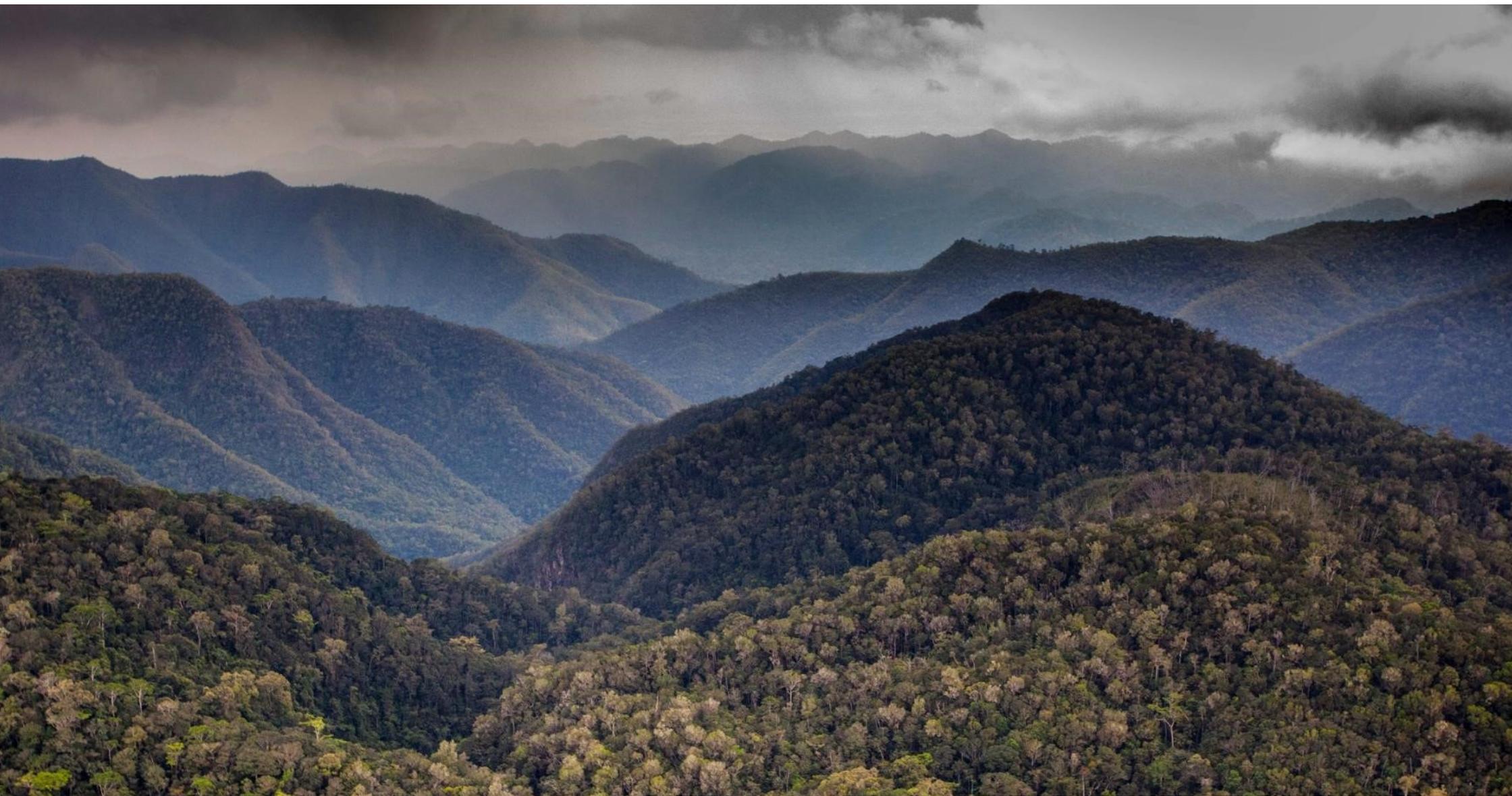


BIOQUALITY HOTSPOTS IN THE FLORA OF BELIZE

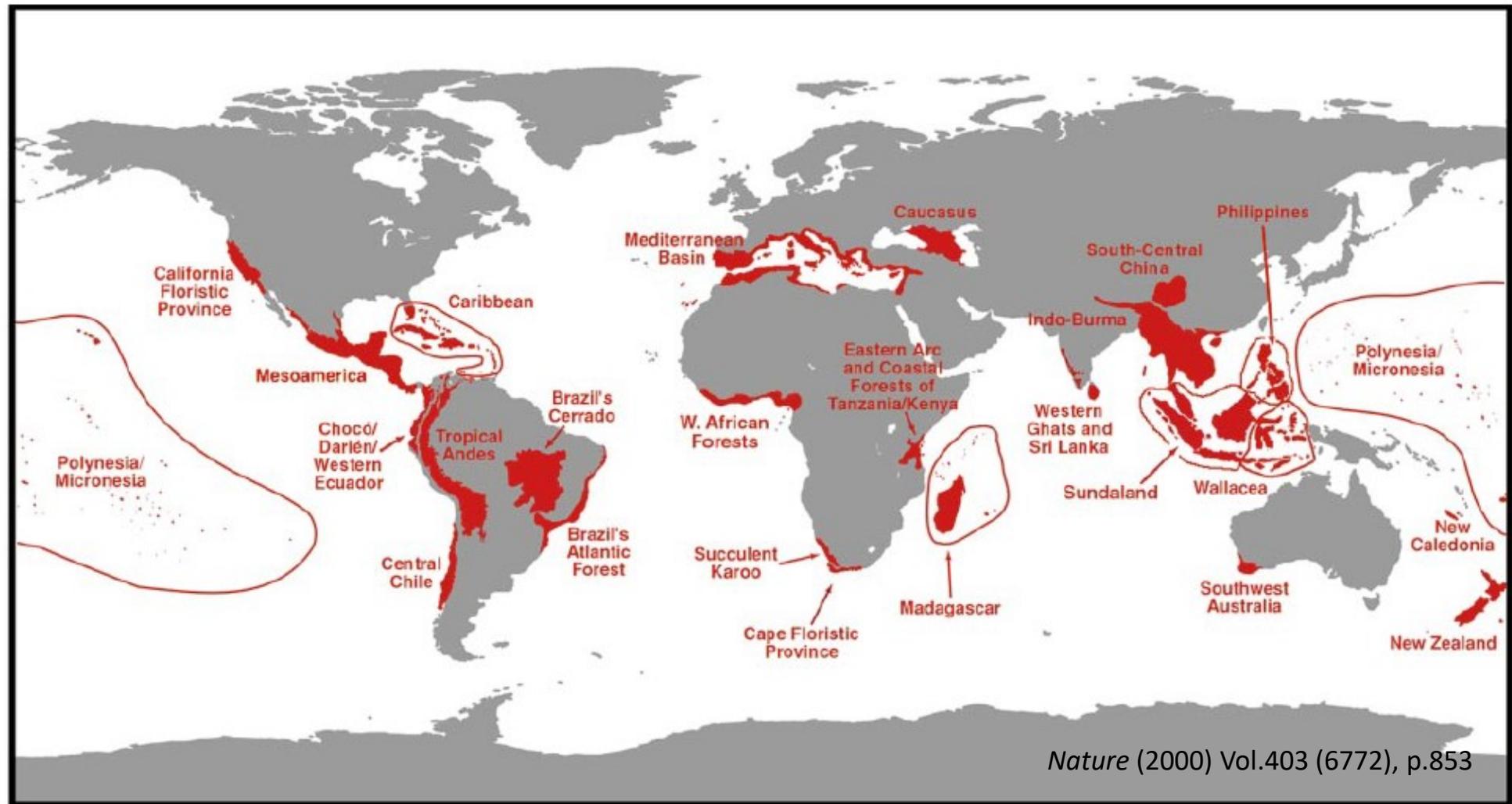
Priorities for research and conservation



Maya Mountains, Belize (Steven W. Brewer, 2013)



Biodiversity hotspots



'exceptional concentrations of endemic species and experiencing exceptional loss of habitat'

The need for fine-scale conservation priorities

'... it is through the conservation of actual sites that biodiversity will ultimately be preserved or lost.... drawing the lessons of global conservation prioritization down to a much finer scale is now the primary concern for conservation planning....'

Brooks *et al.*, 2006. *Science*. Vol 313.

