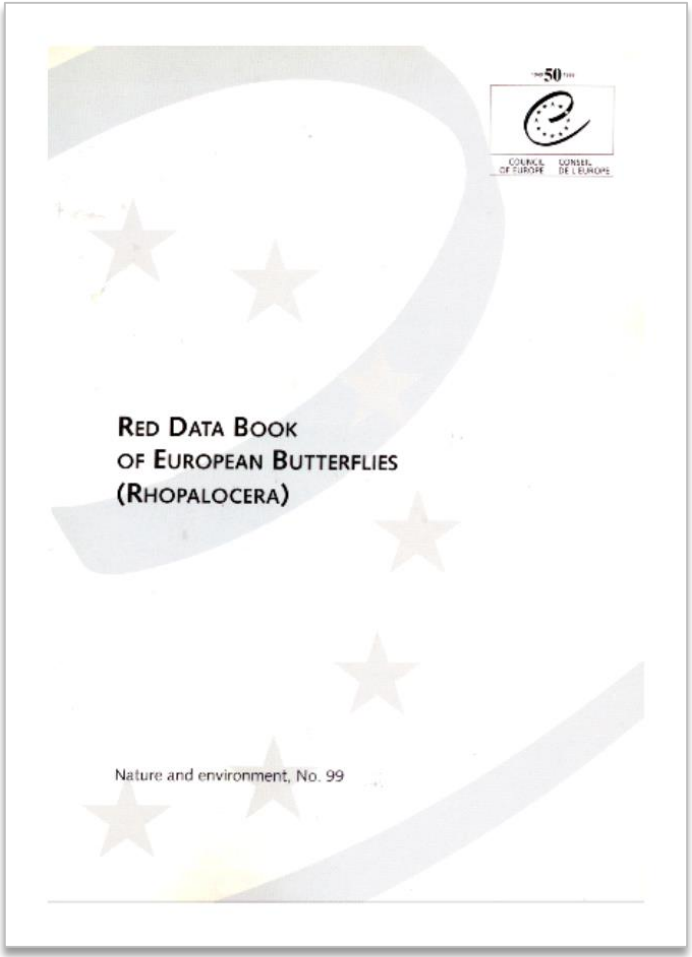
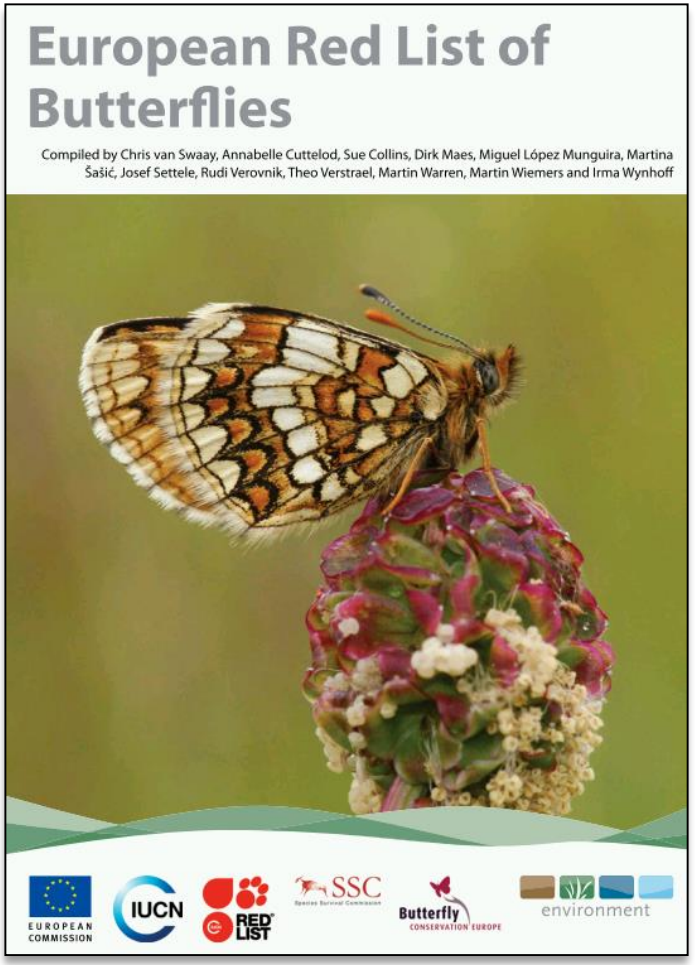
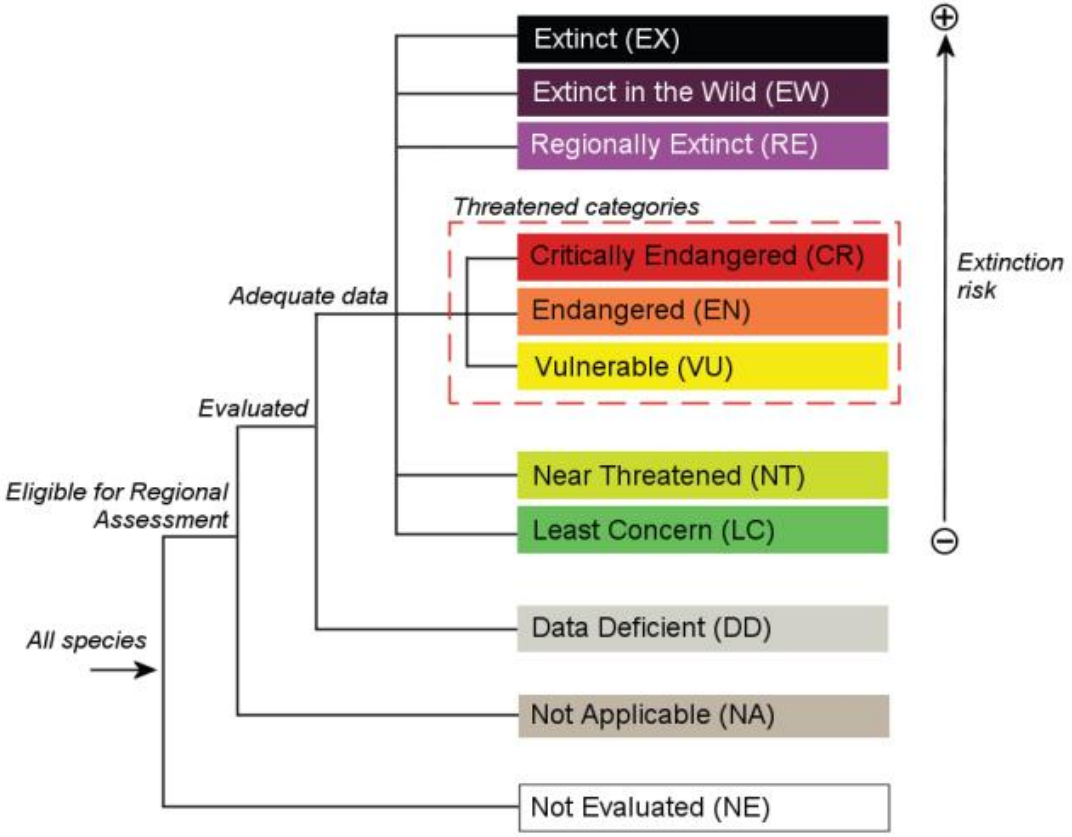
New European Butterfly Red List

