# AWESOME





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## **VEGETATION STUDIO PRO**

Vegetation Studio Pro is a vegetation placement and rendering system designed to replace the standard tree and detail system in the Unity terrain component. It can also spawn and render vegetation on standard unity meshes.

Vegetation is spawned on the terrain based on a flexible set of rules, and controlled with both texture and polygon masks. There is also an extensive Biome system that allows you to define areas with custom biomes and splatmap rules.

Vegetation Studio Pro is based on Unity's new Job system and Burst compiler. This allows all available cores to be used for procedural generation, culling, LOD selection and render list preparation. The Burst compiler and a data oriented structure gives a huge speed increase and a major reduction in main thread CPU use.

Vegetation Studio Pro has its own culling system and a custom render system for Vegetation.

Use your existing trees (SpeedTree, Nature Manufacture, Tree Creator and others), rocks and grass textures. Rendering is done using Unity's new Instancing and Instancing Indirect system. This means no overhead on culling or handling GameObjects. Vegetation Studio should work with most vegetation shaders that support instancing.

You create a Vegetation Package that references your selected trees and plants. Configure the spawn rules and apply it to a terrain. The same package can be re-used on terrains in multiple scenes. Any changes done to the rule set will update the terrain directly.

- Extensive Biome system
- Supports both Unity terrains and mesh terrains
- Rule based vegetation
- Manual paining system
- API for 3rd party tools and shaders
- Run-time masking system
- Instanced rendering
- Rule based splat map generation
- Touch bend grass and plants
- Universal billboard system
- Collider system
- Real-time editor updates
- Multiple terrains/cameras on a single Vegetation System
- VR-Support



• and much more.



# **SETTING UP VEGETATION STUDIO PRO**

This document will give you a quick guide to setting up Vegetation Studio Pro and biomes in a new project. It uses the new job system and burst compiler and requires some additonal setup.

## **SETTING UP UNITY**

The Vegetation Studio Professional beta has a few setup requirements.

The minimum requirement is Unity 2018.2.11 This will likely increase with time as Unity adds a bit more of the NativeArray/job functionality.

Set up a new project in Unity.

Go to Player settings and change the following settings.

- Scripting Runtime Version to .Net 4.x Equivalent
- Api compability level to .net 4.x

Configuration		
Scripting Runtime Version*	NET 4.x Equivalent	
Scripting Backend	Mono	
Api Compatibility Level*	.NET 4.x	
Disable HW Statistics*		
Scripting Define Symbols*		
UNITY_POST_PROCESSING_	_STACK_V2;VEGETATION_STUDIO_PRO	
Allow 'unsafe' Code	$\checkmark$	
Active Input Handling*	Input Manager	

Then open the Package Manager from the window menu. You need to enable show preview packages to see them all.



Packages	
In Project	All
▼ Packages	
Ads	2.0.8
Analytics Library	2.0.16
Burst	0.2.4-preview.25
Collections	0.0.9-preview.4
In App Purchasing	j 2.0.3
Jobs	0.0.7-preview.3
Mathematics	0.0.12-preview.13
Package Manager	UI 1.9.11
Post-processing	2.0.11-preview
TextMesh Pro	1.2.4
▶ Built In Package	5

In Unity 2018.3 + the window changed a bit and you need to turn on preview packages to see all of them

Deskapes		
Packages All packages •		Advanced v 0 Search by nackane name, verified, preview or version number
✓ Advertisement	2.3.1	Advertisement Show preview packages Up to date 2.3.1 # Remov
<ul> <li>Analytics Library</li> </ul>	3.2.2	
Asset Bundle Browser	1.7.0	Version 2.3.1 (2018.3 verified)
Cinemachine	2.2.8	
🗸 In App Purchasing	2.0.3	com.unity.ads
Oculus (Android)	1.29.1	Author: Unity Technologies Inc. Unity Ads is a video ad network for iOS and Android that allows you to quickly and effectively monetize your
Oculus (Standalone)	1.29.0	games.
OpenVR	1.0.2	
🗸 Package Manager UI	2.0.3	
Post Processing		
ProBuilder	3.0.9	
✔ TextMesh Pro	1.3.0	
✔ Unity Collaborate	1.2.15	
Windows Mixed Reality		
Xiaomi SDK	1.0.3	



Select and install 5 packages

- Mathemathics
- Jobs
- Collections
- Burst
- Postprocessing

Install the latest version of each package.

### **IMPORTANT: SOME 2018.2.X USERS HAVE REPORTED AN ERROR WHEN INSTALLING THE**

### LATEST MATHEMATICS PACKAGE. INSTALLING MATHEMATICS 0.0.12-PREVIEW 21 OR

### EARLIER SEEMS TO HAVE FIXED THIS. I EXPECT UNITY TO UPDATE A PACKAGE WITH A FIX

#### SOON.

### THERE IS ALSO A PROBLEM WITH THE LATEST BURST PACKAGES TRY TO STAY AT BURST

### **1.0.0-PREVIEW.6 OR EARLIER UNTIL UNITY COMES OUT WITH A FIX.**

These packages are needed to get Vegetation Studio running with the burst compiler and job system.

if you have the Post Processing stack installed direct from GIT or another source you need to uninstall this and use the version from the package manager.

When done import the Vegetation Studio Pro beta package.





For better speed in the editor turn of the Jobs debuger and Leak Detection.

To use the burst compiler in standalone builds you need to make sure to install **Windows SDK** and **VC++ toolkit** from Visual Studio Installer

Install the latest available version of each.





Workloads	Individual components	Language packs Installation locations	
Runtime f           Runtime s           VC++ 201           VS-+ 201           Visual C+-           Visual C+-           Visual C+-           Visual C+-           Visual C+-	or components based on Node, is vi or components based on Node, is vi upport for R development tools 5.3 v14.00 (v140) toolset for deskto 7 version 15.4 v14.11 toolset 7 version 15.5 v14.12 toolset 7 version 15.7 v14.14 latest v141 to 7 version 15.7 v14.14 latest v141 to 7 version 15.7 v14.14 libs for Spect 7 version 15.7 v14.14 libs for Spect 7 version 15.7 v14.14 libs for Spect 2017 Redistributable Update + compilers and libraries for ARM 4 compilers and libraries for ARM64 + runtime for UWP + tools for CMake	r.4.0 (x86) p ols re (ARM) re (ARM64) re (x86 and x64)	Summary > Visual Studio core editor > Game development with Unity → Individual components * Static analysis tools Windows 10 SDK (10.0.17134.0) VC++ 2017 version 15.7 v14.14 latest v141 tools VC++ 2017 version 15.7 v14.14 latest v141 tools NET Framework 4.6.1 targeting pack NET Framework 4.6 targeting pack
Windows	Universal CRT SDK XP support for C++		
y continuing, you a		ommunity Change edition you selected. We also offer the ability to download other software with Visual Studio. This software i its accompanying license. By continuing, you also agree to those licenses.	Total space required 3.03

## **UPGRADING FROM STANDARD VEGETATION STUDIO**

Vegetation Studio and Vegetation Studio Pro can not be in the same project. Remove the Vegetation Studio folders before importing. Also go to player settings and remove the VEGETATION\_STUDIO compiler define.

You need to set up again and create a new vegetation package.

### ADDING VEGETATION STUDIO PROFESSIONAL TO A SCENE.

After installing the Vegetation Studio Pro beta package you can add Vegetation Studio Pro to the scene using the "Add vegetation Studio Pro to scene" menu.



Next Window Previous Window Ctri	Ctrl+Tab I+Shift+Tab	F	• II M
Layouts	>		G
Debug	>		
Awesome Technologies	>	Mesh terrain setup tool	
Package Manager		Add Grass Patch Generator	
TextMeshPro		Regenerate all splatmaps	Ctrl+Shift+R
lextMeshPro	>	Add Vegetation Studio Pro to scen	1e
General	>	NIN.	and the second second
Rendering	>		
Animation	>		
Audio	>		
Sequencing	>		
Analysis	>		
Asset Management	>		
2D	>		
AI	>		
KB	,		

This will add the required component to the scene. The VegetationSystemPro object is what you will



If you add the terrain to the scene after adding VS Pro you need to manually add the terrain.

Find the Terrain and add the UnityTerrain component.



🔻 ط 🔽 Unity Terrain (Scrip	it)			💽 🕂 🔅
A.W.E.S.O.N		Unit	ty Terrain	
The Unity Terrain component Vegetation System Pro c	nent implements the omponent.	interface needed and	communication with	the
Add/Remove at Enable/Disa	able 🥅			
When set the terrain will automatic area calculati and builds				
Terrain Source ID	Terrain Sou	rce ID1		
() The Terrain Source ID c	an be set different on	each terrain and used	l for spawning rules.	

Next on the terrains tab on the Vegetation System pro component you drag and drop the terrains. You can add multiple terrains here.

Settings	Cameras	Terrains	
Vegetation	Biomes	Edit Biomes	
Environment	Render	Texture Masks	
Debug			
Add terrains			
You can add any terrain im terrains add the UnityTerra	plementing the IVegetationStudioT in component and then drag/drop t	errain interface. On standard he terrain GameObject here.	
Add terrain	🗊 None (Game Object)	0	
Add all Unity terrains	Add all Mesh terrains	Add all Raycast terrains	
Current terrains			
Unity terrain:	🗊 Terrain	0	
Area			
This sets the total area for Vegetation Studio. On automatic it joins the area of all added terrains. For streaming terrain setups configure your total world area manually.			
Automatic calculation	✓		
Recalculate			

The world area will be calculated automatic from all added terrains. For setups where you load



terrain run-time you uncheck automatic calculation and define the total world area.

Next we create vegetation packages/biomes. These are scriptable objects that hold all the rules for vegetation spawning. For this example we will create 2 biomes. a default biome and a forest.





Project Console	
Create +	
🔻 📩 Favorites	Assets ► Biomes
Q All Materials	🚳 Default
Q All Models	🚳 Forest
Q All Prefabs Q All Conflicted	
🔻 🚝 Assets	
🕨 🚔 AwesomeTechnologies	
🚝 Biomes	
and Scenes 🗧	
▶ 🚔 Packages	
	🚳 Assets/Biomes/Forest.asset

If you are going to use biomes together and create splat map rules it is important that all biomes are set up with the same number of textures.

Each biome can have its own splat map generation rules and use any subset of the total textures. This way one biome can use textures 1-5 while the other uses 4-8. There is no problem for the biomes to use the same textures. When the splatmap is generated the rules will be used inside the biome mask area.





Next you add the biomes to the biomes tab of the Vegetation System and name them. Here i set my "default" biome as default and the other as a forest biome. This biome type will also be set on the BiomeAreaMasks we create later.



(script) I I	: •
Cameras Terrains	
Biomes Edit Biomes	
Render Texture Masks	
tion packages. Each can be assigned a biomeID for use with the	
None (Vegetation Package Pro)	
Default (VegetationPackagePro)	
	+
No name	
Forest (VegetationPackagePro)	
Temperate Deciduous Forest	
No name	
01	
Temperate Deciduous Forest	om.

When added you can select what biome to edit on the edit biome tab. This process is similar to normal Vegetation Studio





Settings	Cameras	Terrains
Vegetation	Biomes	Edit Biomes
Environment	Render	Texture Masks
Debug		
Select biome/vegetation pack	age	
Selected vegetation package	2 Forest	÷
Select the biome to edit. C	hanges will be happen direct in the :	scene.
▼ General settings		
Package name	Forest	
▼ Add Vegetation Items		
Drop a Prefab with the veget category to get initial rules	tation item here to create new veger and settings correct.	tation item. Drop on selected
GRASS PLANT TRU DROP DROP D		
Drop a Texture2D to create get initial rules and settings	a new grass or plant vegetation ite correct.	m. Drop on selected category to
DROP		

## SETTING UP A BIOME MASK AREA

The default biome will be used everywhere where there is no BiomeMaskAreas. Add the BiomeMaskArea to a component and edit the nodes to select the area you want. There is also a pre made prefab you can drop in the scene.

For each biome mask area you select what biome should be in the mask area. If the Vegetation System has a biome/vegetation package of the same type it will be spawned within the mask.



🔻 💷 🔽 Biome Mask Area (Script)	<u>∎</u> ‡ ⇔
A.W.ES.O.M.E.	Biome Mask Area
Create the area where you want to r and/or include vegetation types	nodify the vegetation, you can remove
Insert Node: Ctrl-Click Delete Node: Ctrl-Shift-Click	
Show Area 🔽 Show Handles 🔽	
Select ground layers that will be us masks. These will be used in addit	ed for selection when adding and moving ion to unity terrains.
Ground Layers	Nothing +
Generate	e splatmap
This will generate the splatmaps will generate the splatmaps will generate the splatmaps.	th biomes for all Terrains based on current
Vegetation Blend settings	
Texture Blend settings	4
The blend curve defines how the experimental the main biome. Green is for the set of	lge area(within distance) will blend against lected biome. Red the main biome.
Blend distance Use noise	29





### **SPLATMAP RULES**

There is a TerrainSystem component on the same GameObject as the VegetationSystem component. This is used to set up splatmap rules for the added biomes. Select the biome you want to edit. Then enable the Use with splat map generation setting on the textures you want to use with this biome. You then set the distribution curves for height and steepness. There is also noise and weight settings.

Press the generate button to generate the splatmap for all terrains added to the vegetation system.



Select terrain	texture		
Use with auto		on 🔽	
Texture 8 Heig	,		
Texture 8 Stee	epness		
Use perlin noi			
Texture weigh	it		0 5



# **VEGETATION STUDIO MANAGER PRO**

The Vegetation Studio Manager Component is a manager component designed to keep sync between all Vegetation System Pro components in one scene.

It handles sync with Vegetation and Biome masks and has an API to control one or multiple Vegetation Systems run-time. Set new vegetation packages. Vegetation Density etc.