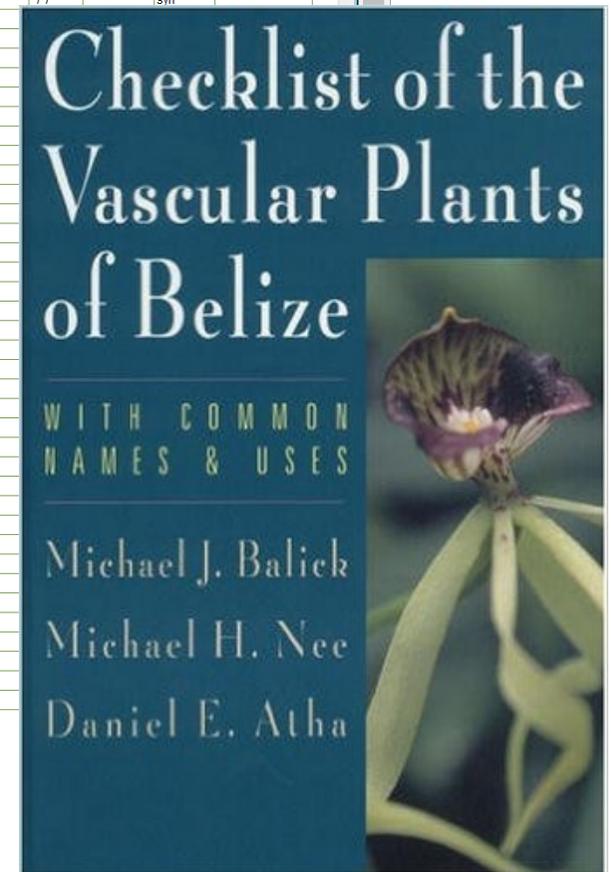
Species checklist

Advanced BRAHMS Gail Stott in Belize [C:\BRAHMS_DATA\BELIZE\DATABASE single-user]

File Edit View Goto Tag FastSort Calculate DataLinks Tools

Species main list [c:\brahms_data\belize\database\species.dbf (alias= SP)] Filter: "" <> upper(SPLK.RBS_2015)