Chris van Swaay, Martin Warren, Sam Ellis
and many others

Butterfly Conservation Europe


50
COUNCIL OF EUROPE
CONSEIL DE L'EUROPE
RED DATA BOOK
OF EUROPEAN BUTTERFLIES
(RHOPALOCERA)
Nature and environment, No. 99


European Red List of Butterflies
Compiled by Chris van Swaay, Annabelle Cuttelod, Sue Collins, Dirk Maes, Miguel López Munguira, Martina Šašić, Josef Settele, Rudi Verovnik, Theo Verstrael, Martin Warren, Martin Wiemers and Irma Wynhoff
EUROPEAN COMMISSION
IUCN
RED LIST
SSC
Butterfly CONSERVATION EUROPE
environment



De Vlinderstichting

IUCN Red List criteria

A. Population size reduction of at least 30% in last 10 years
B. Small geographic range plus 2 out of 3:
    a) Severely fragmented or <10 locations
    b) Continuing decline
    c) Extreme fluctuations
C. Small populations size (<10 000 adults) and decline
D. Very small or restricted population (<1000 adults)
E. Quantative analysis

IUCN Red List criteria

- Get observations for:
  - AOO (Area of Occupancy): count present 2x2km squares
  - EOO (Extent of Occurrence): convex hull around present distribution
  - Range map (historical distribution)
  - Distribution trend
- Get trends (population and/or distribution)
- For B-criterion: info on fragmentation, number of locations, fluctuations (>10 fold)