To create a new Vegetation Studio Manager Component select "Window/AwesomeTechnologies/Add Vegetation Studio Pro to scene" from the menu in Unity.

There should be only one instance of the Vegetation System Manager component per scene.

Settings Vegetation Systems Terrain Systems Vegetation Masks Postprocess volumes

## **SETTINGS**





## **VEGETATION SYSTEMS**



All Vegetation System Pro Components in the scene will auto register with the Vegetation Studio Manager Component and listed here.

## **VEGETATION MASKS**

All Vegetation Masks in the scene will auto register with the Vegetation Studio Manager. The manager will then make sure all VegetationSystems have masks assigned and removed as needed.

## **BIOME AREA MASKS**

All Biome Area masks in the scene will auto register with the Vegetation Studio Manager. The manager will then make sure all VegetationSystems have masks assigned and removed as needed.

## **POSTPROCESS VOLUMES**

The Vegetation Studio manager can help you automate the process of setting up post processing volumes for Biome areas.



A.W.E.S.O.M.I		■ ↓ ☆.
Version: 1.0.0.0		
Settings	Post process volumes	
Add profiles		
None (Post Process Profile)		•
Add post processing profiles here	e to set up PostProcessVolumes for the biomes	
Post process layer	PostProcessing	¢ ]
Remove profile		1
Enabled	✓	
Biome Type	Biome 1	÷
Volume height	20	1
Priority	0	
Blend distance		0
Weight	•	1
Profile	DesktopPostProcessingProfile (PostProcessProfile)	•

You start by adding one or more post processing profiles. You then set the biome type the profile will be assigned to.

Vegetation Studio will then create mesh collider volumes for the Biome Mask Areas of the assigned type on the scene.

In the image below you see two forest areas with a generated biome area.





On the biome mask Area GameObject two new components are added. The standard PostProcessVolume component and a Mesh Collider, this is needed to define the area for the post processing effect. The BlendDistance, Weight and priority settings is set from the same settings on the Vegetation Studio Manager.

This way you can have a global and several post processing volumes that the post processing stack blends between when you move around the scene.







🔻 🌐 🗹 Mesh Collider		💽 🕂 🔅
Convex		
Is Trigger		
Cooking Options	Mixed	\$
Material	None (Physic Material)	0
Mesh	Ħ	0

The global volume you add normally as you would with Unity's post processing 2.0.



# **VEGETATION SYSTEM PRO**

The VegetationSystemPro Component is the main component in Vegetation Studio Pro. It manages setup of terrains, cameras and Vegetation Packages and does the rendering of vegetation and billboards.

The documentation for this component is divided into several pages.



Settings Tab Cameras Tab Terrains Tab Vegetation Tab Biomes Tab Edit Biomes Tab Environment Tab Render Tab Texture Masks Tab Debug Tab



# **SETTINGS TAB (VEGETATION SYSTEM PRO)**

This page is part of the documentation for the **VegetationSystemPro** Component.

A.W.E.S.O.M	etation Stu Profess	Idio Sional
	Refresh vegetation	
Settings	Cameras	Terrains
Vegetation	Biomes	Edit Biomes
Environment	Render	Texture Masks
Debug		
Sea level Sea level is realtive to the min	nimum height of the bounds defined for	Vegetation Studio.
Sea level Exclude sea level cells	33 □	
<i>Cell size</i> VegetationCell size		100
Changing cell size will require	you to re-init the persistent storage.	
BillboardCell size	0	500
This sets the size of the billbo	ard cells. For normal use this does not	need to be changed.
Floating origin anchor	ANone (Transform)	0
Assign a Transform you want VegetationSystem object will	to use as a world anchor for floating ori be used.	gin. If no transform is set the

Sea level Cell size BillboardCell size Floating origin anchor



## **SEA LEVEL**

The sea level setting allows you to define your sea level on the terrains added to the VegetationSystemPro Component. It is relative to the lowest point in any of the added terrains.

Spawning rules for vegetation and splatmap generation use this as a 0 height. This way you can move the sea level and have splatmap rules and vegetation follow this height.

When the settings tab is active the sea level is displayed in the sceneview as a blue transparent plane

Sea level	
Sea level is realtive to the r	ninimum height of the bounds defined for Vegetation Studio.
Sea level	33
Exclude sea level cells	

### **EXCLUDE SEA LEVEL CELLS**

Exclude sea level cells can be used for setups where you have no underwater vegetation or rocks. It will remove internal cells where the entire cell is under sea level. This can speed up run-time spawning on island scenes with a lot of sea area since these cells are not evaluated when close to the camera.

## **CELL SIZE**



Vegetation cell size defines the size in meters for the internal cell structure. A smaller cell size will give faster run-time spawning as you move around the scene since a smaller area is loaded every time a new cell is visible.

Baking vegetation will allow you to use bigger cells since it is much faster to load pre-spawned



vegetation.

Larger cells give a faster init time since there are fewer cells, and also a bit less CPU time used in the render loop. Fewer cells to process to create the current render lists before frustum culling.

## **BILLBOARDCELL SIZE**



Billboard cell size, like the vegetation cell size, defines the area that is batched together for billboards. Larger areas give fewer drawcalls at the cost of updating a bigger area when you add/remove trees run-time with masks or the API.

## **FLOATING ORIGIN ANCHOR**



When using floating origin Vegetation Studio needs to know what object defines the root of the world. This should be the object you move to get rendering closer to the origo. If no object is assigned the GameObject/Transform of the VegetationSystemPro object is used.

Vegetation Studio calculates an offset using this transform and applies it in the renderloop at no extra render cost.



# **CAMERAS TAB (VEGETATION SYSTEM PRO)**

This page is part of the documentation for the **VegetationSystemPro** Component.

Vegetation Studio needs to be assigned one or more cameras in order to select and render vegetation.

You can add multiple cameras and enable/disable these as you want. They will share the internal cache and not use any resources when disabled. You can disable a camera by disabling the GameObject or the camera component itself.

Vegetation System Pro A.W.E.S.O.I Veg	(Script) ME etation Stu Profess	Idio sional
	Refresh vegetation	
Settings	Cameras	Terrains
Vegetation	Biomes	Edit Biomes
Environment	Render	Texture Masks
Debug		
Add cameras Add any camera you want to u viewpoint are used, Select rer also.	use for vegetation selection and rendering Ider direct to camera to avoid cameras re	g. If multiple cameras with different endering the other cameras selection
Add Camera	🖶 None (Camera)	0
Remove camera		
Camera Render direct to camera Render billboards only Camera culling mode	⊪Main Camera (Camera) ▼ ■ Frustum	
	d during editor mode to manage vegetati	on based on the active sceneview.

Add cameras Remove camera



#### Camera

## **ADD CAMERAS**

Drag and drop a camera here to add a new camera to Vegetation Studio. When you add Vegetation Studio to the scene from the menu it will try to automatically add the MainCamera.



## **EDIT/REMOVE CAMERA**

Remove camera		
Render direct to camera	$\checkmark$	
Render billboards only		
Camera culling mode	Frustum	

#### **REMOVE CAMERA**

This will remove the selected camera.

### **RENDER DIRECT TO CAMERA**

With multiple cameras added, render direct to camera should be enabled. This will make sure the camera does not see the other cameras selection and potentially render vegetation twice.

### **RENDER BILLBOARDS ONLY**

With render billboards enabled all mesh grass, plants and objects will be excluded and only the billboards of trees will render. Billboards will also render close to the camera. This can be used for reflection cameras for water etc that does not need the detail of mesh trees and plants.

#### **CAMERA CULLING MODE**

Camera culling mode will decide how the camera does culling of vegetation items.



• Frustum

When frustum is selected all vegetation is culled based on the camera frustum. For invisible trees and large objects behind the camera shadow visibility testing is done and the shadows is rendered.

• Complete360

When complete 360 is selected there is no frustum culling. Vegetation Studio will load and render vegetation in all directions from the camera position. This can be usefull for 360 video exports.

## **SCENEVIEW CAMERA**

When in editor mode a Sceneview camera is added automatically. This will always be the current active sceneview camera.

In editor mode all vegetation culling and selection is based on the current sceneview.

You can not remove this camera. It will not exist in playmode or standalone builds





# **TERRAINS TAB (VEGETATION SYSTEM PRO)**

This page is part of the documentation for the **VegetationSystemPro** Component.

In order to generate, paint and render vegetation Vegetation Studio needs to know what terrains to use. On this tab you can configure areas and add/remove terrains.

■ Vegetation Sys	ES.O.M		oń S Pro	Stur fessi	dio onal	<b>⊒</b> ! ⊀
		Refresh	vegetation			
Settings		Car	neras		Terrains	
Vegetation		Bio	mes		Edit Biomes	
Environment		Re	nder		Texture Masks	
Debug						
Add terrains						
You can add any te UnityTerrain comp Add terrain Add all Unity terr	onent and the	enting the IVegeta en drag/drop the te None (Game Add all Mes	rrain Game( Object)	Object here.	ace. On standard terrains av Add all Raycast terrair	:he ⊙
Current terrains						
Unity terrain:		Terrain				0
Area						
This sets the total streaming terrain s	area for Veg etups config	etation Studio. On ure your total world	automatic it area manu	tjoins the an ally.	ea of all added terrains. For	
Automatic calculation		✓				
		Reca	lculate			

Add terrains Current terrains Area



## **ADD TERRAINS**

Add terrains				
You can add any terrain imple UnityTerrain component and the second s	ementing the IVegetationStudioTerrain interface. On standard terrains add th then drag/drop the terrain GameObject here.			
Add terrain	🛪 None (Game Object)			

There are three kinds of terrains that can be added to the VegetationSystemPro Component. **UnityTerrains**, **MeshTerrains** and **RaycastTerrains**. See the documentation for each of these.

### ADD ALL UNITY TERRAINS

This will find all standard Unity terrains in the scene, add the UnityTerrain Component to them and then add them to the VegetationSystemPro Component.

#### **ADD ALL MESH TERRAINS**

This will find all pre made MeshTerrain Components in the scene and add them to the VegetationSystemPro Component.

### ADD ALL RAYCAST TERRAINS

This will find all pre made RaycastTerrain Components in the scene and add them to the VegetationSystemPro Component.

## **CURRENT TERRAINS**



This is a list of the current terrains added to the VegetationSystemPro Component. Select and press backspace to remove as terrain.

## AREA



Area				
This sets the total area for Vegetation Studio. On automatic it joins the area of all added terrains. For streaming terrain setups configure your total world area manually.				
Automatic calculation		✓		
		Recalculate		

### **TOTAL AREA**

The total area defines the "world" for the VegetationSystemPro component. Within this area there can be multiple terrains that can have vegetation. The internal cell structure is aligned with this area.

### **AUTOMATIC CALCULATION**

By default automatic calculation is enabled. When you add a terrain the area will recalculate and cover the total area of all added terrains.

### RECALCULATE

Press recalculate if you move or resize one of the added terrains in the scene.

### **RUN-TIME LOADED TERRAINS**

If you want to set up Vegetation Studio Pro with multiple terrains that will load run-time you need to disable automatic calculation. You then define an area that covers all the terrains that define your world.

When you start up the cell structure for the entire area is set up. As you create or load terrains runtime the terrain component will auto register itself with the VegetationSystemPro component and refresh the changed area. This way you can have a world of multiple terrains where only parts are loaded at a time.



# **VEGETATION TAB (VEGETATION SYSTEM PRO)**

This page is part of the documentation for the **VegetationSystemPro** Component.

This tab contains settings related to vegetation distances, seed and density.



Vegetation distances LOD control



#### Distance control Random seed

## **VEGETATION DISTANCES**

These distances control how far you can see vegetation from the added cameras.

Vegetation distances		
Grass/Plant distance	O	300
Additional mesh tree distance	o	400
Additional billboard distance		3000

### **GRASS/PLANT DISTANCE**

This is the basic visible distance in meters for all Grass, Plants and Objects. This distance can be reduced per object with the render distance factor. Down to 0 meters where the object is culled.

#### ADDITIONAL MESH TREE DISTANCE

On top of the grass/plant distance you can add additional distance where mesh trees and large objects are rendered.

### **ADDITIONAL BILLBOARD DISTANCE**

This is the total visible distance of tree billboards on top of the grass/plant distance and additional tree distance.

## **LOD CONTROL**



### **GLOBAL LOD DISTANCE FACTOR**

This allows you to control the distance for when LODs change between level. A higher factor gives a more detailed meshes in the distance. This factor is used for all items.


## **DISTANCE CONTROL**



### **DISABLE RENDER DISTANCE FACTOR**

When enabled the render distance factor that is set on each vegetation item is ignored. This will render all vegetation to the grass/plant or tree distance. This can be useful for testing on high end computers, making screenshots or videos where you want more detail in the distance

## **VEGETATION DENSITY**

Grass density	• • • •	
Plant density	0	
Tree density	••	
Object density	·0	
Large Object density		

This global settings allows you to control the density/sample distance of all vegetation items in a category.

It is designed to allow developers to expose settings for the end user. Low end computer can set a lower density on grass and plants and get a speedup from this. This setting does not affect baked vegetation in the persistent storage.

- Grass density
- Plant density
- Tree density
- Object density
- Large object density

## **RANDOM SEED**

Random seed
Seed
0



#### **SEED**

This seed is used as a base for all generation of vegetation. Changing this will "randomize" the vegetation in the scene.



# **BIOMES TAB (VEGETATION SYSTEM PRO)**

This page is part of the documentation for the **VegetationSystemPro** Component.

A.W.E.S.O.I	etation Stu Profess	Idio Idio
	Refresh vegetation	
Settings	Cameras	Terrains
Vegetation	Biomes	Edit Biomes
Environment	Render	Texture Masks
Debug		
Add Vegetation package	on packages. Each can be assigned a bior	neID for use with the biome system.
Add Vegetation package	None (Vegetation Package Pro)	)
Remove biome		
Vegetation package	Background Biome (Vegetation	PackagePro) O
Select biome	Default	
Biome name	Background	

Add vegetation package Remove biome

## **ADD VEGETATION PACKAGE**

Drag and drop a VegetationPackagePro/biome here to add it to the Vegetaion System. A Vegetation system can have multiple biomes active. Only the "Default" biome will show unless there are BiomeMaskAreas in the scene.