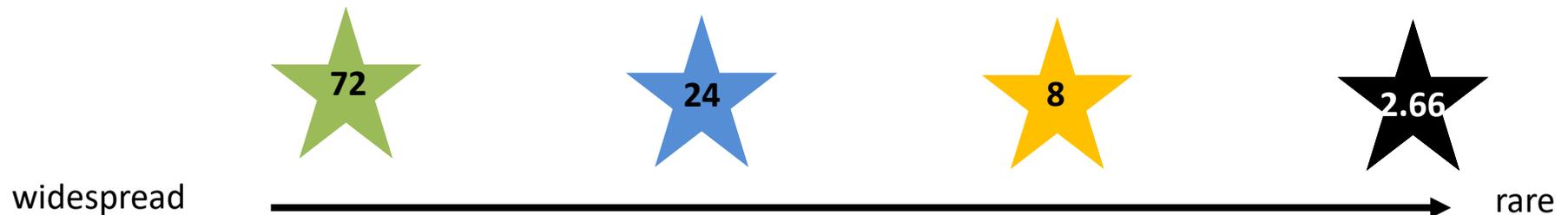
family	genus	sp1	author1	rank1	sp2	author2	rank2	homonym	invalid	legitimacy	nomnote	star	starnote	distrib	lucn	species range	splk.toledo	splk.deg_sq	cites	habit	collection total	full species name	splk.rbs_2015	splk.tnrs	splk.plantlist	splk.balick	splk.goodwinnew	splk
Asteraceae	Orthopappus	angustifolius	(Sw.) Gleason						0		memo	GN	memo	Memo	LC	memo					1	Orthopappus angustifolius		//		syn		
Loranthaceae	Oryctanthus	cordifolius	(C. Presl) Urb.						0		memo	memo	memo	memo	memo						16	Oryctanthus cordifolius	acc			acc		Fore
Loranthaceae	Oryctanthus	phanerolomus	(Standl.) Kuhn						0		memo	memo	memo	memo	memo						2	Oryctanthus phanerolomus	syn	syn	syn	syn		
Loranthaceae	Oryctanthus	spicatus	(Jacq.) Eichl.						0		memo	GN	memo	Memo	memo						1	Oryctanthus spicatus	acc	acc		acc	y	Sav.
Poaceae	Oryza	alta	Swallen						0		memo	memo	memo	memo	memo						1	Oryza alta	rev-tax			syn	acc	
Poaceae	Oryza	latifolia	Desv.						0		memo	GN	memo	Memo	LC	memo					5	Oryza latifolia	acc	acc		acc		
Poaceae	Oryza	rufipogon	Griff.						0		memo	memo	memo	memo	memo						2	Oryza rufipogon						
Melastomataceae	Ossaea	ciliata	Cogn.						0		memo	memo	memo	memo	memo						0	Ossaea ciliata		//		syn		
Melastomataceae	Ossaea	micrantha	(Sw.) Macfarl.						0		memo	memo	memo	memo	memo						15	Ossaea micrantha	rev-tax					
Melastomataceae	Ossaea	trichocalyx	Pittier						0		memo	memo	memo	memo	memo						0	Ossaea trichocalyx						
Asteraceae	Otopappus	curviflorus	(R. Br.) Hemsl.						0		memo	memo	memo	memo	memo						2	Otopappus curviflorus	acc					
Asteraceae	Otopappus	guatemalensis	(Urb.) R.L. H.						0		memo	GD	memo	Memo	memo					Herb-CLI	2	Otopappus guatemalensis	acc					
Asteraceae	Otopappus	scaber	S.F. Blake						0		memo	GD	memo	Memo	memo						3	Otopappus scaber	acc					
Asteraceae	Otopappus	verbesinoides	Benth.						0		memo	memo	memo	memo	memo						2	Otopappus verbesinoides	acc					
Icacinaceae	Ottoschulzia	pallida	Lundell						0		memo	memo	memo	memo	memo						5	Ottoschulzia pallida						
Ochnaceae	Ouratea		Aubl.						0		memo	memo	memo	memo	memo						7	Ouratea	-					
Ochnaceae	Ouratea	guatemalensis	Engl.						0		memo	memo	memo	memo	memo						1	Ouratea guatemalensis	syn					
Ochnaceae	Ouratea	insulata	L. Riley						0		memo	memo	memo	memo	memo						15	Ouratea insulata	acc					
Ochnaceae	Ouratea	lucens	(Kunth) Engl.						0		memo	GN	memo	Memo	memo					Shrub	59	Ouratea lucens	acc					
Ochnaceae	Ouratea	lucens	(Kunth) Engl. var. podogyne (Donn. f.)						0		memo	memo	memo	memo	memo						1	Ouratea lucens var. podogyne						
