Supporting Information. Haydee Borrero, Ramona O. Prieto, Julio C. Alvarez, Tamara Ticktin, Mario Cisneros and Hong Liu. Hurricane and exotic herbivore destabilized populations of a tropical epiphytic orchid in its peripheral range

Appendix S1

Methods

Hurricane Simulation at the Peripheral population, Everglades National Park, Florida USA

To simulate the historic and increased probability of hurricane impacts on long-term population growth rates (λ values) at the Everglades National Park we used two Markovian chains. The matrices used in the Markovian chains were divided into four phases**:** (1) phase I, the hurricane year (census 5); (2) phase II, first year post-hurricane (census 6); (3) phase III, second and third year post hurricane (7 and 8); (4) phase IV, non-hurricane affected years (census 1, 2, 3, and 4) (Table S1). The probability of a hurricane happening on any given year was 0.1. If a hurricane did occur, then Phase II was followed by Phase III, unless another hurricane. The two matrices in phase III occurred at equal probability on the second and third year post-hurricane. On the fourth year after a hurricane and until the next hurricane occurs, the four matrices in phase IV occurred at equal probability. To project the effects of an increase in hurricane frequency, we applied changes to the yearly hurricane probability to 0.15 (an increase of 50%). The remaining probabilities for the above post-hurricane stayed the same.

Table S1. Transition matrices for populations of *Trichocentrum undulatum* arranged by site and year transition. Bold indicates fertility elements that were estimated using pooled data (see in text Methods).

Site		Seedling	Juvenile	Adult
A) Peripheral Population, Florida, USA				
Number of individuals monitored: 278				
Most recent population structure: (3, 30, 40)				
Year 1 - 2, 2013-2014				
	Seedling	0.11111111	0	0.467556
	Juvenile	0.81481481	0.64102564	0.066667
	Adult	0	0.23076923	0.855556

Year 2 -3 , 2014-2015				
	Seedling	0.02272727	0	0.018868
	Juvenile	**0.3536585**	0.66666667	0.018692
	Adult	0	0.15686275	0.850467
Year 3 - 4, 2015-2016				
	Seedling	**0.0731707**	0	0.052632
	Juvenile	**0.3536585**	0.79487179	0.008772
	Adult	0	0.07692308	0.815789
Year 4 -5, 2016-2017				
	Seedling	**0.0731707**	0	0.030612
	Juvenile	**0.3536585**	0.75	0.030612
	Adult	0	0.15625	0.795918
Year 5 - 6, 2017-2018 Ψ Hurricane Year				
	Seedling	**0.0769231**	0	0.107143
	Juvenile	**0.7692308**	0.28125	0.011905
	Adult	0	0.26315789	0.607143
Year 6 -7, 2018-2019				
	Seedling	0.07692308	0	0.226415
	Juvenile	0.76923077	0.66666667	0.207547
	Adult	0	0.33333333	0.698113
Year 7 - 8, 2019-2020				
	Seedling	0.16666667	0	0.157343
	Juvenile	0.66666667	0.7037037	0.068182
	Adult	0	0.14814815	0.818182
Year 8 - 9, 2020-2021				
	Seedling	**0.0769231**	0	0.075
	Juvenile	**0.7692308**	0.6	0.05
	Adult	0	0.26666667	0.8

B) Core 1 Population, Mayabeque, Cuba

Number of individuals monitored: 193

Most recent population structure: (2, 4, 136)

Year 4 -5, 2016-2017				
	Seedling	**0.1**	0	0.012658
	Juvenile	**0.1**	0.77777778	0.012658
	Adult	0	0.22222222	0.974684
Year 5 - 6, 2017-2018				
	Seedling	**0.1**	0	0.016667
	Juvenile	**0.1**	**0.6842105**	0.008333
	Adult	0	**0.2631579**	0.958333
Year 6 -7, 2018-2019				
	Seedling	**0.1**	0	0.014184
	Juvenile	**0.1**	**0.6842105**	0
	Adult	0	**0.2631579**	0.964539

C) Core 2 Population, Pinar del Rio, Cuba

Number of individuals monitored: 104
Most recent population structure: (3, 12, 76)
Year 6 -7, 2018-2019

Seedling	**0.1**	0	0.024691
Juvenile	**0.1**	0.64285714	0.036585
Adult	0	0.14285714	0.902439

D) Core 3 Population, Matanzas, Cuba
Number of individuals monitored: 290
Most recent population structure: (9, 30, 102)
Year 4 -5, 2016-2017

Seedling	0	0	0.125
Juvenile	1	0.69565217	0
Adult	0	0.2826087	0.977273

Year 5 - 6, 2017-2018

Seedling	0	0	0.090909
Juvenile	1	0.77777778	0.020202
Adult	0	0.16666667	0.969697

E) Core 4 Population, Sancti Spiritus, Cuba
Number of individuals monitored: 53
Most recent population structure: (0, 0, 44)
Year 6 - 7, 2018-2019

Seedling	**0.0666667**	0	**0.001**
Juvenile	**0.3333333**	**0.7142857**	0
Adult	0	**0.2380952**	0.86

Table S2 Transition matrices for simulated populations of *Trichocentrum undulatum* arranged by site and simulation type. Modified matrices for the simulations are identified in "Status."

Site	Seedling	Juvenile	Adult
A) Peripheral Population, Florida, USA			
Status: Removal of mortality from leaf herbivory			
Year 1 transition			
Seedling	0.0731707	0	0.0526316
Juvenile	0.3536585	0.8857143	0.009434
Adult	0	0.0857143	0.8773585
Year 2 transition			
Seedling	0.0731707	0	0.0306122
Juvenile	0.3536585	0.7741935	0.0315789
Adult	0	0.1612903	0.8210526
B) Core 1 Population, Mayabeque, Cuba			
Status: Episodic recruitment introduction			
Seedling	0.2222222	0	0.4675556
Juvenile	0.5555556	0.6842105	0.0058824
Adult	0	0.2631579	0.9647059
C) Core 3 Population, Matanzas, Cuba			
Status: Introduction of hurricane induced mortality			
Seedling	0	0	0.1283422
Juvenile	0	0.2790698	0.0106383
Adult	0	0.0697674	0.606383
Status: Logging induced mortality based on host species			
Seedling	0	0	0.1709402
Juvenile	0.9090909	0.3076923	0.025641
Adult	0	0.0512821	0.4273504
Status: Logging induced mortality based on host species & DBH			
Seedling	0	0	0.1709402
Juvenile	0.6363636	0.4102564	0.025641
Adult	0	0.1282051	0.7008547