## **INCLUDED BIOMES**

Remove biome		
Vegetation package	Background Biome (VegetationPackagePro)	⊙
Select biome	Default	÷
Biome name	Background	

### **REMOVE BIOME**

Click Remove Biome to remove a biome from the VegetationSystemPro Component.

### **VEGETATION PACKAGE**

This is the selected vegetation package. you can drag/drop a new package here to swap out the current.

### **SELECT BIOME**

This sets the biome type of the vegetation package. If set as default it will show everywhere on the terrain where there are no BiomeMaskAreas. BiomeMaskAreas must match the selected BiomeType of the vegetation package

### **BIOME NAME**

A name of your choice for this vegetation package.



# **EDIT BIOMES TAB (VEGETATION SYSTEM PRO)**

This page is part of the documentation for the **VegetationSystemPro** Component.

The edit biomes tab of VegetationSystemPro allows you to add/delete and edit spawning rules for VegetationItems in a VegetationPackage/Biome.

Here you will add your trees, rocks, grass etc and adding rules to control where they spawn.



<ul> <li>Vegetation System Pro (S</li> <li>A.W.ES.O.M</li> <li>Vegetation</li> </ul>	etation Stu Profess	idio.
		sional
Settings Vegetation Environment	Refresh vegetation Cameras Biomes Render	Terrains Edit Biomes Texture Masks
Debug Select biome/vegetation package		
Selected vegetation package	1 Default biome	
<ol> <li>Select the biome to edit. Chang</li> </ol>	es will be happen direct in the scene.	
▼ General settings		
Package name	Default biome	
▼ Add Vegetation Items		
Drop a Prefab with the vegetation initial rules and settings correct.	n item here to create new vegetation ite	
GRASS		
Drop a Texture2D to create a ne and settings correct.	w grass or plant vegetation item. Drop (	
Select Vegetation Item		
	Trees	Large Objects
Objetcs	Plants	Grass
Delete selected ite		Copy selected item
General settings		
▶ Position		
Distance falloff		
▶ Colliders		
Noise rules		
<ul> <li>Biome area rules</li> <li>Concave location rules</li> </ul>		
Concave location rules Terrain texture rules		
Texture mask rules		
Vegetation mask rules		
Terrain source rules		



Select biome/vegetation package General settings Add Vegetation Items Select Vegetation Item General settings Position Distance falloff Colliders Noise rules Biome area rules Concave location rules Terrain texture rules Texture mask rules Vegetation mask rules Terrain source rules

## **SELECT BIOME / VEGETATION PACKAGE**

Select the vegetation package/biome you want to edit.



## **GENERAL SETTINGS**

Set the name of the Vegetation package.





## **ADD VEGETATION ITEMS**

In order to add new vegetation to the Vegetation Package, drag and drop the prefab of the plant, tree etc to the corresponding drop area. The difference between the areas is the default configuration for each item. Sample distance, Type, rotation etc.

In addition to prefabs you can drop Texture2D grass and flowers directly. They will be used as mesh grass/plants and you have a range of settings. If you want more detailed control you can make a custom grass mesh patch prefab using the **Grass Patch Generator.** 



## **SELECT VEGETATION ITEM**

To remove or edit a Vegetation Item in the package, select it from the grid.

Select Vegetation Item		
All	Trees	Large Objects
Objetcs	Plants	Grass
Delete selected item		Copy selected item

Delete item will remove it from the vegetation package.

Copy selected item will allow you to paste it as a new item with all the same settings.



## **GENERAL SETTINGS**

▼ General settings				
Vegetation type: Objects				
Prefab	👮 pf_boulder_01_040	0		
Name	pf_boulder_01_040			
Enable run-time spawn	$\checkmark$			
Render mode	Instanced	÷		
Disable shadows				
Seed				
Render distance: 150				
Render distance factor				
The render distance is calculated from the vegetation distance.				
	Refresh prefab			

### **PREFAB/TEXTURE**

This is the assigned prefab/texture for the vegetation item. You can drag/drop a new prefab here to switch prefabs.

### **ENABLE RUN-TIME SPAWN**

Enable run-time spawn must be enabled for Vegetation Studio to procedurally spawn the vegetation. Disable this to remove the item. This is also disabled when baking to the persistent storage. Vegetation is then loaded directly from the storage

### **RENDER MODE**

There are currently 3 different render mode for Vegetation Items.

• Normal

Using Graphics.DrawMesh. This is the slowest rendering method and a fallback for computers without instancing support.

• Instanced

Most Vegetation Items will use Instanced rendering. They will be rendered in batches of up to 1023 per draw call at a low CPU cost.

• Instanced Indirect

At release only Vegetation Studio Grass is rendered InstancedIndirect. This is rendering done from a ComputeBuffer on the GPU. when set up the CPU use is very low and there is no 1023 batch limit like Instanced Rendering.



### **DISABLE SHADOWS**

Check to disable shadows on this vegetation item. This will override shadow settings on the Render tab.

### **RENDER DISTANCE FACTOR**

The render distance factor is by default set to 1. You can reduce this to only render this vegetation item a shorter distance from the camera than set as a default distance for the category.

### **POSITION**



▼ Position				
Sample distance Density Randomize position Use sample point offset Rotation Rotation offset Min/Max scale Scale multiplier	▼ Rotate XVZ X 0 0.4714286 X 1	Y 0 Y 1	Z 0 1 Z 1	13.6 1
Use height rule Advanced Min/Max height	▼ □ 0		1500	
Use steepness rule Advanced Min/Max steepness	▼ □ 0		30	
Position offset	× 0	Υ 0	Z 0	









### **SAMPLE DISTANCE**

When trying to find possible positions for Vegetation Items the terrain will be sampled. Each Vegetation Item will sample at "Sample Distance" intervals in both x and z direction.

### **RANDOMIZE DISTRIBUTION**

When enabled the sampled position will be randomized within 50% of sample distance.

### **MIN/MAX SCALE**

The vegetation Item will be spawned with a random size based on the min/mac value of the scale.

### **POSITION OFFSET**

This Vector3 offset will be applied to the final sampled position. This is useful to move rocks down a bit more in the ground etc.

### **ROTATION**

- Rotate around Y
- Rotate XYZ
- Follow terrain
- Follow terrain scale
- Geological Buckling. (coming soon)

When tilting of specific spawned objects in the XZ planes (compass) are needed, for instance with geological buckling, or tilting from the plane of deposition for sedimentary rocks, Vegetation Studio has XZ sliders that will tilt the models to be spawned in world space. This is independent of Y axis rotation, so that models spawned with this method can be of any Y axis rotation, but will always have the same world space XZ rotation. Ensuring a more realistic geological outcome for spawned rocks and strata. The same technique can be employed for spawning a cheval de frise (sharpened angled stake defensive barrier), or wind-swept trees on a high cliff; indeed any repeating object that requires tilting from the horizontal at a given compass direction

### HEIGHT

Height setting is used to decide if a Vegetation Item can spawn in a location or not. It is relative to Sea level in Settings.





### **USE HEIGHT LEVEL**

Enable to use height level as part of the rules.

### **SELECTION TYPE**

- Simple
- Advanced

Advanced mode is still under development. Planned finished during the Beta.

### **MIN/MAX HEIGHT**

the min and max height allowed for the Vegetation Item.

### **STEEPNESS**

Steepness setting is used to decide if a Vegetation Item can spawn in a location or not. Value is location steepness (0-90 degrees)

### **USE STEEPNESS**

Enable to use steepness as part of the rules.

### **SELECTION TYPE**

- Simple
- Advanced
- Advanced mode is still under development. Planned finished during the Beta.

### **MIN/MAX STEEPNESS**

the min and max steepness allowed for the Vegetation Item.

### **DISTANCE FALLOFF**







The distance falloff rule is designed for grass. It will based on the current viewpoint reduce the grass density in the distance. This is a good speed increase for 1st person games at low visible difference.

### **COLLIDERS**

Change collider type from disabled to add a collider to the Vegetation Item. This is possible on trees, objects and Large Objects.

See **ColliderSystem** page for more detailed information.



There is several types of colliders available

• Capsule

This lets you configure a single Capsule collider for a tree or a rock

• Box

This lets you configure a single Box collider for a tree or a rock

• Sphere

This lets you configure a single Sphere collider for a tree or a rock

• Mesh

This lets you configure a single Mesh collider for a tree or a rock

Custom Mesh

This lets you configure a single Mesh with a mesh you assign

• From Prefab This option will use the original colliders set up on the Vegetation Item Prefab



▼ Colliders				
Collider type	Capsule			
Radius	0.25			
Height				
Offset	X 0	Υ 0	Z 0	
Distance factor	0		0.15	
Current distance: 22.50 meters				
The distance from the camera w distance. Trigger	here colliders are created.	Distance is a factor of th	e vegetation draw	
Include in NavMesh bake	✓			
NavMesh Obstacle Type	Capsule			
Center	X 0	Υ 0	Z 0	
Radius	0.5			
Height				
Carve	<b>v</b>			

### **NAVMESH OBSTACLE**

When enabled you can add a NavMesh obstacle to the generated colliders. This can carve out holes in Unity Navmeshes while the collider is active.

## **NOISE RULES**

Noise rules help you set the density and scale scale of the vegetation item using perlin noise.

You can also use cutoff rules to remove vegetation completely in some areas.



▼ Noise rules		
Use perlin noise cutoff Perlin noise cutoff Perlin noise scale Perlin noise offset Inverse perlin noise	✓ × 0 Y 0	0.5 5
Use perlin noise density Perlin noise scale Perlin noise offset Inverse perlin noise	✓ × 0 Y 0 ✓	5
Use perlin noise scale Min/Max scale Perlin noise scale Perlin noise offset Inverse perlin noise	▼ 0.7 × 0 ▼	5

## **BIOME AREA RULES**

Biome area rules work for any biome not set as default.

### **EDGE SCALE RULE**

The edge scale rule lets you scale the vegetation item based on the distance to the edge of the biome. This can give you smaller trees at biome edges etc.

### **EDGE INCLUDE RULE**

The edge include/exclude rule allows you to select vegetation item that only exist at the edge of the biome.



▼ Biome area rules		
Use biome edge scale rule Affected edge distance Min/Max scale Inverse		10
Use biome edge include rule Max edge distance Inverse	✓	10
Biome rules are not used with d	efault biome	

## **CONCAVE LOCATION RULES**

The concave location rule will test the terrain for concave/convex locations and only spawn the vegetation Item there.

▼ Concave location rules		
Use concave location rule Min height difference Distance Average		1 3
Inverse		
<ol> <li>Average setting sets if average</li> </ol>	or minimum edge samples are used.	

## **TERRAIN TEXTURE RULES**

Terrain texture rules will use the terrain textures on the Unity Terrains. You select one or more textures that must be used at a location to include/exclude.

### **EXCLUDE TERRAIN TEXTURES**

Enable toggle to show UI and use exclude rules. You can add multiple Terrain textures and rules.

### **INCLUDE TERRAIN TEXTURES**

Enable toggle to show UI and use include rules. You can add multiple Terrain textures and rules.



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🔻 Terrain texture rules			
Use include terrain texture rules	<		
	Add new i	tem	
	Delete selecte	ed item	
	Texture 1		÷
Min/Max Texture Placement Dens	0.1	_(	1
Use exclude terrain texture rules			
	Add new i	tem	
	Delete selecte	ed item	
Selected texture	Texture 6		÷
Min/Max Texture Placement Dens	0.1	_(	1
Terrain texture rules will only work for Unity terrains.			
In the case of multiple Unity terra the first terrain.	ins added to the veg	etation system the preview 1	textures shown are from

## **TEXTURE MASK RULES**

Configure texture mask rules. Masks must be added on the Texture Mask tab. Rules function the same way as terrain texture rules.



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🔻 Texture mask rules	
Use texture mask include rules	✓
Select texture mask group	1. Wheat field - RGBAChannel +
	Add new rule
Remove rule	
Select channel	R Channel \$
Inverse	
Min/Max mask density	0.1 1
Use texture mask exclude rules	
Select texture mask group	1. Wheat field - RGBAChannel +
	Add new rule
Remove rule	
Select channel	R Channel +
Inverse	
Min/Max mask density	0.1 1

## **VEGETATION MASK RULES**

Enable toggle to show Vegetation ID dropdown selection and use vegetation mask rule.

When enabled the vegetation item will only spawn in vegetation Mask Areas or Lines where the localized vegetation include the same.



▼ Vegetation mask rules	
Use with vegetation mask	$\checkmark$
Vegetation type	Vegetation Type 1 +

## **TERRAIN SOURCE RULES**

UnityTerrains, MeshTerrains and Raycast terrains can each have one or multiple TerrainSourcIDs. Check the include or Exclude here to decide what terrains the VegetationItem can spawn on.

▼ Terrain source rules		
Use terrain source include rule		
Include Terrain Source ID 1	Include Terrain Source ID 5	
Include Terrain Source ID 2	Include Terrain Source ID 6	
Include Terrain Source ID 3	Include Terrain Source ID 7	
Include Terrain Source ID 4	Include Terrain Source ID 8	
Use terrain source exclude rule		
Exclude Terrain Source ID 1	Exclude Terrain Source ID 5	
Exclude Terrain Source ID 2	Exclude Terrain Source ID 6	
Exclude Terrain Source ID 3	Exclude Terrain Source ID 7	
Exclude Terrain Source ID 4	Exclude Terrain Source ID 8	



# **ENVIRONMENT TAB (VEGETATION SYSTEM PRO)**

This page is part of the documentation for the **VegetationSystemPro** Component.

The environment tab allows you to adjust settings that relate to the environment, wind, snow, rain etc.