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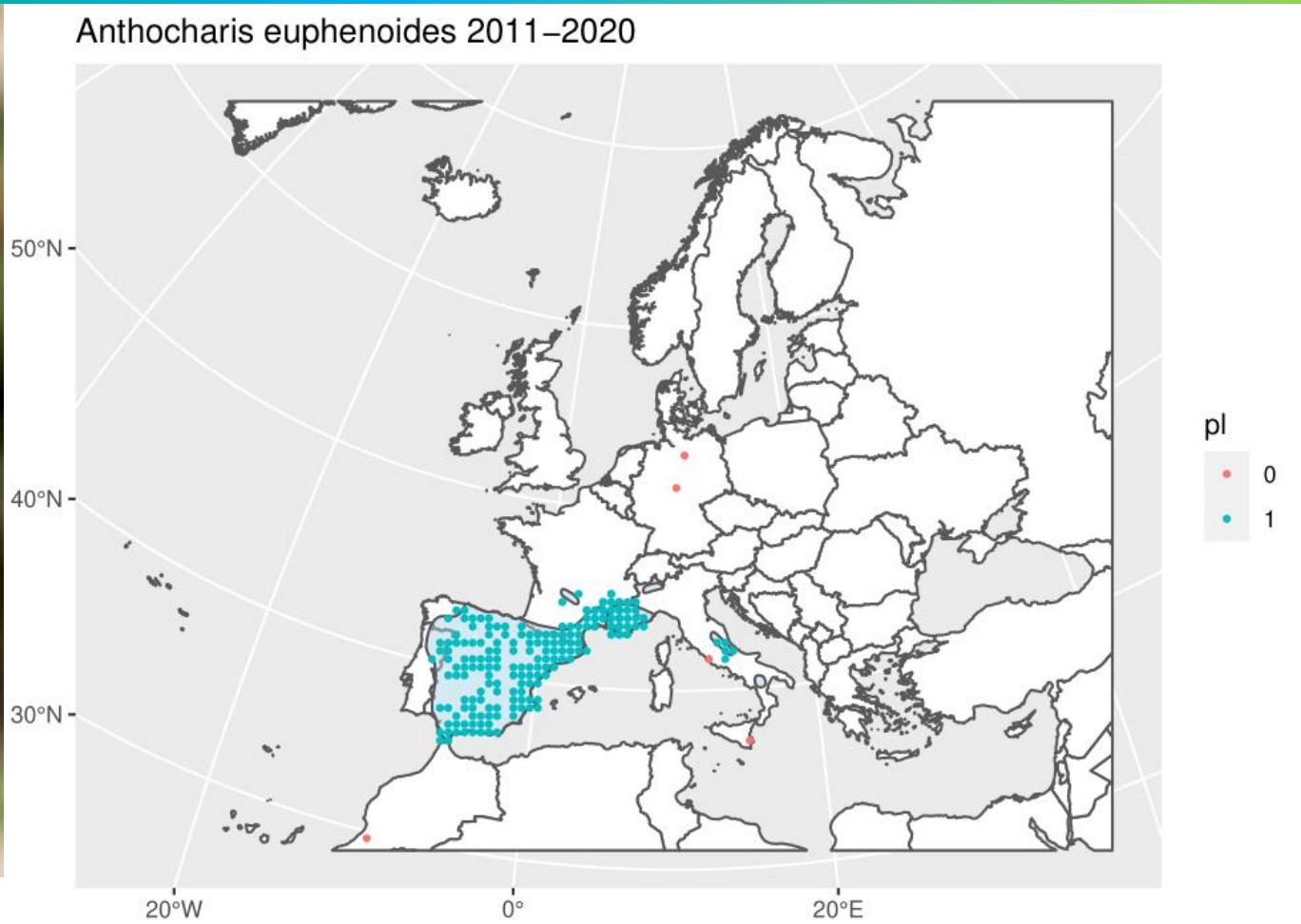
