Lift Factor* for planing/lift behavior.
5. If the craft yaws from uneven support, add points or widen margins; if it feels sticky, lower *Current Drag*.