	244 C	Idio ional
Settings	Cameras	Terrains
Vegetation	Biomes	Edit Biomes
Environment Debug	Render	Texture Masks
Snow Snow amount Snow minimum height	°	
Snow minimum height is relativ		
<i>Billboard</i> Billboard snow color Snow brightness Snow blend factor		1 2.75
<i>Rain</i> Rain amount	•	
Wind		
Wind Zone Wind speed factor	\$WindZone (Wind Zone)	
CTI Wind Settings Wind Speed		
<i>HD Wind Settings</i> Base Wind Speed (km/h) Turbulence		45 0.4
3D Noise		Select
Flex Noise World Size Shiver Noise World Size		150 60
Gust Noise		Select
Gust World Size Gust Speed		600 20
Gust Scale	-0	0.35
Fantasy Adventure Environment   Windvectors	wina settings	Select
Base Wind Speed Wind Strength		0.33
Wind Amplitude		. 14
Trunk Wind Speed Trunk Wind Weight		10 4 0.5
Trunk Wind Swinging	ttinas	0.5
Wind Waves	ungs	Select
Wind Wave Size	·0	10
Wind Speed		1



Snow Rain Wind CTI Wind Fantasy Adventure Environment Wind Vegetation Stuido Grass Wind

### **SNOW**

Snow settings are a way to have global setting for snow. Shaders that have support for dynamic snow can now create a ShaderController class for the shaders. These classes will get a call when a environment setting changes allowing the class to modify the material of the vegetation.

This way the developers can manage their own settings for the custom shader and the user has only one place to adjust.



Billboard snow is a dynamic snow feature on the vegetation studio billboards. This can be enabled for shaders that supports it in the shader controller.

## RAIN

As with snow this rain setting is passed to the shader controller and 3rd party shaders that support wetness can implement this and adjust the material.



## WIND

Vegetation Studio Pro has support for 3rd party wind controllers. This is a system where the developer can implement an interface and the wind controller class is found by reflection. This way the shader controller will get access to a wind zone and the global wind speed factor.



## **INCLUDED WIND CONTROLLERS**

There are a few included wind controlers for 3rd party shaders.

They all have different setting based on the capabilities of the shader.

### **CTI-WIND**

CTI Wind Settings
Wind Speed
1

### FANTASY ADVENTURE ENVIRONMENT WIND

*Rain* Rain amount

0





Fantasy Adventure Environm Windvectors	ent Wind Settings		Select
Base Wind Speed Wind Strength Wind Amplitude		•	0.33 1 14
Trunk Wind Speed Trunk Wind Weight Trunk Wind Swinging		•	10 4 0.5

### **VEGETATION STUDIO GRASS WIND**





# **RENDER TAB (VS PRO)**

This page is part of the documentation for the **VegetationSystemPro** Component.

This tab contains setting related to the rendering of the vegetation.

Vegetation System Pro	etation Stu Profess	∎ : *. Idio ional
	Refresh vegetation	
Settings	Cameras	Terrains
Vegetation	Biomes	Edit Biomes
Environment	Render	Texture Masks
Debug		
<i>Shadows</i> Grass cast shadows Plants cast shadows Trees cast shadows Objects cast shadows Large objects cast shadows Billboards cast shadows		
Layers		
Grass layer	Default	
Plant layer	Default	
Tree layer	Default	
Object layer	Default	
Large object layer	Default	
Select what layers vegetation	i should render on.	
Shadow culling		
Sun Directional Light	🧟 Directional light (Light)	0
Assign the sun directional lig	ht. Used for shadow culling	

### Shadows



Layers Shadow culling

### **SHADOWS**

Each vegetation category has its own setting for shadows. You can disable/enable shadows for each category here.

In addition to this shadows can be disabled on a per item basis on the Edit Biome tab.

Shadows	
Grass cast shadows	
Trees cast shadows	$\checkmark$
Objects cast shadows	$\checkmark$
Large objects cast shadows	$\checkmark$
Billboards cast shadows	

## LAYERS

The layer settings defines what layers each vegetation category will be rendered on.

Layers		
Grass layer	Default ‡	
Plant layer	Default +	
Tree layer	Default +	
Object layer	Default +	
Large object layer	Default +	
Select what layers vegetation should render on.		

## **SHADOW CULLING**

In order to calculate if shadows from trees behind the camera can be seen Vegetation Studio needs to know what light is used as sunlight. It will try to find this automatic but add a light here if selected wrong or it is missing.



*Shadow culling* Sun Directional Light

😨 Directional light (Light)

🕛 Assign the sun directional light. Used for shadow culling



## **TEXTURE MASKS TAB (VEGETATION SYSTEM PRO)**

This page is part of the documentation for the **VegetationSystemPro** Component.

In Vegetation Studio Pro you can set up one or more textures as a texture mask group and use that in spawning rules to include or exclude vegetation.

	36	Idio Sional
	Refresh vegetation	
Settings	Cameras	Terrains
Vegetation	Biomes	Edit Biomes
Environment	Render	Texture Masks
Debug		
Select biome/vegetation package Selected vegetation package ① Select the biome to edit masks	1 Default biome for.	
Add texture mask group Mask type	RGBA Channel +	Add mask group
Select mask group	1. Wheat field - RGBAChannel	
Delete Texture mask group Name Add texture mask	Wheat field	None (Texture 2D) Select

Select biome/vegetation package Add texture mask group Select mask group



### **SELECT BIOME/VEGETATION PACKAGE**

Texture mask groups are saved in a vegetation package. To get started select the package you want to edit texture masks for. When added the texture group is only available for rules on that vegetation package.



### ADD TEXTURE MASK GROUP

To add a new texture mask group select the mask type and press the add mask button. The only mask type available now is RGBA Channel that can use RGBA32 or ARGB32 uncompressed textures. Other will be added later.

Add texture mask group			
Mask type	RGBA Channel	¢	Add mask group

### SELECT MASK GROUP

The select mask group selects what texture mask group you want to edit.

### **DELETE TEXTURE MASK GROUP**

Press to delete the group. Any vegetation items using this mask as a spawning rule will have the rule removed.

### NAME

Set the name you want on the texture mask group. This name will show up when setting up rules.



Select mask group	1. Wheat field - RGBAChannel	
Delete Texture mask group		
Name	Wheat field	
Add texture mask		
		None
		(Texture 2D)
		Select

### ADD TEXTURE MASK

A texture mask group can have multiple textures. Add new by dragging and dropping here.

Select what texture you want to edit settings for by clicking the image of the texture.



### **REMOVE TEXTURE**

Click remove texture button to remove a texture from the texture mask group.


#### **TEXTURE AREA**

Each texture has an area in worldspace to cover. This could be to fit the area of a single terrain, multiple terrains or even a high detail mask for a city area. The mask area is set by a rect where you set corner and width/height.

#### SELECT TERRAIN/SNAP TO TERRAIN

In order to do setup of the world area easier there is a snap function. Select any terrain in the list and press snap to terrain. This is useful for splatpmaps and other textures that align with a single terrain.

### **SNAP TO WORLD AREA**

Click the snap to world area button to scale the texture to fit the entire defined world area in the VegetationSystemPro component.



# **DEBUG TAB (VEGETATION SYSTEM PRO)**

This page is part of the documentation for the **VegetationSystemPro** Component.

<ul> <li>Vegetation System Pro ( A.W.E.S.O.N Vegetation System Pro (</li> </ul>	N/	ndio ional
	Refresh vegetation	
Settings	Cameras	Terrains
Vegetation	Biomes	Edit Biomes
Environment	Render	Texture Masks
Debug		
<i>Debug settings</i> Show vegetation cells Show potential visible cells Show visible cells Show biome cells Show vegetation mask cells Show billboard cells Show visible billboard cells		
Prefab tools		
	Refresh all prefabs	

Debug settings Prefab tools

## **DEBUG SETTINGS**

These settings will, when enabled, draw vegetation cells and billboard cells in the sceneview. This can be useful for debugging to see that the cells are created and follow the terrain heights.



Debug settings	
Show vegetation cells	
Show potential visible cells	
Show visible cells	
Show biome cells	
Show vegetation mask cells	
Show billboard cells	
Show visible billboard cells	

## **PREFAB TOOLS**

Refresh all prefabs will load the prefab of each vegetation item again. It will detect the shader used and add the shader controller and UI settings if available. This will reset any shader spesific settings exposed by the shader controller.

Prefab tools

Refresh all prefabs



# **VEGETATION PACKAGE PRO**

A Vegetaion package/biome is a scriptable object that holds all the procedural settings for the vegetation of a biome.

You assign this to a VegetationSystemPro component to edit and use the vegetation package.

It also holds splatmap generation rules and references to terrain textures.

Using packages to store vegetation makes it easy to re-use the ruleset on other terrains and projects.



	wesome Vegeta	tion Studio Professional	
! To edit an vegetation p	ackage add it to a vegetatio	in system pro component	
<i>Biome</i> Select biome			
Selected: pf_boulder_01_ VegetationItemID	_040	0af85cdd-e899-4a28-8d53-52aa5eda1506	
Terrain textures			
	7		
Texture 1 Height			
Texture 1 Steepness			
Use perlin noise Texture weight		1	1



# **TERRAIN SYSTEM PRO**

The TerrainSystem Component does splat map generation for the terrain. You can setup a rule set based on any number of textures in your terrain and based on height, steepness and other settings it will generate your terrain splat map.

Locked textures can be used to paint the terrain normally and will be kept even if you change the rule set and generate the splat map again. This way the manual work you do painting roads etc. will not be affected.

The component needs to be added to the same GameObject as VegetationSystemPro Component. This is done by default when setting up Vegetation Studio in a new scene. If Splat map generation is not needed, disable or remove the component.

Each biome can have its own set of splatmap rules that will be applied within the BiomeMaskArea with the transition blended between biomes based on the mask settings.

The vegetation package can store references to terrain textures. There is a system for reading these textures from a terrain or applying it to terrains. This helps you to set up new terrains with an already configured biome.



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▼Terrain System Pro (Script)	17-500 Hites	🖬 न
A.W.E.S.O	IME	Terrain System
Settings	Edit Biome Splatmap	Edit terrain textures
elect biome/vegetation package		
elected vegetation package	Default biome	
Select the biome to edit. Press the affected by this.	Generate Splatmap button to apply se	ttings to the terrains. Only unity terrains are
	Generate biome splatmap	05
🕛 You can lock textures. These will no	ot be not be removed when generating	the splat.
Gene	erate biome splatmaps - clear loc	ked textures
how heatmap 🦳		
Enable to show the terrain distributi generated.	on for the selected texture. Noise is a	an estimate and will not be the same as when
Automatic terrain texture distribution the terrain	on is done based on the curve setting:	s for height over water level and steepness(angle)
how terrain textures 🛛 🔽		
The textures on the first terrain, not	t in the package will show in the list be	elow. These are the actual textures used.
elect terrain texture		
se with auto splat generation 🦷 ock texture 🥅		
Locked textures are kept while gene	erating splatmaps	
Height/Steepness rules		
Noise/Concave/convex rules		

Select biome/vegetation package Select terrain texture Height/Steepness rules Noise/Concave/convex rules Edit terrain textures Select biome/vegetation package



### **SELECT BIOME/VEGETATION PACKAGE**

Select what vegetation package/biome you want to edit splat map rules for.



Select biome/vegetation package	
	1 Default biome +
Select the biome to edit. Press the affected by this.	he Generate Splatmap button to apply settings to the terrains. Only unity terrains are
	Generate biome splatmaps
You can lock textures. These will	I not be not be removed when generating the splat.
Ge	enerate biome splatmaps - clear locked textures
Show heatmap	
Enable to show the terrain distrib generated.	oution for the selected texture. Noise is an estimate and will not be the same as when
Automatic terrain texture distribution the terrain	ution is done based on the curve settings for height over water level and steepness(angle) of
Show terrain textures	$\checkmark$
The textures on the first terrain,	not in the package will show in the list below. These are the actual textures used.

### **GENERATE BIOME SPLATMAPS**

This will generate the splatmap for all Unity terrains added to the VegetationSystemPro component. Locked textures will be kept in the splatmap.

### **GENERATE BIOME SPLATMAPS - CLEAR LOCKED TEXTURES**

This will generate the splatmap for all Unity terrains added to the VegetationSystemPro component. Locked textures are cleared.

#### SHOW HEATMAP

Enabling this will show a heatmap on the terrains. This allows you to see the coverage of the selected terrain texture rule as if there were no other textures on the entire terrain.

#### SHOW TERRAIN TEXTURES

Enabled by default. When enabled the textures shown in the list is from the first added Unity Terrain and not the textures in the package.

#### SELECT TERRAIN TEXTURE

Select what texture on the biome you want to set splatmap rules for. "Use with auto splat generation" has to be enabled in order for a rule to be active.



Lock texture allows you to lock textures not used for splat generation. This can be useful for painting manual paths or other features and keeping them while regenerating the splatmap of a terrain.

Select terrain texture			
Use with auto splat generat Lock texture ① Locked textures are kep	g splatmaps		

### **HEIGHT/STEEPNESS RULES**

### **HEIGHT CURVE**

The height curve setting sets the use of the texture based on height. Vertical axis is amount and horizontal height where 1 is max.



Height value goes from 0 to the set Max

terrain height.

#### **STEEPNESS CURVE**

The steepness curve setting sets the use of the texture based on terrain steepness. Vertical axis is amount and horizontal steepness where 1 is max.





steepness value goes from 0 to 90

degrees.

#### **NOISE/CONCAVE/CONVEX RULES**

In addition to height/steepness rules you can use noise to control distribution.

There is also a concave and convex ruleset to add textures in concave and convex areas.

The Texture weight is a weight of the selected textures while blending in with others that could be in the same location.

▼ Noise/Concave/conve	(rules		
Use perlin noise			
Texture weight			
Use concave rules			
Use convex rules			

### **EDIT TERRAIN TEXTURES**

The edit terrain textures tab has some tools for reading from and adding terrain textures to terrains.



