Appendix 2 – Environmental variables: additional information

Variable category	Code	Variable description	References
Climatic	CLIM_1	first axis from a PCA on 12 worldclim variables and altitude (see Table 4)	Rothermel and Semlitsch, 2002; Pineda and Lobo, 2009; Girardello *et al.*, 2010; Hartel *et al.*, 2010
	CLIM_2	second axis from a PCA on 12 worldclim variables and altitude (see Table 4)	
Land cover	WOOD_DM	Area of deciduous and mixed forest	Pope, Fahrig and Merriam, 2000; Pellet, Guisan and Perrin, 2004; Cushman, 2006; Zanini *et al.*, 2008; Hartel *et al.*, 2010; Boissinot *et al.*, 2015; Zhang *et al.*, 2016; Collins and Fahrig, 2017; Boissinot, Besnard and Lourdais, 2019
	WOOD_C	Area of coniferous forest	
	CROP	Area of crop	Knutson *et al.*, 1999; Lehtinen, Galatowitsch and Tester, 1999; Mann *et al.*, 2009; Hartel *et al.*, 2010; Boissinot, Besnard and Lourdais, 2019
	PASTURE	Area of permanent pasture	Scribner *et al.*, 2001; Janin *et al.*, 2009; Hartel *et al.*, 2010
	NB_PONDS / D_BREED_SITE	Ponds density / distance to breeding site	Janin *et al.*, 2009; Ribeiro *et al.*, 2011; Arntzen *et al.*, 2017; Boissinot, Besnard and Lourdais, 2019
	NB_HEDGE	Hedgerow density	Joly *et al.*, 2001; Pellet, Guisan and Perrin, 2004; Vos *et al.*, 2007; Angelone, Kienast and Holderegger, 2011; Boissinot, Besnard and Lourdais, 2019
	NB_ROAD	Road density out of urban area	Vos and Chardon, 1998; Carr and Fahrig, 2001; Hels and Buchwald, 2001; Cushman, 2006; Eigenbrod, Hecnar and Fahrig, 2008; Hartel *et al.*, 2010; Petrovan and Schmidt, 2016; Boissinot, Besnard and Lourdais, 2019
	D_RIVER	Distance to river	Ficetola *et al.*, 2008 (and rivers have indirect effect on fish presence and increase predation risk)
	URBAN	Area of urban (build up)	Rubbo and Kiesecker, 2005; Gagné and Fahrig, 2007; Hartel *et al.*, 2010; Cayuela *et al.*, 2015; Zhang *et al.*, 2016

Table 1. Reference used to define main predictors used for species distribution modelling of each amphibian species in Pays de la Loire region. See Figure 2/ table 4 for the list of climatic variables.

	Bufo spinosus & *Hyla arborea*		*Salamandra salamandra* & *Rana temporaria*		Other species	
FIRC	CLIM_1	1.17	CLIM_1	1.12	CLIM_1	1.14
	CLIM_2	1.09	CLIM_2	1.06	CLIM_2	1.05
	d_breed_site*	1.37	d_breed_site*	1.45	d_breed_site*	1.45
	nb_pond2000*	1.31	nb_pond1000*	1.30	nb_pond1000*	1.39
	wood_c600*	1.41	wood_c300*	1.29	wood_c300*	1.24
	wood_dm600*	1.58	wood_dm300*	1.47	wood_dm300*	1.50
	nb_hedge600	1.63	nb_hedge300	1.49	nb_hedge300	1.44
	dist_perm_stream	1.07	dist_perm_stream	1.08	dist_perm_stream	1.05
	pasture600	2.07	pasture300	1.32	pasture300	1.35
	crop2000	2.20	crop1000	1.78	crop1000	1.78
	urban2000	1.65	urban1000	1.52	urban1000	1.43
CIRC MS	CLIM_1	1.21	CLIM_1	1.10	CLIM_1	1.13
	CLIM_2	1.10	CLIM_2	1.07	CLIM_2	1.07
	d_breed_site	1.24	d_breed_site	1.24	d_breed_site	1.38
	nb_pond2000	1.33	nb_pond1000	1.26	nb_pond1000	1.39
	wood_c600	1.46	wood_c300	1.28	wood_c300	1.29
	wood_dm600	1.69	wood_dm300	1.49	wood_dm300	1.54
	nb_hedge600	1.66	nb_hedge300	1.41	nb_hedge300	1.46
	dist_perm_stream	1.06	dist_perm_stream	1.04	dist_perm_stream	1.03
	pasture600	2.21	pasture300	1.34	pasture300	1.37
	crop2000	2.49	crop1000	1.87	crop1000	1.90
	urban2000	1.69	urban1000	1.42	urban1000	1.44
	road2000	1.13	road1000	1.06	road1000	1.07
CIRC SS	CLIM_1	1.12	CLIM_1	1.08	CLIM_1	1.07
	CLIM_2	1.08	CLIM_2	1.04	CLIM_2	1.05
	nb_pond600	1.15	nb_pond300	1.11	nb_pond300	1.10
	river_perm600	1.08	stream_temp300	1.04	river_perm300	1.04
	wood_c600	1.92	river_perm300	1.05	wood_c300	1.34
	wood_dm600	3.41	wood_c300	1.33	wood_dm300	2.01
	nb_hedge600	1.68	wood_dm300	1.96	nb_hedge300	1.45
	pasture600	5.08	nb_hedge300	1.41	pasture300	2.04
	crop600	6.25	pasture300	1.92	crop300	2.96
	urban600	2.73	crop300	2.78	urban300	1.63
	road600	1.09	urban300	1.56	road300	1.06
			road300	1.05		
DIST	CLIM_1	1.13	CLIM_1	1.13	CLIM_1	1.11
	CLIM_2	1.02	CLIM_2	1.04	CLIM_2	1.04
	d_crop	1.65	d_crop	1.68	d_crop	1.64
	d_breed_site	1.29	d_breed_site	1.41	d_breed_site	1.27
	d_stream	1.13	d_stream	1.27	d_stream	1.14
	d_urban	1.16	d_urban	1.16	d_urban	1.14
	d_wood_dm	1.27	d_wood_dm	1.18	d_wood_dm	1.18
	d_wood_c	1.14	d_wood_c	1.12	d_wood_c	1.10
	d_meadow	1.62	d_meadow	1.74	d_meadow	1.60
	d_nb_hedge	2.06	d_nb_hedge	2.04	d_nb_hedge	2.06
	d_road	1.28	d_road	1.22	d_road	1.29
	breed_site = ponds + lakes		breed_site = ponds + temporary streams		breed_site = ponds	