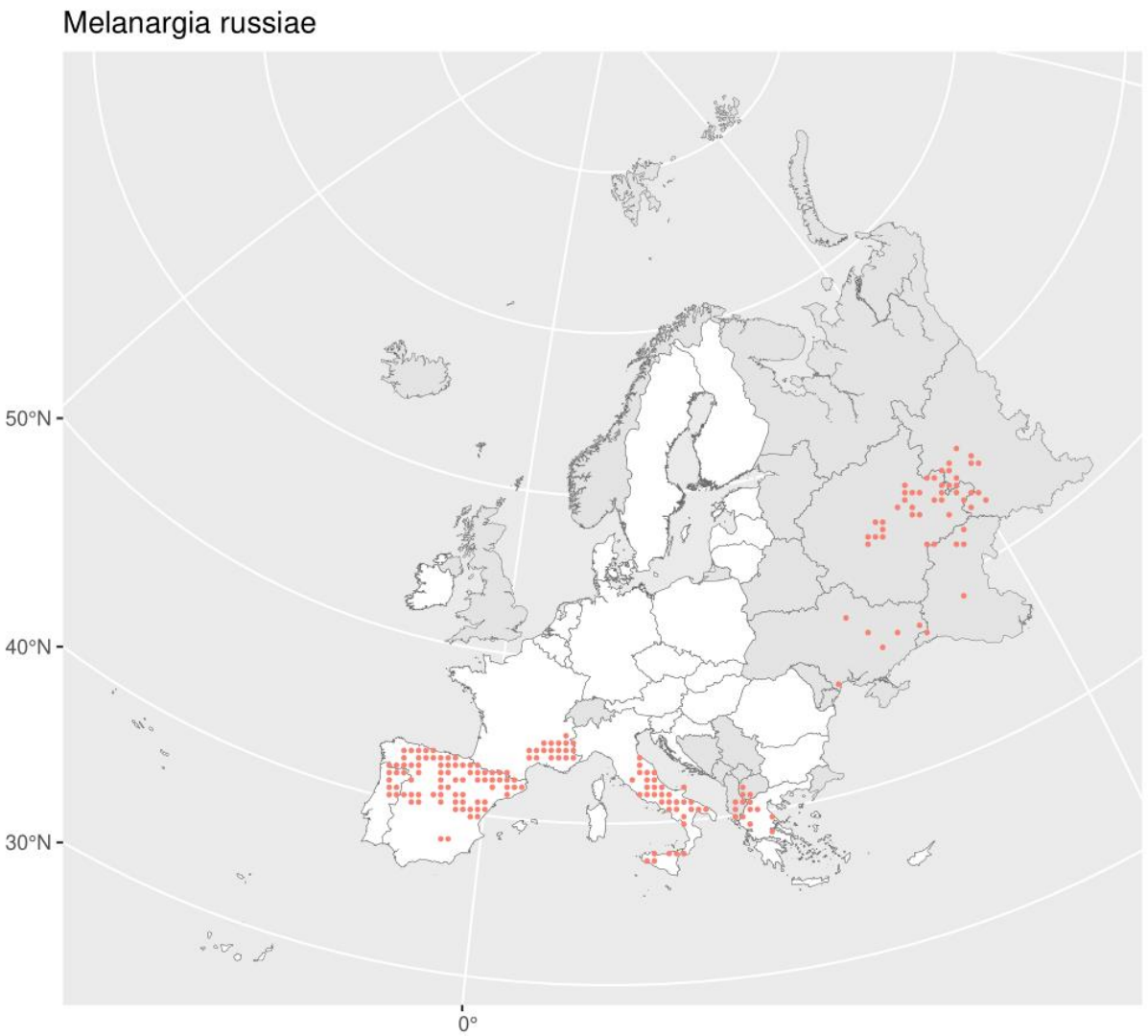
Distribution data