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📑 🔽 Terrain System Pro (S	cript)		5.	🔊 🗄 🌾
A.W.	E.S.O.M.E.	Terrain	System	
Settings	Edit B	iome Splatmap	Edit terrain textures	
Select biome/vegetation packa	ge			
Selected vegetation package	1 Default biome			
	Read text	ures from terrain		
1 This will replace textures in	the VegetationPackage/bi	ome with the textures from an	added Unity Terrain	
	Apply te	xtures to terrain		
This will replace textures or	n unity terrains with the tex	tures in the selected biome.		
Select terrain texture				
Terrain texture layer 8				
Texture Normal				
Select Select				
Texture tile size	X 15	Y 15		

### **SELECT BIOME/VEGETATION PACKAGE**

Select what vegetation package/biome you want to use.





### **READ TEXTURES FROM TERRAIN**

This will read all textures from the first Unity terrain added on the VegetationSystemPro component. The Vegetation Package has to be created with the same amount of textures as the terrain has.

### **APPLY TEXTURES TO TERRAIN**

This will apply all textures in the package to all Unity terrains on the VegetationSystemPro component.

#### SELECT TERRAIN TEXTURE

Select what terrain texture to edit.





### **TERRAIN TEXTURE LAYER**

You can here edit what diffuse and normal texture is used for a layer. Tile size can also be set.



# **TERRAIN TYPES**

In order to have a terrain to spawn or paint vegetation on Vegetation Studio needs to be assigned one or more terrains.

See the individual terrain type for how it works and is set up.

UNITY TERRAIN PRO MESH TERRAIN PRO RAYCAST TERRAIN PRO



# **UNITY TERRAIN**

In order to add a terrain to Vegeation Studio Pro it needs access to a component implementing an interface. This is done to have a common interface for multiple terrain types making it easier to extend and support terrain types.

To use a standard Unity terrain add the UnityTerrain Component to the same GameObject as the terrain. You can then add the terrain to the Vegeation System Pro component.

When a component is added it will store the position of the terrain. This is used for floating origin when terrains is loaded run-time. If you create the component run-time in code you need to set this terrain position to the terrains origin.



🔻 📾 🔽 Unity Terrain (Script)			I ⇒
A.W.E.S	3.0.M.E	Unity Terrain	
The Unity Terrain component imp	lements the interface needed a	ind communication with the Veg	etation System Pro component.
Add/Remove at Enable/Disable			
When set the terrain will add and disabled on the VegetationSystem	l remove itself when enabled/di em. This is only done in playmo	sabled. This will only work if au de and builds	tomatic area calculation is
Disable Unity trees/details			
When enabled this will disable U	nity trees and details at startu		
Terrain Source ID	Terrain Source ID1		
The Terrain Source ID can be set	et different on each terrain and	used for spawning rules.	

Add/Remove at Enable/Disable Disable Unity trees/details Terrain Source ID

## **ADD/REMOVE AT ENABLE/DISABLE**

For setups where you load and unload terrains run-time check this box. When loaded the component will auto register with the VegetaionSystemPro component in the scene. Remember that autocalculate area has to be turned off on the terrain tab of the VegetationSystemPro component to use this.

Add/Remove at Enable/Disable	
When set the terrain will add and disabled on the VegetationSystem	d remove itself when enabled/disabled. This will only work if automatic area calculation is em. This is only done in playmode and builds

## **DISABLE UNITY TREES/DETAILS**

When enabled this will disable draw on Unitys trees and detail. This is enabled by default since Vegetation Studio does its own rendering of Vegetation





## **TERRAIN SOURCE ID**

This setting gives the terrain an ID. This ID can be used for spawning rules. A vegetation item that only grows on one terrain etc. The same ID exists on the other terrain types.





## **MESH TERRAIN**

The mesh terrain allows you to add any mesh in the scene with a MeshRenderer. it will build an internal BVH tree used for sampling the height and normal of the terrain when spawning vegetation. Terrain Texture rules will be ignored.

This also allows for multi level spawning.

You can add a mesh terrain source to each of the meshes. This can be used for spawning rules.



### **MESH TERRAIN DATA**

Create a new MeshTerrainData object. This is a scriptable object that will store the generate BVH tree used for terrain lookup.

### **MULTI LEVEL SPAWING**

When enabled raycasts against the terrain can hit multiple levels of meshes



### ADD/REMOVE AT ENABLE/DISABLE

Enable this if you plan to load the MeshTerrains run-time

## **MESH TERRAIN SOURCES**

🖬 🔽 Me	esh Terrain (Script	)	<b>國</b> 井 (
.:	.W.E.S.O.M.E.		Mesh Terrain
	Settings	Mesh terrain sources	Debug
MESH DRO		Unity terrains to add them to	the terrain source data.
Includeo Meshes	d sources		
Mesh:	TerrainMesh (Me	sh I ⊙ Mesh Terrain Sourc	e 1 🛊 🛛 Remove
Mesh:	🔍 Cube (Mesh Ren	der 💿 Mesh Terrain Sourc	e 2 ‡ Remove
Mesh:	見 Cube (1) (Mesh F	Ren ⊙ Mesh Terrain Sourc	e 1 🕴 🛛 Remove
Mesh:	📕 Cube (2) (Mesh I	Ren ⊙ Mesh Terrain Sourc	e 1 🕴 🛛 Remove
Generat	te terrain data		
		Generate terrain data	
🕕 ті	he generated data will be	e stored in the assigned Mesh	TerrainData object.

### **GENEATE TERRAIN DATA**

To create a mesh terrain drag and drop one or more meshRenderers to the component. Then press generate terrain data.







## **RAYCAST TERRAIN**

Add the raycast terrain to any gameobject and define a bounds relative to the object position. It will then raycast the layers selected for colliders to find terrain position/normal during spawning.

Raycasting is done using the new RaycastCommand job system that goes wide on all cores.

🔻 📾 🔽 Rayca	st Terrain	(Script)				💽 🕂 🗞
A	.W.E.S.O.	N.E.S.		Raycast	Terrain	
	r <b>ain loading/</b> e at Enable/(		rigin			
autom.	set the terrain atic area calcu ode and builds	will add and lation is di	d remove itself whe sabled on the Vege	n enabled/disable tationSystem. Th	ed. This will only nis is only done	r work if in
						01
S <i>ettings</i> Area						
		Center	X 0	Υ 0	Z 0	
		Extent	X 1024	Y 150	Z 1024	
Ground laye	rs		Default			\$
Terrain Sou	rce ID		Terrain Source I	D1		\$
🕛 The Te	errain Source I	D can be s	et different on each	terrain and used	for spawning ru	les.
Info						
The ra it show	ycast terrain i: Id not be move	s designed ed run-time	to be in a fixed loc or follow cameras	ation. Except for 1 or characters.	floating origin m	ovement

### ADD/REMOVE AT ENABLE/DISABLE

For setups where you load and unload terrain run-time check this box. When loaded the component will auto register with the VegetaionSystemPro component in the scene. Remember that autocalculate area has to be turned off on the terrain tab of the VegetationSystemPro component to use this.

### **TERRAIN POSITION**

The terrain position is stored in editor mode and used as an original position when using floating origin in a scene.



#### AREA

The area is a Bounds defining the area you want to use for raycasting. Any collider within these bounds will be tested.

### **GROUND LAYERS**

Ground Layers should be set to the layers you have colliders that should be used as terrain.

### **TERRAIN SOURCE ID**

This setting gives the terrain an ID. This ID can be used for spawning rules. A vegetation item that only grows on one terrain etc. The same ID exist on the other terrain types.



# **COLLIDER SYSTEM PRO**

The collider system included in Vegetation Studio Pro will help you create colliders for your trees and rocks. Since there can be huge amounts of trees and rocks the collider system will create colliders when close to the camera.

The colliders are configured on each vegetation item on the Edit biomes tab of the Vegetation System Pro component.

Colliders are re-used from an internal pool.

Multiple cameras are supported and if cameras overlap only one collider is created for the same tree/rock.

## **SETTINGS**



Collider System Pro (Script)	Collider System	₪ ;;! \$,
Settings	Debug	
General info		
When enabled the collider system will creat assigned cameras. Collider settings are on	e colliders for objects and trees around each vegetation item.	the
Colliders are created in playmode and build		
<i>Visibility</i> Show colliders		

Check show colliders to see the generated collider object in the hierarchy.

## DEBUG

The debug setting shows how many instances are evaluated every frame. When within range the colliders are created.

Collider System Pro (Scr	ipt)	Collider System	■ ↓ ☆.
Settings		Debug	
<i>Debug info</i> Show visible vegetation cells			
Runtime info Visible cells: 76 Loaded instances: 1458 Visible colliders: 0			
	Refre	esh	



# **PERSISTENT VEGETATION STORAGE PRO**

Persistent Vegetation Stora	WASZICIO EIGINIA	n Storage
Settings	Stored Vegetation	Bake Vegetation
Edit Vegetation	Paint Vegetation	Precision Painting
The PersistentVegetationStorage C VegetationSystem Component or fr	omponent is designed to store baked vegetation om 3rd party systems. The Vegetation Item loca	generated from the rules in the itions are stored in a scriptable object.
Vegetation storage		
Storage	PersistentVegetationStorage_2 💿 🦳 👘	Create Storage
Create a new PersistentVegetation Create/AwesomeTechnologies/Per	StoragePackage object by right clicking in a proj sistent Vegetation Storage Package. Then drag	ject folder and select and drop this here.
Setup		
	Initialize persistent storrage	
Initialize persistent storrage will cl configuration of the VegetationSys	ear the current storrage and configure it to store tem component	vegetation items for the current
Status Cell count: 196		

Settings Stored Vegetation Bake Vegetation Edit Vegetation Paint Vegetation Precision Painting

### **SETTINGS**

In order to work the Persistent Vegetation Storage component needs

a **PersistentVegetationStoragePackage**. Create a new package and drag and drop it to the Storage slot in the inspector. The first time a package is added or if the package is initialized for another terrain it will ask you to initialize it. You can also press the create storage button to have one created and saved in the project folder for you.

When initialized it will work for only this terrain with the current vegetation cell size. If you change



the cell size you need to initialize the storage again. This will clear all data in the storage.

Persistent Vegetation Stor	age (Script) O.M.E. Persistent Vegetatio	n Storage.		
Settings	Stored Vegetation	Bake Vegetation		
Edit Vegetation	Paint Vegetation	Precision Painting		
The PersistentVegetationStorage VegetationSystem Component or	The PersistentVegetationStorage Component is designed to store baked vegetation generated from the rules in the VegetationSystem Component or from 3rd party systems. The Vegetation Item locations are stored in a scriptable object.			
Vegetation storage				
Storage	■PersistentVegetationStorage_4 ©	Create Storage		
Create a new PersistentVegetationStoragePackage object by right clicking in a project folder and select Create/AwesomeTechnologies/Persistent Vegetation Storage Package. Then drag and drop this here.				
Setup				
Initialize persistent storrage				
Initialize persistent storrage will clear the current storrage and configure it to store vegetation items for the current configuration of the VegetationSystem component				
Status Cell count: 196				

### **VEGETATION STORAGE**

Create a Persistent Vegetation Storage Package by right clicking in a project folder and select Create/Awesome Technologies/Persistent Vegetation/persistentVegetationStorage Package and give it a name. Then drag/drop the package to the slot.



You can also have Vegetation Studio create it for you. It will be stored in the PersistentVegetationStorageData folder under Assets.





#### **SETUP**

If you change the cell size or world area of the VegetationSystemPro component you need to initialize the storage again. This will clear any vegetation instances in the storage

Setup	
Initialize persistent storrage	
Initialize persistent storrage will clear the current storrage and configure it to store vegetation items for the current configuration of the VegetationSystem component	

### **STATUS**

This shows the total cell count in the storage.

Status	
Cell count: 196	

### **STORED VEGETATION**

This tab shows you info about all the vegetation stored in the storage.



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V 📾 Persistent Vegetation Sto	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	etation Storage	<b>₪</b> ≓ ⇔,
Settings	Stored Vegetation	Bake '	Vegetation
Edit Vegetation	Paint Vegetation	Precisi	ion Painting
Storage size: 0.00 mbyte Total item count: 2,233,438			
<i>Status</i> Disable persistent storage			
Select biome/vegetation package Selected vegetation package	1 Default biome		
Select Vegetation Item			
Information : GrassFrond02 Use vegetation masks Instance count: 966,231			
Vegetation Studio - Baked vegeta	tion : 966,231		Clear instances
	Clear selected Vegetation Item from	m storage	
	ems from the selected biome from storage. ar ALL items from the selected biome	e from storage	
Clear	ALL BAKED items from the selected bi	ome from storage	
CI	ear ALL items from all VegetationPack	kages/biomes	
Clear	ALL BAKED items from all Vegetation	Packages/biomes	

### **STORAGE SIZE**

This is the total storage size saved on disk. The disk size only updates when you save the scene.

Total item count is the number of instances in the storage.

#### **STATUS**

You can enable/disable the persistent storage by checking this.



### **SELECT BIOME/VEGETATION PACKAGE**

In order to see the vegetation stored select the VegetationPackage/biome you want to see vegetation instances for.

### **SELECT VEGETATION ITEM**

Select each item to see the number of stored instances.

If you have vegetation from multiple sources. baked, manually painted, imported, added with API etc you will see a count per source with an option to clear instances per source.

### **CLEAR INSTANCES**

There are several options to clear baked or all instances from one or more vegetation packages. Select enable runtime spawn if you want to edit the spawning rules again.

## **BAKE VEGETATION**

In order to bake the results of the run-time spawning rules to the storage package select the vegetation item you want to bake and press the "Bake vegetation from ruleset button". This will create all instances for the terrain and store it in the package.