Table 2. Variance inflation factor values for each predictors, models and species groups

Climatic variables

			Contribution (ACP)				
			Dim.1	Dim.2	Dim.3	Dim.4	Dim.5
VARIABLES	Altitude	r_alt	7,18	7,52	0,62	44,81	22,89
	Annual mean temperature (°C)	r_bio1	10,91	5,80	4,91	1,11	2,24
	Mean temperature of warmest quarter (°C)	r_bio10	2,47	16,01	18,18	12,75	1,48
	Mean temperature of coldest quarter (°C)	r_bio11	14,67	0,66	0,02	1,48	1,88
	Annual precipitation (mm)	r_bio12	9,50	7,44	0,14	6,53	20,79
	Precipitation seasonality (C of V)	r_bio15	14,29	0,52	1,82	5,94	0,83
	Precipitation of wettest quarter (mm)	r_bio16	11,82	4,32	0,01	6,77	11,86
	Precipitation of driest quarter (mm)	r_bio17	1,10	18,31	14,72	2,48	0,17
	Precipitation of warmest quarter (mm)	r_bio18	0,06	16,39	43,64	13,22	0,66
	Max temperature of warmest week (°C)	r_bio5	1,95	18,28	11,16	2,30	6,93
	Temperature annual range (Bio05-Bio06) (°C)	r_bio7	12,01	4,07	4,43	1,96	5,07
	Mean temperature of wettest quarter (°C)	r_bio8	14,03	0,67	0,34	0,64	25,19

Table 4. variable selection and their contribution for each axis of the PCA

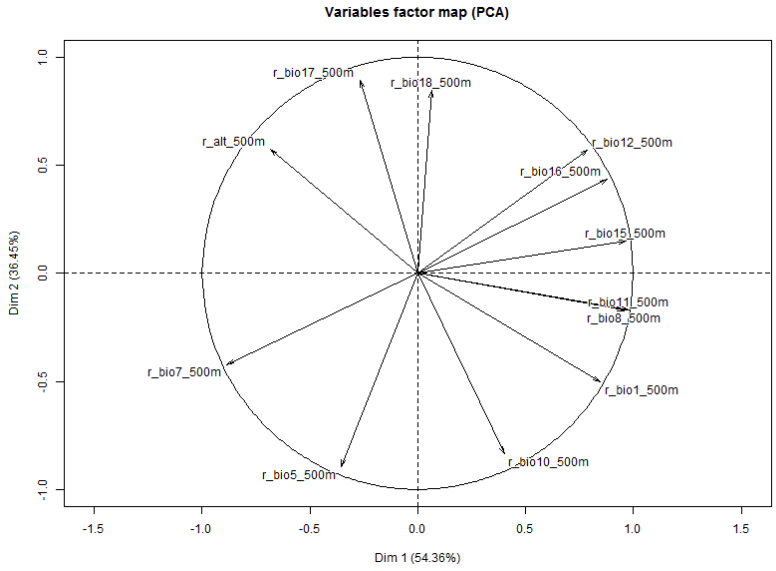

Figure 2. Representation of the attributes on the factors 1 and 2 obtain by PCA by descriptor. We use layer for Worldclim at regional extent to obtain 2 layers according to axis 1 (CLIM_1) and axis 2 (CLIM_2) of the ACP. Final resolution was 500m to homogenize pixels size of climatic variables and landscape variables layers.

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