- GBIF
- iNaturalist.org and observation.org → use validated records for checking GBIF data
- Lepidiv (UFZ) and art. 17 distribution maps (EU)
- Validate with ‘old’ range maps from 2010 Red List
- Check outliers in team with experts (Rudi Verovnik, Martin Wiemers, Patrick Gros, Pieter Vantieghem, Miguel Munguira and others

De Vlinderstichting


Anthocharis euphenoides 2011–2020
50°N
40°N
30°N
20°W
0°
20°E
pl
0
1


Melanargia russiae
50°N
40°N
30°N
0°

Next step: fill the holes

- Build a Species Distribution Model (SDM) to fill the gaps, especially in Russia
- Input:
  - Distribution data 10x10km:
    - Generate zeroes
  - Environmental data:
    - Four climate variables
    - Altitude
    - IUCN habitat map → in output also habitat preference

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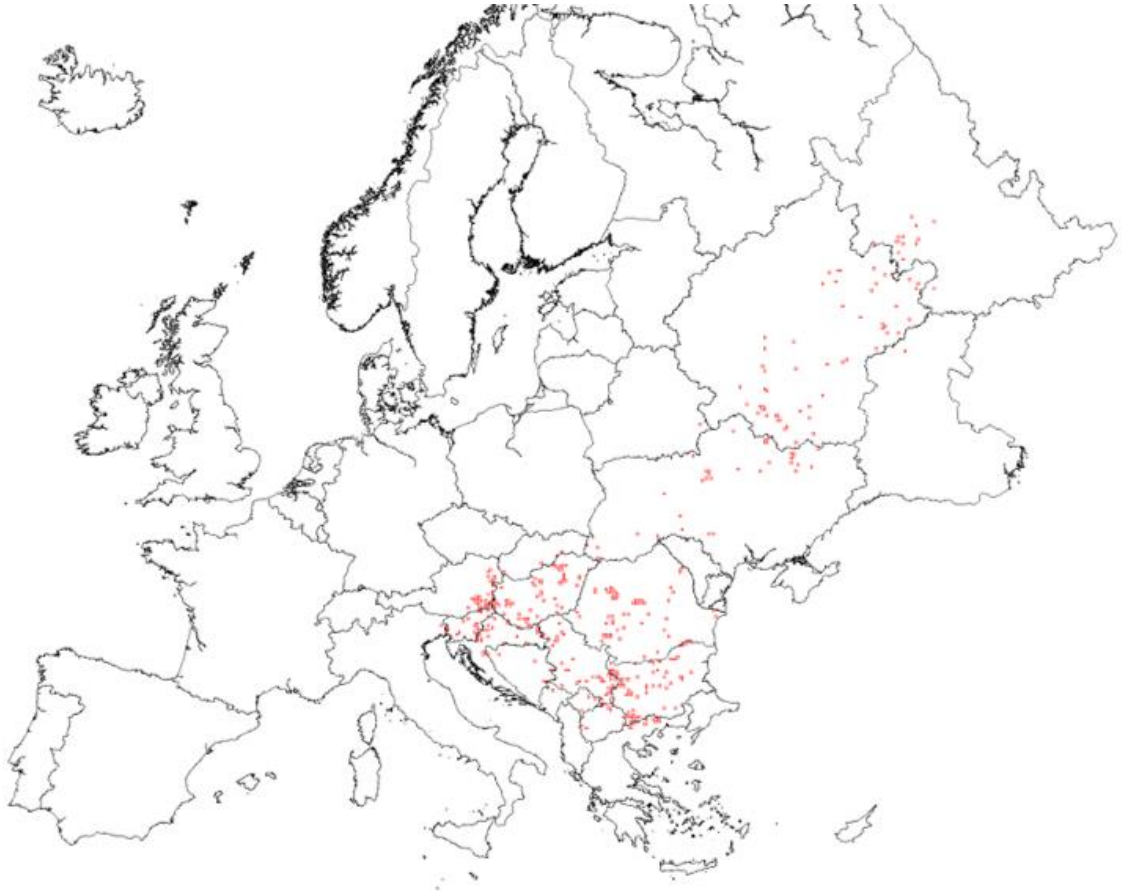