Use the "Bake ALL" button to bake all vegetation items to the package. This will also disable the "run-time spawn" on each vegetation item. After bake it is loaded form the storage.


V 🖬 Persistent Vegetation Storag	ge (Script) IME. Persistent Vegetation	n Storage
Settings	Stored Vegetation	Bake Vegetation
Edit Vegetation	Paint Vegetation	Precision Painting
Select biome/vegetation package Selected vegetation package	Default biome	
Select Vegetation Item		
	Bake Vegetation Item from ruleset	
Bake vegetation item will calculate all instances of the vegetation item in the terrain and store this in the persistent storage. This will also disable 'Enable run-time spawn' on the vegetation item.		
	Bake ALL Vegetation Items from ruleset	t
Bake ALL Ve	egetation Items from all VegetationPack	ages/Biomes

#### **SELECT BIOME/VEGETATION PACKAGE**

Select the biome you want to bake vegetation from



#### **EDIT VEGETATION**

This allows you to manually add, remove and edit any tree, object or large object in the persistent storage.

If you edit an items position, scale or rotation the VegetationSourceID will be set to manual edit.



V 🖬 Persistent Vegetation Sto	MANY CONSIGNATION	n Storage
Settings	Stored Vegetation	Bake Vegetation
Edit Vegetation	Paint Vegetation	Precision Painting
Select biome/vegetation package Selected vegetation package	1 Default biome	
Select Vegetation Item		
Select ground layers that will be terrains.	used for selection when adding and moving mask	s. These will be used in addition to unity
Ground Layers	Nothing	
Insert Vegetation Item: Ctrl-Click Delete Vegetation Item: Ctrl-Shift-C	lick	
Select the Vegetation item to edit	t. Move/scale and rotate handles will show up in t	he sceneview.

Add new items with Ctrl-click in the terrain. Remove with Ctrl-Shift-Click



All items within range will get normal unity move, rotate and scale handles. Mode is selected with the normal unity buttons.





### **PAINT VEGETATION**

The persistent storage has a painting tool for painting grass and plants. It works in a similar way unity terrain painting tool does but with some additional functionality.



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Persistent Vegetation Sto	orage (Script) S.O.M.E. Persistent Vegetatio	n Storage
Settings	Stored Vegetation	Bake Vegetation
Edit Vegetation	Paint Vegetation	Precision Painting
Select biome/vegetation package		
Selected vegetation package	1 Default biome	
Select Vegetation Item		
Selected: pf_boulder_01_040		
Select ground layers that will be terrains.	e used for selection when adding and moving mask:	s. These will be used in addition to unity
Ground Layers	Nothing	
		<b>* * * ∛</b> ∛ ∛
Delete Vegetation: Ctrl-Click		
Delete Vegetation will only remo	ove vegetation of the selected type.	
Settings		
Randomize Position		
Paint on colliders		
Use steepness/angle rules		
Sample distance Brush Size		5
	rotation mode set in the VegetationPackage	

#### PAINTING

You paint with left click in the map, remove instanced with ctrl-click.

#### **SETTINGS**

- Randomize position will add randomness to the sample positions on top of the point grid you see in the terrain
- Paint on colliders
   With this enabled you will be able to paint vegetation on any collider in the scene as well as the terrain
- Use steepness/angle rules





With this enabled each vegetation items steepness rules (set in VegetationSystem component) will be applied before painting

- Sample distance This is the density of the painting
- Brush size The size of the brush







### **PRECISION PAINTING**

The precision painting tool is similar to the normal painting tools but works a bit differently. While the normal painting tools project a brush from above and down on the terrain and colliders the precision painting tool will use a ray from the camera perspective. The normal of the hit point will be used as up direction for the placed vegetation. This allows for fine tuning the positioning.

The precision tool will allow you to paint on any mesh, even without a collider.



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V 🖬 Persistent Vegetation St	orage (Script) S.O.M.E. Persistent Vegetatio	n Storage
Settings	Stored Vegetation	Bake Vegetation
Edit Vegetation	Paint Vegetation	Precision Painting
Select biome/vegetation package Selected vegetation package	1 Default biome	
Precision Painting will allow you vegetation upside down if the ro	to fine place vegetation. Position is based on a scr tation settings is set to follow terrain.	een ray and will even allow you to place
Select Vegetation Item		
Select ground layers that will b terrains.	e used for selection when adding and moving masks	;. These will be used in addition to unity
Ground Layers	Nothing	
<i>Settings</i> Painting mode	Terrain And Meshes	
This will raycast any enabled n	neshes in the scene for position.	
Use steepness/angle rules Sample distance		2.28





Internally the painting tool is building up an octree of all gameobjects with meshes in the scene and manually raycasting these to find the mesh intersection.









### **PERSISTENT VEGETATION STORAGE PACKAGE**

The persistent vegetation storage package is a scriptable object designed to store vegetation instances for a single terrain. You create the package with right clicking in any project folder. Choose "Create/Awesome Technologies/persistent vegetation/Persistent vegetation storage package". Give the package the name you want and assign it to the PersistentVegetationStorage component.

The package is configured to serialize binary. A text serialization will be slow and use way more space and memory. You might have to configure your version control software to store this file in binary.

See the **PersistentVegetationStorage** component for more info.



# **VEGETATION MASKS**

Vegetation masks are a set of Components designed to control vegetation. They can used both design and run-time. By adding areas with polygons or lines with a width you can remove, add or modify vegetation within the area. Common use cases are roads, houses, city areas etc.

See the components linked below for a more detailed description.



Example with a house with a vegetation mask. Vegetation will adapt to the house/mask as it is moved in the scene.

#### MASK TYPES

See the available mask types for a detailed description on use.

#### **Vegetation Mask Area Pro**

#### **Vegetation Mask Line Pro**



**Vegetation Beacon Pro** 



# **VEGETATION MASK AREA**

The VegetationMaskArea component will handle run-time masking of vegetation. It is designed to be added to GameObjects in the scene and will make the vegetation adapt based on the settings. A mask will follow, scale and rotate with the GameObject. It can also be saved with prefabs and instanced at run-time.

In addition to the area defined by the nodes in the component, each vegetation type, Grass, Plants, Trees, Objects and Large Objects can be filtered and can have an additional range outside of the polygon mask area.

Masks are used at spawn time when new areas are loaded and will not affect rendering speed. Masking out vegetation may result in better performance.

Node editing Handles Mask settings Global vegetation removal Localized vegetation placement Script access



In this example an extra mask area that only removes trees is added to clear the area in front of the house. In addition to this each



house has its own mask.



This image shows a VegetationMaskArea component added to a house mode. It has nodes on the house corner and in addition to this an added range to remove trees and plants.



🕼 🔽 Vegetation Mas Ve	k Area (So egetatio		io	<b>a</b>
Create the area who remove and/or inclusion			e vegetation, y	ou can
Insert Node: Ctrl-Click Delete Node: Ctrl-Shift-	Click			
Show Area Show Handles		2		
<i>Mask settings</i> Mask Name				
Global vegetation remo	oval			
The area within the texture. To get a 10 the same distance.	additional pe )0% removal	rimeter rang in this area	e will be filtere set min and ma	d by a noise ax range to
Remove Grass				
Additional perimeter ra	nge	0	0	0
Noise scale		-0		5
Remove Plants		$\checkmark$		
Additional perimeter ra	nge	0	@	0
Noise scale		-0		5
Remove Trees				-
Additional perimeter ra Noise scale	nge	0	@	0 5
Remove Objects Additional perimeter ra		<b>▼</b> ₀		0
Noise scale	nge	- -		5
		_		
Remove Large Objects Additional perimeter ra	nae	▼ 0		0
Noise scale	nge			5
Localized vegetation of				
Localized vegetation pla Include vegetation	acement			
	Add vege	tation type		
Selected item		1. Item		
Vegetation type		Vegetatio	n Type 1	
Density				
Size			0	1
	Delete sel	ected item		
Accuracy		-0		0.2
	Calculate	hull outline		
This will analyze th calculate an outline		the GameOb	ject and childro	





This house prefab has a vegetation mask. When you add it to a scene or move it, the vegetation will adapt.

#### **NODE EDITING**

You can add or delete nodes directly in the editor. Nodes will follow terrain. Ctrl-Click in terrain to add new nodes. They will position between the 2 closest nodes. Ctrl-Shift-Click to delete nodes.

Insert Node: Ctrl-Click Delete Node: Ctrl-Shift-Click

#### HANDLES

Show area will draw a line around the polygon area in scene view in the editor.

Show handles will add movement handles to the scene view. Use them to move nodes. With high node count polygons (100+) handles at a distance will not show.



Show Area 🔽 Show Handles 🔽

#### **MASK SETTINGS**

Mask name will show up as a label in center polygon in sceneview when option is turned on in VegetationStudioManager component.

Mask settings	
Mask Name	

### **GLOBAL VEGETATION REMOVAL**

In order to remove vegetation within the polygon area enable Remove Grass, Plants, Trees, Objects or Large objects.

Additional perimeter ranges is in meters and can be set separate for each category. This will expand the polygon in all directions.

<i>Global vegetation removal</i> Remove Grass Additional perimeter range Noise scale	✓ 1.882353		5.647061 12.7
Remove Plants Additional perimeter range Noise scale	0 0	] <b>@</b>	0
Remove Trees Additional perimeter range Noise scale	▼ 0 	Φ	0
Remove Objects Additional perimeter range Noise scale	▼ 0 	Φ	0
Remove Large Objects Additional perimeter range Noise scale	▼ 0 	•	0 5

The additional perimeter range has a min/max value. The distance between these is using a perlin



noise for the falloff to give a more organic edge to the mask. You can adjust the Noice scale to get a result you like

#### LOCALIZED VEGETATION PLACEMENT

Localized vegetation placement is used to include a vegetation type in a mask area. This could be used to introduce a new plant in a farm area, flowers in a garden etc. that does not spawn in the rest of the environment. In order to use enable the Include vegetation checkbox and add one or more Vegetation Types. The Vegetation item you want to spawn will have to be set with the same Vegetation Type ID in the Vegetation System component.

The vegetation item will be spawned inside the polygon with all normal rules set in the Vegetation System inspector.

The density and size of these rules can be overridden on a mask to mask basis. This can give the effect of plants growing over time etc. These settings can be set run-time. This could allow you to switch plants in a field, make them bigger etc.

Localized vegetation placement		
Include vegetation	$\checkmark$	
Add	egetation type	
Selected item	1. Item	
Vegetation type	Vegatation Type 1	
Density	0 1	
Size	1	
Delet	e selected item	





VegetationMaskArea component set up to exclude all vegetation within the area and add a plant to the field. Here size parameter is changed.

In order to configure a plant to be used for vegetation masks you select the plant in the vegetation system inspector and at the bottom enable the Use Vegetation Mask checkbox and select an ID. Multiple plants can have the same ID.





#### **SCRIPT ACCESS**

The VegetationMaskArea component can be added to any GameObject run-time. The mask settings and points can be changed at any time. The UpdateVegetationMask() function must be called after changes from script.

Available mask settings and default values are:

```
public bool RemoveGrass = true;
public bool RemovePlants = true;
public bool RemoveTrees = true;
public bool RemoveObjects = true;
public bool RemoveLargeObjects = true;
public float AdditionalGrassPerimiter = 0;
public float AdditionalPlantPerimiter = 0;
public float AdditionalTreePerimiter = 0;
public float AdditionalObjectPerimiter = 0;
public float AdditionalLargeObjectPerimiter = 0;
```

Adding a new mask to a gameobject:

```
VegetationMaskArea vegetationMaskArea =
this.gameObject.AddComponent<VegetationMaskArea >();
vegetationMaskArea.RemoveGrass = true;
vegetationMaskArea.AdditionalGrassPerimiter = 5f;
vegetationMaskArea.ClearNodes();
vegetationMaskArea.AddNodesToEnd(pointListArray);
//Points in the array list needs to be in worldspace positions.
vegetationMaskArea.UpdateVegetationMask();
```

The VegetationMaskArea will internally create a object of the type PolygonMaskArea. If you have your own system to manage polygon areas you want to mask you can also do this directly. You need to create a new PolygonMaskArea object, configure it and add it to the

static VegetationStudioManager.AddVegetationMask(maskArea); function.

You will be responsible for keeping a reference to the PolygonMaskArea object and remove it and add a new if you want to change it. VegetationStudioManager.RemoveVegetationMask(maskArea);



List<Vector3> worldSpaceNodeList = GetWorldSpaceNodePositions(); //Replace GetWorldSpaceNodePositions with your own code to make a list if Vector3 positions in worldspace. PolygonMaskArea maskArea = new PolygonMaskArea { removeGrass = RemoveGrass, removePlants = RemovePlants, removeTrees = RemoveTrees, removeObjects = RemoveObjects, removeLargeObjects = RemoveLargeObjects, additionalGrassWidth = AdditionalGrassPerimiter, additionalPlantWidth = AdditionalPlantPerimiter, additionalTreeWidth = AdditionalTreePerimiter, additionalObjectWidth = AdditionalObjectPerimiter, additionalLargeObjectWidth = AdditionalLargeObjectPerimiter }; maskArea.AddPolygon(worldSpaceNodeList); VegetationStudioManager.AddVegetationMask(maskArea);

Look in VegetationMaskArea.cs for example on how to add localized vegetation placement from code also.



# **VEGETATION MASK LINE**

The VegetationMaskLine component will handle run-time masking of vegetation. It is designed to be added to GameObjects in the scene and will make the vegetation adapt to them based on the settings. A mask will follow, scale and rotate with the GameObject. It can also be saved with prefabs and instanced at run-time.

In addition to the area defined by the nodes in the component, each vegetation type, Grass, Plants, Trees, Objects and Large Objects can be filtered and can have an additional range outside of the polygon mask area.

Masks are used at spawn time when new areas are loaded and will not affect rendering speed. Masking out vegetation may result in better performance.