Ochnaceae	Ouratea	nitida	(Sw.) Engl.						0		memo	BU	memo	Memo	memo					Shrub	58	Ouratea nitida	acc					
Ochnaceae	Ouratea	pyramidalis	L. Riley						0		memo	memo	memo	memo	memo						1	Ouratea pyramidalis						
Oxalidaceae	Oxalis								0		memo	memo	memo	memo	memo						0	Oxalidaceae	-					
Oxalidaceae	Oxalis								0		memo	memo	memo	memo	memo						3	Oxalis	-					
Oxalidaceae	Oxalis	corniculata	L.						0		memo	GN	memo	Memo	LC	memo					1	Oxalis corniculata						
Oxalidaceae	Oxalis	frutescens	L.						0		memo	GN	memo	Memo	LC	memo				Herb	45	Oxalis frutescens	acc					
Oxalidaceae	Oxalis	frutescens	L. subsp. angustifolia (Kunth)						0		memo	GN	memo	memo	memo					Herb	23	Oxalis frutescens subsp. angustifolia	rev-tax					
Oxalidaceae	Oxalis	galeottii	Turcz.						0		memo	memo	memo	memo	memo						0	Oxalis galeottii						
Oxalidaceae	Oxalis	latifolia	Kunth						0		memo	GN	memo	Memo	NA	memo					1	Oxalis latifolia	acc					
Oxalidaceae	Oxalis	neaei	DC.						0		memo	memo	memo	memo	memo						0	Oxalis neaei	syn					
Oxalidaceae	Oxalis	stricta	L.						0		memo	memo	memo	memo	memo						0	Oxalis stricta	acc					
Oxalidaceae	Oxalis	yucatanensis	(Rose) L. Riley						0		memo	memo	memo	memo	memo						0	Oxalis yucatanensis	rev-a					
Annonaceae	Oxandra		A. Rich.						0		memo	memo	memo	memo	memo						2	Oxandra	-					
Annonaceae	Oxandra	belizensis	(Lundell) Lundell						0		memo	BK	memo	Memo	memo					Tree	4	Oxandra belizensis	acc					
Annonaceae	Oxandra	proctorii	Lundell						0		memo	memo	memo	memo	memo						1	Oxandra proctorii	acc					
Cyperaceae	Oxycaryum	cubense	(Poep. & Kuhn) Engl.						0		memo	GN	memo	Memo	LC	memo				Graminoid	0	Oxycaryum cubense	acc					
Fabaceae - Fabi	Oxyrhynchus	trinervius	(Donn. Sm.) Engl.						0		memo	memo	memo	memo	memo						1	Oxyrhynchus trinervius						
Asteraceae	Oyedaea	lundellii	H. Rob.						0		memo	memo	memo	memo	memo						4	Oyedaea lundellii						
Alliaceae	Pabellonia	oxypetala	(Phil.) Quez.						0		memo	-	memo	memo	memo						1	Pabellonia oxypetala						
Malvaceae	Pachira	aquatica	Aubl.						0		memo	GN	memo	Memo	NA	memo				Tree	28	Pachira aquatica	acc					
Melastomataceae	Pachyanthus	lundellianus	(L.O. Williams) Engl.						0		memo	memo	memo	memo	memo					Shrub	8	Pachyanthus lundellianus	acc					
Bignoniaceae	Pachyptera	hymenaea	(DC.) A.H. Gentry						0		memo	memo	memo	memo	memo						1	Pachyptera hymenaea						
Bignoniaceae	Pachyptera	kerere	(Aubl.) Sandw.						0		memo	memo	memo	memo	memo						0	Pachyptera kerere	acc					
Fabaceae - Fabi	Pachyrhizus		Rich.						0		memo	memo	memo	memo	memo						8	Pachyrhizus	-					