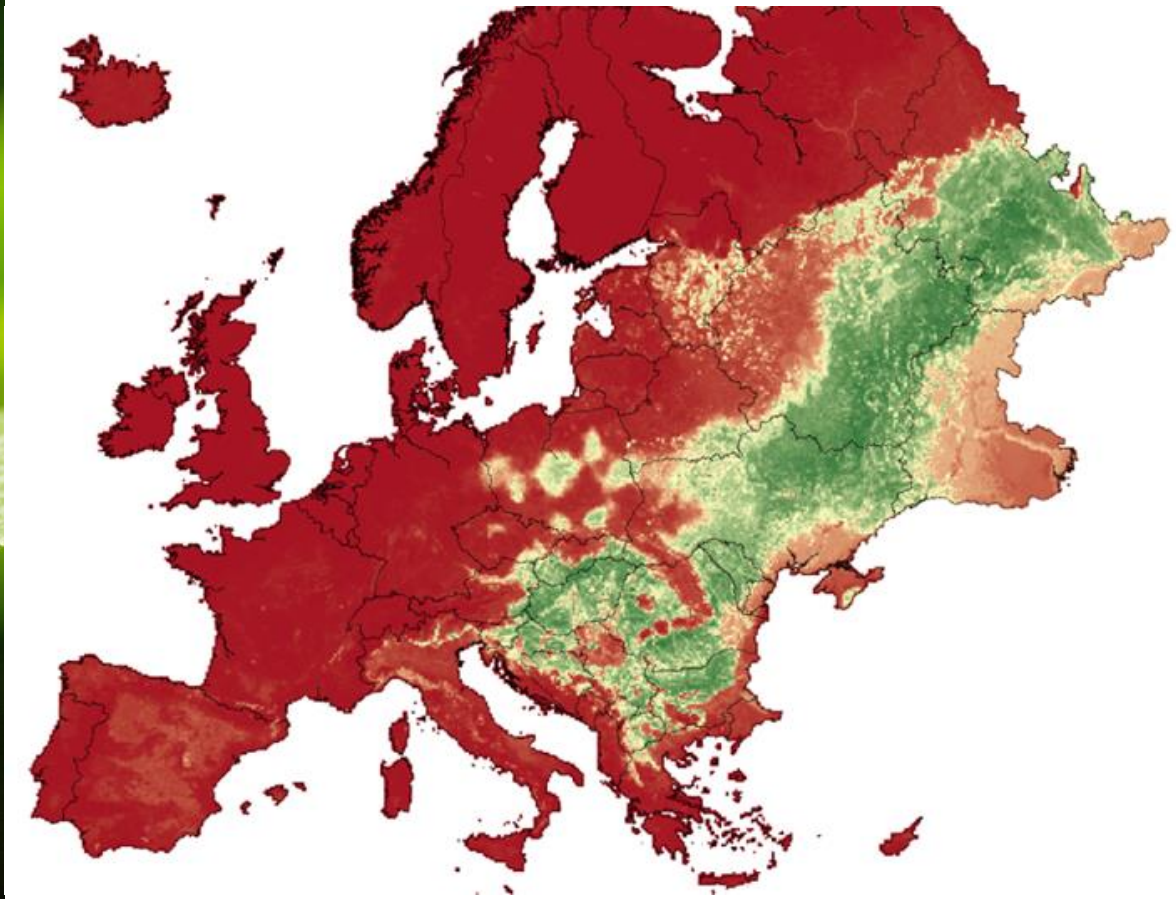

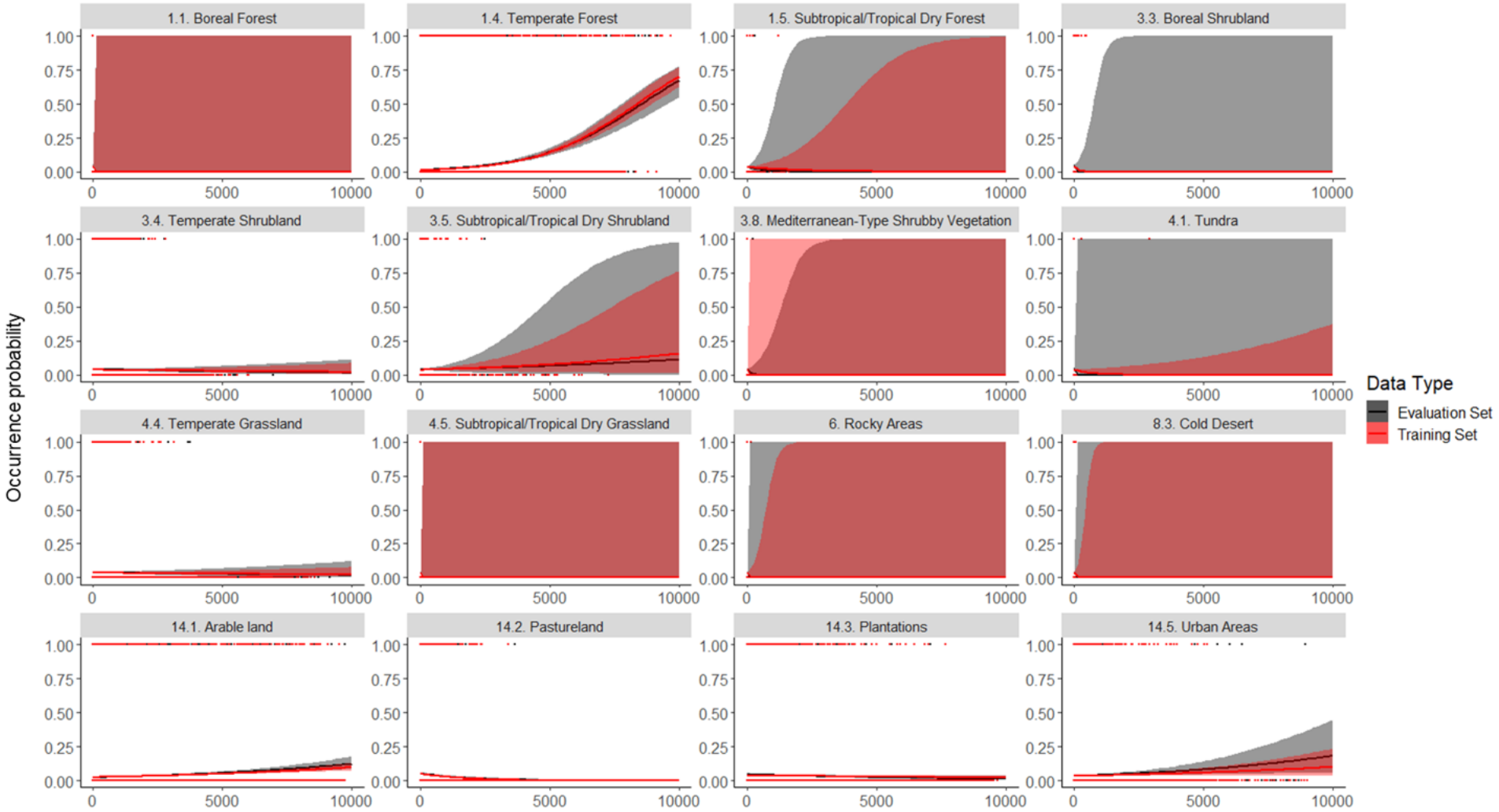
1.1. Boreal Forest
1.4. Temperate Forest
1.5. Subtropical/Tropical Dry Forest
3.3. Boreal Shrubland
3.4. Temperate Shrubland
3.5. Subtropical/Tropical Dry Shrubland
3.8. Mediterranean-Type Shrubby Vegetation
4.1. Tundra
4.4. Temperate Grassland
4.5. Subtropical/Tropical Dry Grassland
6. Rocky Areas
8.3. Cold Desert
14.1. Arable land
14.2. Pastureland
14.3. Plantations
14.5. Urban Areas
Occurrence probability
0.00
0.25
0.50
0.75
1.00
0
5000
10000
Data Type
Evaluation Set
Training Set

Make rangemap

- Combine the real observations (old and new) on a map
- Discard SMD points >100km from handmade rangemap of 2010 Red List, unless adapted (e.g. *Pieris mannii* and *Cupido argiades*)
- Create an ‘alphahull’ around the points
- This ‘fills’ up large areas in E Europe, especially Russia
- New rangemap is built on data and SDM’s