▼	ເອັ ⊽Vegetation Mask Line (Sci Vegetati		io		P \$.
	Create the area where you want and/or include vegetation types	to modify the	vegetation, you	can	remove
	Insert Node: Ctrl-Click Delete Node: Ctrl-Shift-Click				
	Show Area Show Handles	2			
	<i>Mask settings</i> Mask Name				
	Global vegetation removal				
	The area within the additional pe texture. To get a 100% removal same distance.	rimeter range in this area s	e will be filtered b set min and max	iya i rang	noise e to the
	Remove Grass	✓			
	Additional perimeter range	0	0	0	
	Noise scale	-0		- 5	5
	Remove Plants	✓			
	Additional perimeter range	0	••	0	
	Noise scale	-0		- 5	5
	Remove Trees	$\checkmark$			
	Additional perimeter range	0	•	0	
	Noise scale	-0		- L	5
	Remove Objects	$\checkmark$			
	Additional perimeter range	0	<b>—</b> —	0	
	Noise scale	_0		- L	5
	Remove Large Objects	$\checkmark$			
	Additional perimeter range	0	<b>—</b> —	0	
	Noise scale	-0		- !	5
	Localized vegetation placement Include vegetation				
	Width			- [	2
	Set the with of the line segments	in meters to	define the mask	area	





Image showing a road masked using a VegetationMaskLineComponent. (Roads by Sentieri)

Node editing Handles Mask settings Global vegetation removal Localized vegetation placement Width Script access

#### **NODE EDITING**

You can add or delete nodes direct in the editor. Nodes will follow terrain. Ctrl-Click in terrain to add new nodes. They will be positioned between the 2 closest nodes. Ctrl-Shift-Click to delete nodes.



Insert Node: Ctrl-Click Delete Node: Ctrl-Shift-Click

### HANDLES

Show area will draw a line around the polygon area in scene view in the editor.

Show handles will add movement handles to the scene view to move nodes. With high node count polygons (100+) handles at a distance will not show.

Show Area	
Show Handles	✓

#### **MASK SETTINGS**

Mask name will show up as a label in the center polygon in sceneview when option is turned on in VegetationStudioManager component.



### **GLOBAL VEGETATION REMOVAL**

In order to remove vegetation within the polygon area enable Remove Grass, Plants, Trees, Objects or Large objects.

Additional perimeter distances is in meters and can be set separately for each category. This will expand the polygon in all directions.



<i>Global vegetation removal</i> Remove Grass	✓	
Additional perimeter range Noise scale	0 @ O	0 5
Remove Plants Additional perimeter range Noise scale	▼ 0 0 -0	0 5
Remove Trees Additional perimeter range Noise scale	▼ 0 0 -0	0
Remove Objects Additional perimeter range Noise scale	▼ 0 0 —●	0
Remove Large Objects Additional perimeter range Noise scale	<ul> <li>✓</li> <li>●</li> </ul>	0



It is possible to set a different additional distance on top of the line width. In this case trees are kept further away from the road.



Plants limited for a distance and grass only removed in road area.



Road masked out with a VegetationMaskLine component. (Roads by Sentieri)

The additional perimeter range has a min/max value. The distance between these is using a perlin noise for the falloff to give a more organic edge to the mask. You can adjust the Noice scale to get a result you like

### LOCALIZED VEGETATION PLACEMENT

Localized vegetation placement is used to include a vegetation type in a mask line. This could be used to introduce a new plant as a hedge, plant trees in a row by a road etc. that does not spawn in the rest of the environment. In order to use enable the Include vegetation checkbox and add one or more Vegetation Types. The Vegetation item you want to spawn will have to be set with the same Vegetation Type ID in the Vegetation System component.

The vegetation item will be spawned inside the polygon with all normal rules set in the Vegetation System inspector.

The Density and size of these rules can be overridden on a mask to mask basis. This can give the effect of plants growing over time etc. These settings can be set run-time. This could allow you to switch plants in a field, make them bigger etc.



Localized vegetation placement		
Include vegetation	$\checkmark$	
Add ve	getation type	
Selected item	1. Item 💠	
Vegetation type	Vegatation Type 1 +	
Density		
Size	1	
Delete	selected item	



#### WIDTH

Width setting controls the with of the line mask.





#### **SCRIPT ACCESS**

The VegetationMaskLine component can be added to any GameObject run-time. The mask settings and points can be changed at any time. The UpdateVegetationMask() function must be called after changes from script.

Available mask settings and default values are:

```
public bool RemoveGrass = true;
public bool RemovePlants = true;
public bool RemoveTrees = true;
public bool RemoveObjects = true;
public bool RemoveLargeObjects = true;
public float AdditionalGrassPerimiter = 0;
public float AdditionalPlantPerimiter = 0;
public float AdditionalTreePerimiter = 0;
public float AdditionalObjectPerimiter = 0;
public float AdditionalLargeObjectPerimiter = 0;
```

Adding a new mask to a gameobject:

```
VegetationMaskLine vegetationMaskLine =
this.gameObject.AddComponent<VegetationMaskLine>();
vegetationMaskLine.RemoveGrass = true;
vegetationMaskLine.AdditionalGrassPerimiter = 5f;
vegetationMaskLine.ClearNodes();
vegetationMaskLine.AddNodesToEnd(pointListArray);
//Points in the array list needs to be in worldspace positions.
vegetationMaskLine.UpdateVegetationMask();
```

The VegetationMaskLine will internally create a object of the type PolygonMaskLine. If you have your own system to manage polygon areas you want to mask you can also do this direct. You need to create a new PolygonMaskLine object, configure it and add it to the

 $static \ Vegetation \\ Studio \\ Manager. \\ Add \\ Vegetation \\ Mask (mask \\ Line); \ function.$ 

You will be responsible for keeping a reference to the PolygonMaskLine object and remove it and add a new if you want to change it. VegetationStudioManager.RemoveVegetationMask(maskLine);



Internally the VegetationMaskLine component will make one PolygonMaskLine object per segment in the line.

```
List<Vector3> worldSpaceNodeList = GetWorldSpaceNodePositions();
//Replace GetWorldSpaceNodePositions with your own code to make a list if Vector3
positions in worldspace.
PolygonMaskLine maskLine = new PolygonMaskLine
{
removeGrass = RemoveGrass,
removePlants = RemovePlants,
removeTrees = RemoveTrees,
removeObjects = RemoveObjects,
removeLargeObjects = RemoveLargeObjects,
additionalGrassWidth = AdditionalGrassPerimiter,
additionalPlantWidth = AdditionalPlantPerimiter,
additionalTreeWidth = AdditionalTreePerimiter,
additionalObjectWidth = AdditionalObjectPerimiter,
additionalLargeObjectWidth = AdditionalLargeObjectPerimiter
};
maskLine.AddPolygon(worldSpaceNodeList);
VegetationStudioManager.AddVegetationMask(maskLine);
```

Look in VegetationMaskLine.cs for example on how to add localized vegetation placement from code also.



# **VEGETATION BEACON**

The VegetationBeacon Component is designed to include/attract vegetation to areas. You can add it to any GameObject and save it with a prefab.

You configure radius and a fallout curve. The curve controls the density from the center of the area and out to the edge. This can be used to add trees, plants or objects to an area. The included vegetation will still react to any configured rules, terrain textures, height, steepness, noise etc. And can also be culled by other VegetationMasks.



Flowers in the field here is placed using a Vegetation Beacon



Settings Radius Falloff curve	e Vegetation Beacon (Script) الله الله الله الله الله الله الله الل			
Localized vegetation placement         Add vegetation type         Selected item       1. Item         Vegetation type       Vegetation Type 2	Radius	-0	18.9726	
Localized vegetation placement         Add vegetation type         Selected item       1. Item         Vegetation type       Vegetation Type 2	This curve sets the spawn chan	ce of the localized vegetation. I	eft center,	
Add vegetation type       Selected item     1. Item       Vegetation type     Vegetation Type 2				
Selected item     1. Item     +       Vegetation type     Vegetation Type 2     +				
Vegetation type Vegetation Type 2 #				
Size 1.19	Vegetation type Density Size	Vegetation Type 2		

#### **SETTINGS**






Sceneview Gizmo showing the area/radius of the vegetation beacon

#### RADIUS

This sets the effect radius of the Vegetation Beacon.



#### **FALLOFF CURVE**

The falloff curves sets the density of the included vegetation types. Left of the curve is the center of the area and right the edges in all directions. Top is 100% of the normal density of the Vegetation Item. Bottom is 0 spawn chance.

### LOCALIZED VEGETATION PLACEMENT

Localized vegetation placement is used to include a vegetation type the beacon area. This could be used to introduce a new plant in a area, flowers in a garden etc. that does not spawn in the rest of the environment. In order to use enable the Include vegetation checkbox and add one or more Vegetation Types. The Vegetation item you want to spawn will have to be set with the same Vegetation Type ID in the Vegetation System component.

The vegetation item will be spawned inside the area with all normal rules set in the Vegetation System inspector.

The density and size of these rules can be overridden on a mask to mask basis. This can give the effect of plants growing over time etc. These settings can be set run-time. This could allow you to switch plants in a field, make them bigger etc.

Localized vegetation placement						
Add vegetation type						
Selected item	1. Item 💠					
Vegetation type Density Size	Vegatation Type 2 ‡ 1 1.29					
Delete selected item						

In order to configure a plant to be used for vegetation masks you select the plant in the vegetation system inspector and at the bottom enable the Use Vegetation Mask checkbox and select an ID. Multiple plants can have the same ID.







### **BIOME MASK AREA**

The biome mask area allows you to define areas on the terrain that will contain a different biome. Create the polygon area and select a BiomeType. This will spawn vegetation from VegetationPackages/Biomes with the same BiomeType added to the VegetationSystemPro component.





r 🖻 🔽	Biome Mask Area (Script)		🔊 🕂 🕈
M	N.E.S.O.M.E.	Biome Mask Ar	ea
•	Create the area where you want and/or include vegetation types	to modify the vegetation, you can	remove
Inser	t Node: Ctrl-Click		
	e Node: Ctrl-Shift-Click le edge: Ctrl-Alt-Click		
1099			
•	Edges betwee 2 disabled edge r calculating edge distance in rul	odes will not be included when es and blending.	
Show	ı Area	▼	
Show	ı Handles	$\checkmark$	
•		e used for selection when adding a sed in addition to unity terrains.	
Grou	und Layers	Nothing	
	Generat	e splatmap	
0	This will generate the splatmap current rules in the vegetation	s with biomes for all Terrains base packages.	ed on
Vege	etation Blend settings		



Texture Blend settings						
The blend curve defines how the	edge area(within distance) will blend s for the selected biome. Red the main					
biome.	s for the selected blome. Ked the main					
Blend distance	0 10.3					
Use noise	✓					
Noise scale	O 4					
When enabled noise will be used create the edge blend values.	l in addition to the fallout curve to					
Mask settings						
Mask Name	Small Forest					
Select biome	Boreal Forest \$					

### **NODE EDITING**

You can add or delete nodes directly in the editor. Nodes will follow terrain. Ctrl-Click in terrain to add new nodes. They will position between the 2 closest nodes. Ctrl-Shift-Click to delete nodes.



### HANDLES

Show area will draw a line around the polygon area in scene view in the editor.

Show handles will add movement handles to the scene view. Use them to move nodes. With high



node count polygons (100+) handles at a distance will not show.

Show Area	✓
Show Handles	✓

### **GROUND LAYERS**

Ground layers sets the layers used as terrain when editing nodes. This is needed for Mesh and Raycast terrains.

### **VEGETATION BLEND SETTINGS**

These 2 curves defines how the Vegetation from the Biome Mask Area blends with the biome under it. This blend happens within blend distance.

### **TERRAIN BLEND SETTINGS**

This curves defines how the textures/splatmap from the Biome Mask Area blends with the biome under it. This blend happens within blend distance.

#### **BLEND DISTANCE**

The distance in meters from the biome edge used to blend between the biomes

#### **USE NOISE**

Enable noise in the blend area

#### **NOISE SCALE**

Scale of the noise.

### **MASK SETTINGS**

#### MASK NAME

Set the name of the Biome Area Mask. Will show in the sceneview when selected.



#### **SELECT BIOME**

Select what biome will be in the Biome Mask Area



# **RUNTIME PREFAB SPAWNER**

The Runtime Prefab Spawner component is designed to instantiate prefabs related to the trees or objects in Vegetation Studio. It allows you to assign a prefab to a Vegetation Item. When the item is within range of the camera an instance of the prefab is created at the exact location of the item. This item will be removed automatically when the item is out of range again.

The use case for this could be to add effects like falling leaves, insects near flowers, sounds from the old tree, harvesting logic etc. The prefabs can have any scripts attached.

The rules set up in the prefab spawner is saved in the vegetation package.



📾 🔽 Runtime Prefab Spawn	er (Script)			1
A.W.E.S.O.M.E	Runtir	ne Prej	fab Spawner	
Settings	Editor		Debug	
Select biome/vegetation packa				
Selected vegetation package	1 Desert			
Select Vegetation Item				
All	Trees		Large Objects	
Objetcs	Plants		Grass	
		*		
Selected item	rock_01_LOD0 Add run-time prefab	rule		
Runtime prefab	🗊 GreenSphere			G
Spawn frequency				1
Scale		Υ 1	Ζ 1	
Add vegetation item scale				
Rotation Offset	X 0 X 0	Y 0 Y 0	Z 0 Z 0	
Prefab layer	Default			
Seed				12
Use pooling system	$\checkmark$			
Distance factor				0.25
Current distance: 50.00 meter:	5			
The distance from the came current vegetation item draw	ra where prefabs are insta v distance.	ntiated. D	istance is a factor of th	
F	Remove run-time prefa	ib rule		

This approach allows you to add special functionality to large amounts of vegetation items with no extra overhead of culling and processing the effect gameobjects in the hierarchy.



echnologies

Vegetation Studio Pro

You add it to the GameObject with the VegetationSystem component and configure.