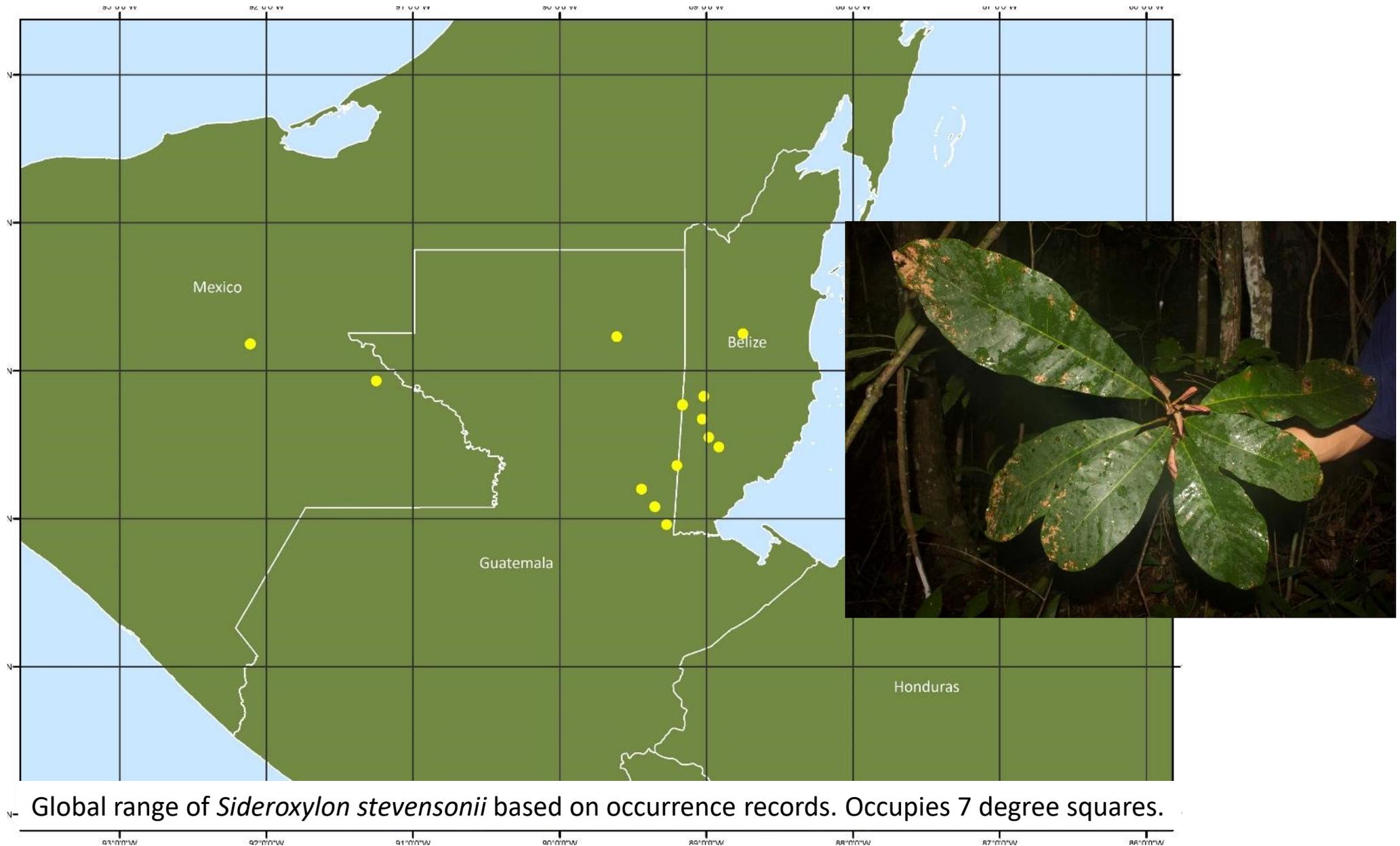
Star categories

Assign each species to a Star category based on its global range (degree square count).

Each Star has an ideal mean number of degree squares occupied (ideal mean range).

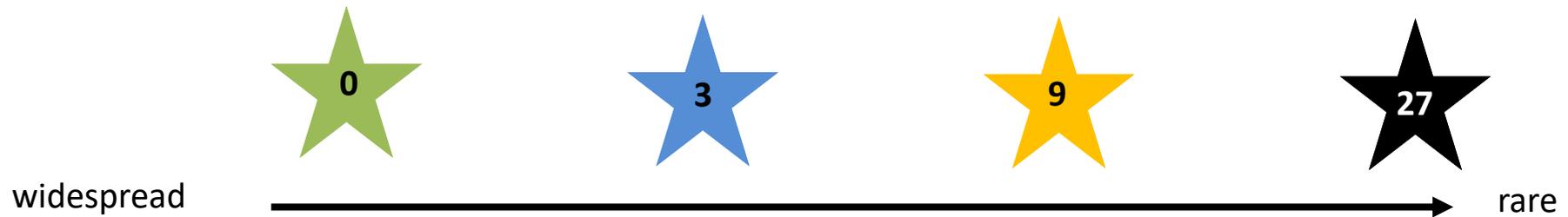


Star categories

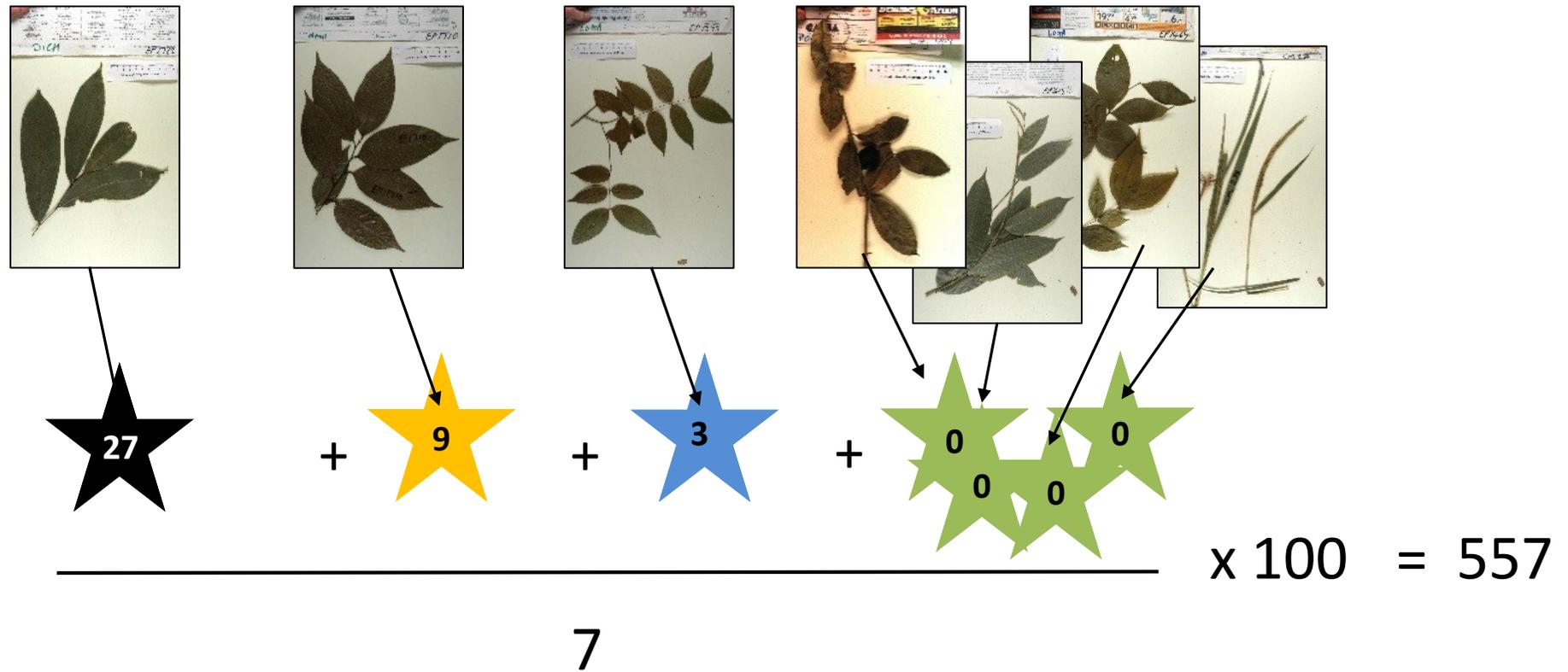


Star weights

Each Star carries a standardised weight that is used to calculate GHI.