In this example video we added a prefab with a falling leaves particle effect to one of the tree models. When any tree of this type gets within range it will instantiate a copy of the effect with the same position as the tree. When it is out of range it is removed automatically. This will allow for effects on huge amounts of trees or plants with no overhead of culling and gameobject hierarchy handling.



Image showing the falling leaves.

#### **SELECT BIOME/VEGETATION PACKAGE**

Select what vegetation package you want to edit rules for.



Select biome/vegetation package Selected vegetation package 1 Desert \$

#### **SELECT VEGETATION ITEM**

Select the vegetation item you want to add or edit rules for.



#### ADD RUN-TIME PREFAB RULE

Click this to add a rule to the selected item. A item can have more than one rule.



#### **EDIT RULE SETTINGS**

These are the spawing rules for each added prefab. Adjust to get the frequency and position you want.



Runtime prefab	🧊 GreenSphere							
Spawn frequency						-	1	
Scale	X 1				z			
Add vegetation item scale	$\checkmark$							
Rotation	X 0		0		Ζ	0		
Offset	X 0		0		Ζ	0		
Prefab layer	Default							÷
Seed							12	
Use pooling system	✓							
Distance factor							0.25	
Current distance: 50.00 meters								
The distance from the camera where prefabs are instantiated. Distance is a factor of the current vegetation item draw distance.								
Remove run-time prefab rule								

#### **SPAWN FREQUENCY**

Spawn frequency is the chance of a prefab being spawned on a vegetation instance. 1 = 100% of instances.

#### **SCALE**

This controls the scale of the prefabs. This overrides any scale set in the transform of the prefab from before.

#### ADD VEGETATION ITEM SCALE

Trees and rocks have a random scale set on the vegetation item. select this to have the prefab scale with the vegetation item instance.

#### **ROTATION**

Rotation in localspace of the vegetation item.

#### **OFFSET**

Offset in localspace of the vegetation item



#### **PREFAB LAYER**

Here you can set the layer the instantiated prefab will be added to.

#### **SEED**

Random seed for selection of what instances that get a prefab spawned.

#### **USE POOLING SYSTEM**

By default prefabs will be using the built in pooling system. Prefabs are disabled and enabled before used again. Uncheck this if the prefab can not be pooled.

#### **DISTANCE FACTOR**

This sets the distance from camera where the prefab will be created/removed

#### **REMOVE RUN-TIME PREFAB RULE**

Click this to remove the prefab rule.



# **TOUCH REACT SYSTEM PRO**

Vegetation Studio has a Touch React system that allows grass and flowers to bend when in contact with selected meshes or colliders in the scene. To enable this add a TouchReactSystem component to a GameObject in the scene. There should be only one of these components in the scene. When adding Vegetation Studio Pro to the scene one is created by default.

If you are not planning to use touch react system just disable the component or remove it.

The touch react capability can be added to Objects or Large Objects spawned by the VegetationSystem component or any GameObject with a collider or Mesh.

It is also possible to do advanced rendering using a custom material to a layer invisible to the main camera. See the Car track guide linked below.

Settings Tab Editor Tab Debug Tab Adding touch react to your scene Touch React Collider Component Touch React Mesh Component Requirements

Video showing a car set up with a touch material on a Trail Renderer to create a persistent track in the grass. See this guide for a more detailed look at setting up the car tracks.







By adding a TouchReactCollider component to the boat you can force the grass to only grow up to the boat.

### **SETTINGS TAB**





🔻 📴 🔽 Touch React System (Scr	ipt)	<b>n</b> \$,
AWESOME	100	
Touch	React	
Same Balling and		
Version: 1.0 RC2		
Settings E	Editor D	ebug
Touch react system will bend gra Only one instance per scene.	ass and plants in an area arou	ind a camera.
<i>Settings</i> Auto select camera	~	
<ol> <li>Select a camera to follow.</li> </ol>		
Touch React layer		31
Select a layer not visible by any touch buffer for selected collide	vother camera. This is used t rs and meshes within range.	o render a
Buffer resolution	Normal	÷
Pixel resolution of the touch rea 1024x1024 and High = 2048x2		ormal =
Affected area (meter)		50
Area around camera affected by resolution on the mask.	touch react. Increasing rang	e reduces
Current resolution 0.05 meter		

#### **AUTO SELECT CAMERA**

By default Camera.MainCamera is used for touch React area selection. Disable checkbox to select camera manually. The area around the camera is rendered to a TouchReactBuffer that is used by the custom grass shader.

Settings		
Camera	📾 CenterEyeAnchor (Camera)	



#### **TOUCH REACT LAYER**

Select a layer not seen by the game cameras. This layer is used to render meshes and colliders to the touch buffer.

#### **BUFFER RESOLUTION**

Select the resolution of the touch buffer. Larger buffer gives better resolution on large areas but will take more time to render.

#### **AFFECTED AREA**

Affected area is the ortho size of the camera used to render the touch buffer to GPU. a size of 50 will affect 25 meters in radius from the camera.

### **EDITOR TAB**



Disable the "Hide TouchReact Camera" checkbox to show the Camera rendering the touch buffer in the inspector hierarchy.



▼ VegetationStudio ▶ VegetationSystem	
▼ TouchBendSystem	
TouchBendCamera	

The camera is created and configured by the TouchReactSystemPro component. There should normally be no need to change anything on the camera.

							2	\$,
Solid	Color							
								1
Ortho	graphic							
50								
Near	-10000							
Far	10000							
X 0			0					
W 1		Н						
-100								
Forwa	ird							
-								
0.022								
10								
Displ	ay 1							
None	(Main Disp	lay	r)					
	Ortho 50 Near Far × 0 W 1 -100 Forwa 0.022 10 Displ	Near -10000 Far 10000 X 0 W 1 -100 Forward ✓ 0.022 10 Display 1	Orthographic 50 Near -10000 Far 10000 X 0 Y W 1 H -100 Forward 0.022 10 Display 1	Orthographic 50 Near -10000 Far 10000 X 0 Y 0 W 1 H 1 -100 Forward 0.022 10	Orthographic 50 Near -10000 Far 10000 X 0 Y 0 W 1 H 1 -100 Forward 0.022 10 Display 1	Orthographic         50         Near       -10000         Far       10000         X       0       Y       0         W       1       H       1         -100       Forward       Image: Comparison of the second of the s	Orthographic 50 Near -10000 Far 10000 X 0 Y 0 W 1 H 1 -100 Forward 0.022 10 Display 1	Solid Color         Orthographic         50         Near         -10000         Far         10000         X         0       Y         0       Y         0       Y         0       Y         0       Y         0       Y         0.022       0.022         10       Display 1

### **DEBUG TAB**







If you enable the "Show colliders/meshes" checkbox everything that will bend the grass will show up as green in the sceneview.





Touch react debug mode enabled and disabled

#### **COLLIDERS AND MESH**

Count of colliders and meshes include all added by normal GameObjects. Vegetation Items rendered instanced to the touch buffer will not show up in the count.

### ADDING TOUCH REACT TO YOUR SCENE

#### NORMAL GAMEOBJECTS

Any GameObject in the scene with a Collider or a MeshFilter can be used with touch react.

### **TOUCH REACT COLLIDER COMPONENT**



	ⓓ ✔Touch React Collider (Script)	P \$,						
	Touch React							
	Colliders							
	Add child colliders 🗸							
	Add all colliders from child GameObjects.							
	Collider scale 1							
	Collider scale affects the touch react area of the collider. Can be usefull to increase on character colliders and large grass patches. Mesh colliders will not scale.							
	Refresh colliders							
Refresh colliders. Update colliders from Gameobject.								

#### **ADD CHILD COLLIDERS**

With Add child colliders checked the component will add and render all colliders in the GameObject and children to the Touch React buffer.

When disabled only colliders on the GameObject will be used.

#### **COLLIDER SCALE**

It can sometimes be useful to scale up the effect of colliders. In cases with many and small colliders like ragdolls you will get better effect with a bigger scale of the colliders rendered to the buffer. To get head and body overlapping etc. Play with the scale until you get the effect you want.





Effect of touch react enabled on a character with a ragdoll and colliders. The scale is increased a bit in order to properly hit the vertexes of the grass





Same scene with touch react turned off. You can almost not see the character in the grass.

#### **REFRESH COLLIDERS**

Press refresh colliders if you change or update the colliders run-time.

//get a reference to the TouchReactCollider and call touchReactCollider.RefreshColliders() //to do the refresh in script.



### **TOUCH REACT MESH COMPONENT**

🔻 📴 🔽 Touch React Mesh (Script)	<b>a</b> \$,
Touchikeact	

Add the TouchReactMesh collider to any GameObject with a MeshFilter. The mesh in the mesh filter will be rendered to the touch react buffer and grass will bend.

### **REQUIREMENTS**

In order for touch react to work with grass or flowers they need to be using Vegetation Studios custom grass shader. You can add Texture 2D grass, plants or Flowers direct to the Vegetation Studio Component or customize them using the **Grass Patch Generator** that makes mesh patch



grass patches with built in LOD.



# **GRASS PATCH GENERATOR**

Grass Patch Generator is a tool to produce mesh grass and plant patches with level of detail (LOD) from standard Texture2D images with alpha.

Size, resolution and a range of settings will be saved with the prefab. The resulting prefab can be used with Vegetation Studio as instanced rendered grass with Touch Bend support. Or used as normal GameObjects in Unity with a LOD Group.

To create a new generator select "Window/AwesomeTechnologies/Add Grass Patch Generator" from the menu in Unity. This will make a new GameObject with a generator component. There is a default grass texture loaded. Add your texture. Set settings as described below in this page. When finished choose one of the 2 options(with and without LOD) to save the prefab. Prefab, mesh asset and Material will be saved in the folder you choose.

The settings in the box "Shader settings" can be changed runtime in the Vegetation System inspector when used later.

When the prefab is saved the GameObject with the generator is no longer needed and can be removed from the scene.

If you want to save the settings for later use, make a prefab of the GrassPatchGenerator object.

See Guide - Create a new grass patch for an example.









Patch Settings Resolution Bending Mesh Grass texture Shader Settings Ambient Occlussion Wind Bending Random Mesh Info Generate



🛛 📴 🛛 Grass Patch Generator (S	cript)	🛐 \$,		
Vegetation Studio				
<i>Patch settings</i> Plane count Size Min/Max Scale Plane height Plane width		15 0.4 2 0.4 0.4		
<i>Resolution</i> Width segments Height segments	è			
<i>Bending</i> Minimum bend height Bend Curve	• <u> </u>	0.05 0.25 0.25		
<i>Mesh</i> Generate backside				
Grass texture				
<i>Shader settings</i> Tint color 1 Tint color 2 Random darkening Root ambient Alpha cutoff		0.31 0.63 0.1		
Ambient occlusion				
Horizontal: min -> max height.	Vertical: bottom: no ambient -	> top:		
🔍 max ambient				



Wind bending			
Horizontal: min -> max height. max bend	Vertical: bottom: do not bend -> top:		
Include phase Include bending Include Ambient occlusion <i>Vertex colors</i> Show vertex colors	<ul> <li></li> <li></li></ul>		
<i>Random</i> Seed	o 1		
Mesh info Verts: 135 Tris: 120			
Save prefab and add to scene			
Save prefab with LOD and add to scene			

### **PATCH SETTINGS**

• Plane count

Number of planes used for the grass patch. Higher plane count gives more grass but also a higher polygon mesh.

• Size

The size of the mesh. This adjust the randomness of the plane center position.

Min/max scale

Min/max scale of each individual plane. Add a bigger range for more randomness

• Plane Height

Base height of each plane. Make sure the height/width aspect fit the texture you are using.

• Plane width

Base width of each plane. Make sure the height/width aspect fit the texture you are using.



Patch settings		
Plane count	0	15
Size	_0	0.4
Min/Max Scale	0.8 1	2
Plane height		0.4
Plane width		0.4

### **RESOLUTION**

• width segments

Number of width segments for each plane. If you want the planes to curve you need a higher count than  $\mathbf{2}$ 

• height segments

Number of width segments for each plane. If you want the planes to bend you need a higher count than  $\mathbf{2}$ 

Resolution		
Width segments	•	
Height segments	•	

### **BENDING**

• Minimum bend height

This setting will set the minimum height in meters where the planes are allowed to start bending.

• Bend

Bend amount above the minimum height setting

• Curve

Curve amount of each plane.

Bending		
Minimum bend height	- 0	0.05
Bend		0.25
Curve	O	0.25

### **MESH**

Enable this setting to generate a backside for the planes in the grass patch. This is not needed for use with the VegetationStudio grass shader.



*Mesh* Generate backside

### **GRASS TEXTURE**



Here you assign the grass/plant texture you want to use with the grass patch.

### **SHADER SETTINGS**

Shader settings		
Tint color 1		1
Tint color 2		1
Random darkening	O	0.31
Root ambient		 0.63
Alpha cutoff	O	0.2

These shader settings are the initial settings for the grass patch. They can be adjusted in the VegetationSystem inspector when you add a grass patch to Vegetation Studio.

### **AMBIENT OCCLUSSION**

Ambient occlusion
I Horizontal: min -> max height. Vertical: bottom: no ambient -> top: max ambient



### WIND BENDING

Wind bending	
! Horizontal: min -> max height. '	Vertical: bottom: do not bend -> top: max bend
Include phase Include bending Include Ambient occlusion <i>Vertex colors</i>	
Show vertex colors	

### RANDOM

Sets the random seed used to generate all the positions, rotation and size of each plane.

Random		
Seed	•	1

### **MESH INFO**

Size info on the current generated mesh

Mesh info		
Verts: 135		
Tris: 120		

### **GENERATE**

When you are happy with the patch you can save it to the scene and project. If you select to save with LOD it will automatic generate a LOD for the grass pacth. The LOD is additive and will keep adding more planes on the higher quality LODs up to the max plane count.



Save prefab and add to scene ave prefab with LOD and add to scen