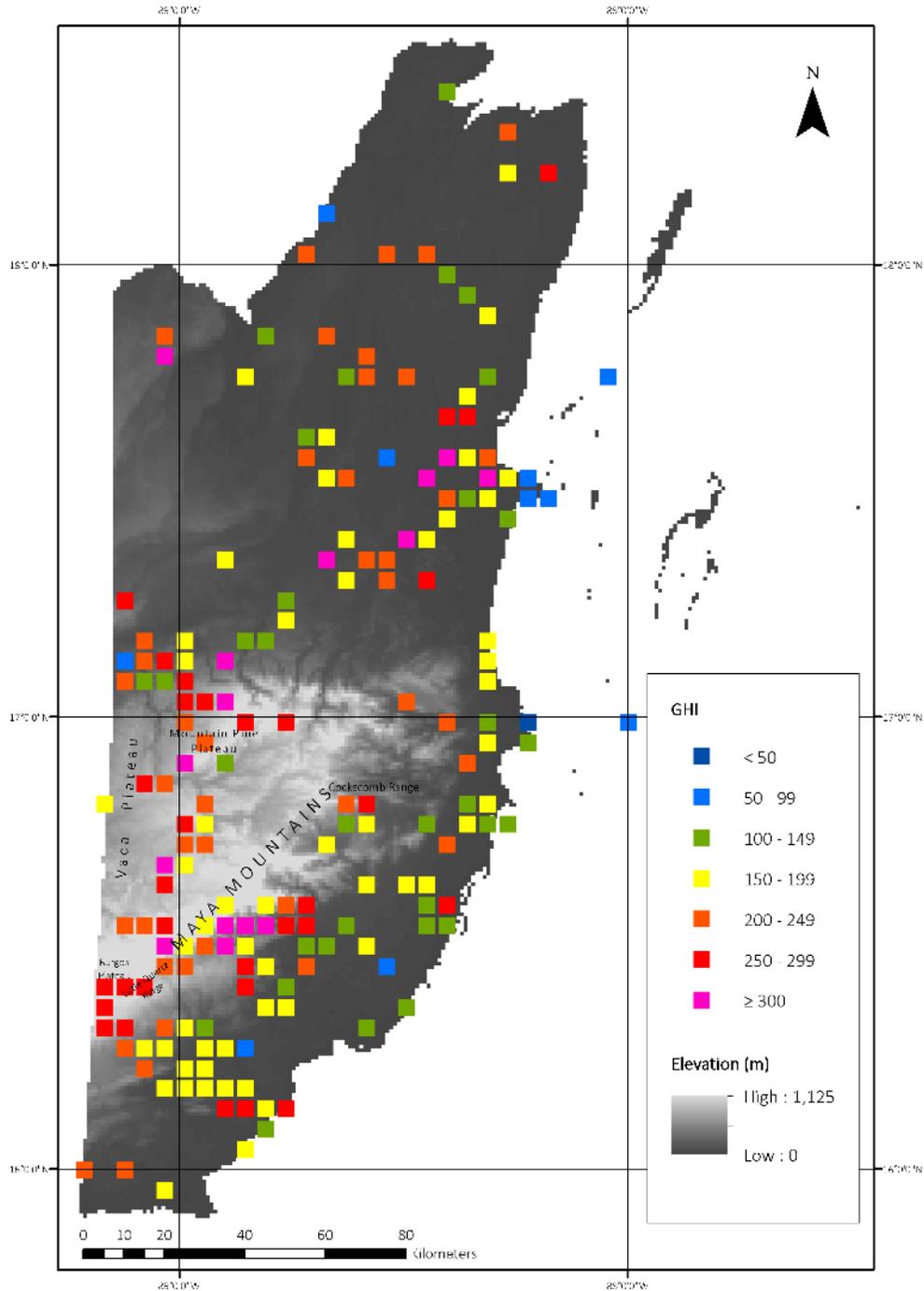
Sample GHI calculation



GHI above 300 is associated with high bioquality (a 'hotspot').

Scores below 75 are typical of vegetation of low bioquality.

Observed GHI



GHI calculated per 5km grid cell using botanical records from the Belize database.

Lots of gaps in collecting....

Modelling GHI using stacked species distribution models (SSDM)

Maxent model for each individual species.

Reclassify output (raster file of continuous probability values) to binary (presence / absence).

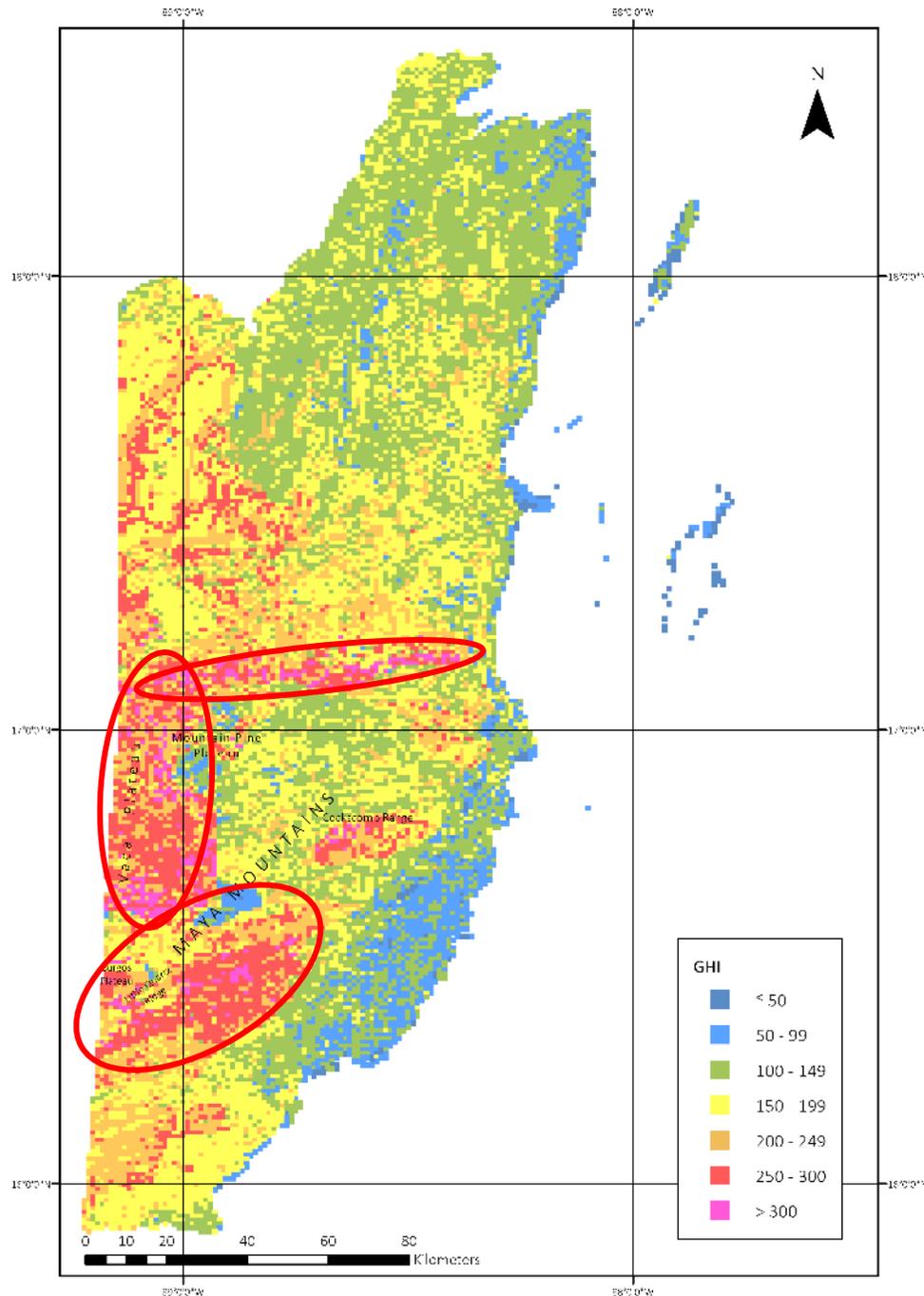
Stack rasters and count the number of species in each cell.

Constrain species richness based on species richness estimates.

If predictions exceed estimates, remove taxa with lowest probability of occurrence.

Use the revised species list to calculate GHI.

GHI predictions for Belize



Can we trust the models?

Within model testing for each species.

Predictions were tested using an independent dataset.

An aerial photograph of a vast, forested mountain range. The mountains are covered in dense, green forest, and the terrain is rugged with deep valleys. The sky is overcast with grey clouds, creating a dramatic and somewhat somber atmosphere. The text is overlaid on the image in white, centered horizontally.

Publish the modelling work

+

Reports for PA managers

Publish database analyses

+

Report for FD and ERI that sets out a systematic approach
towards completing a national plant inventory