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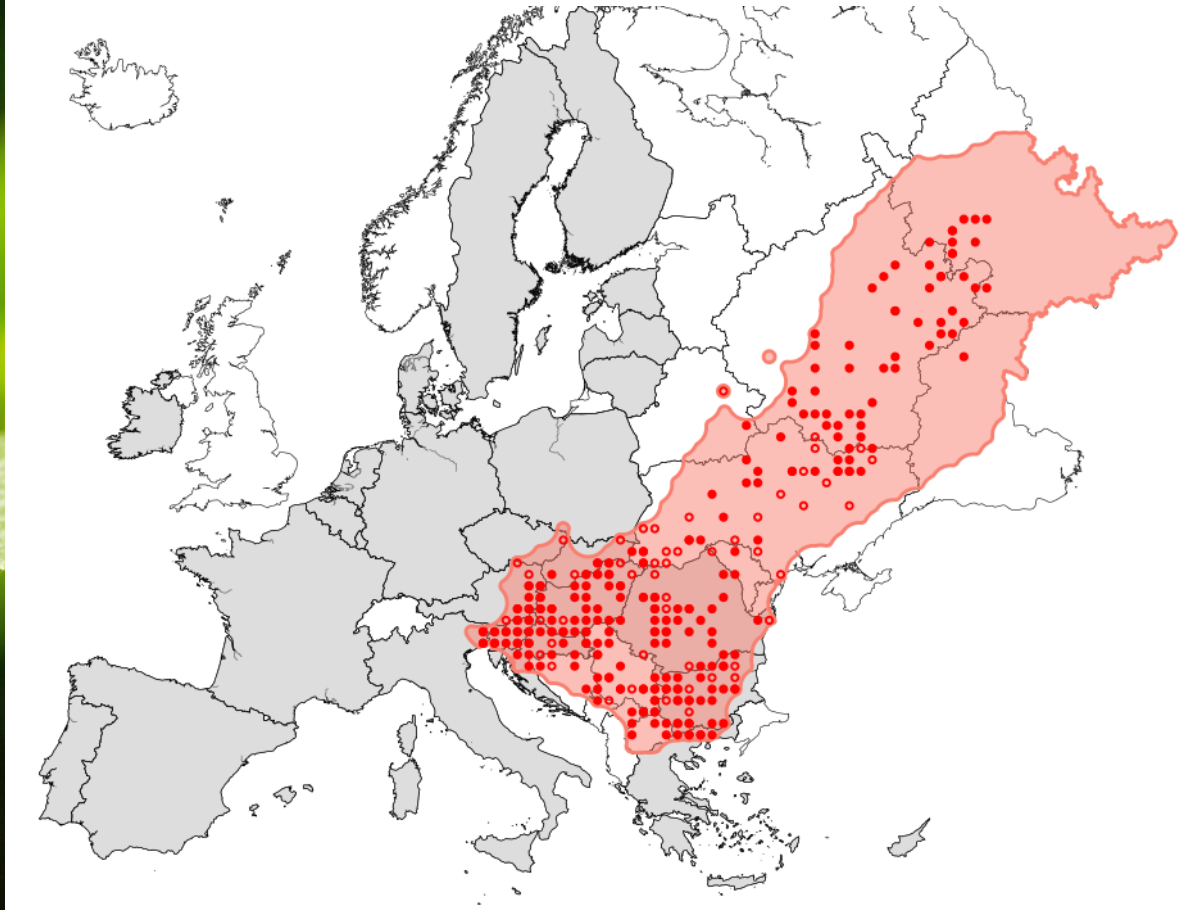
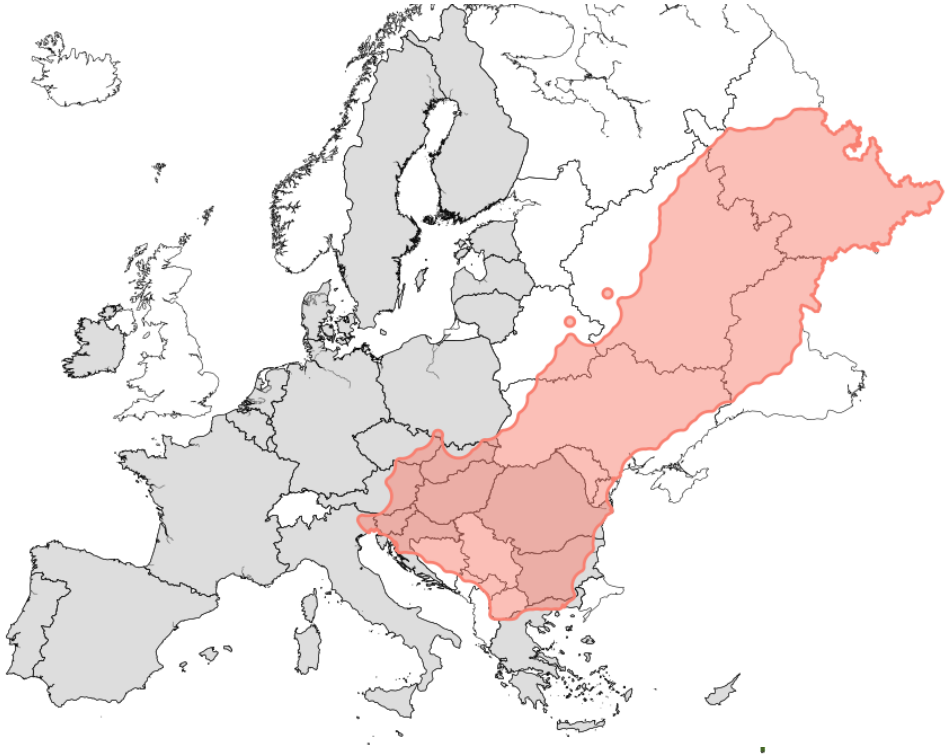


RL 2010 handmade range map

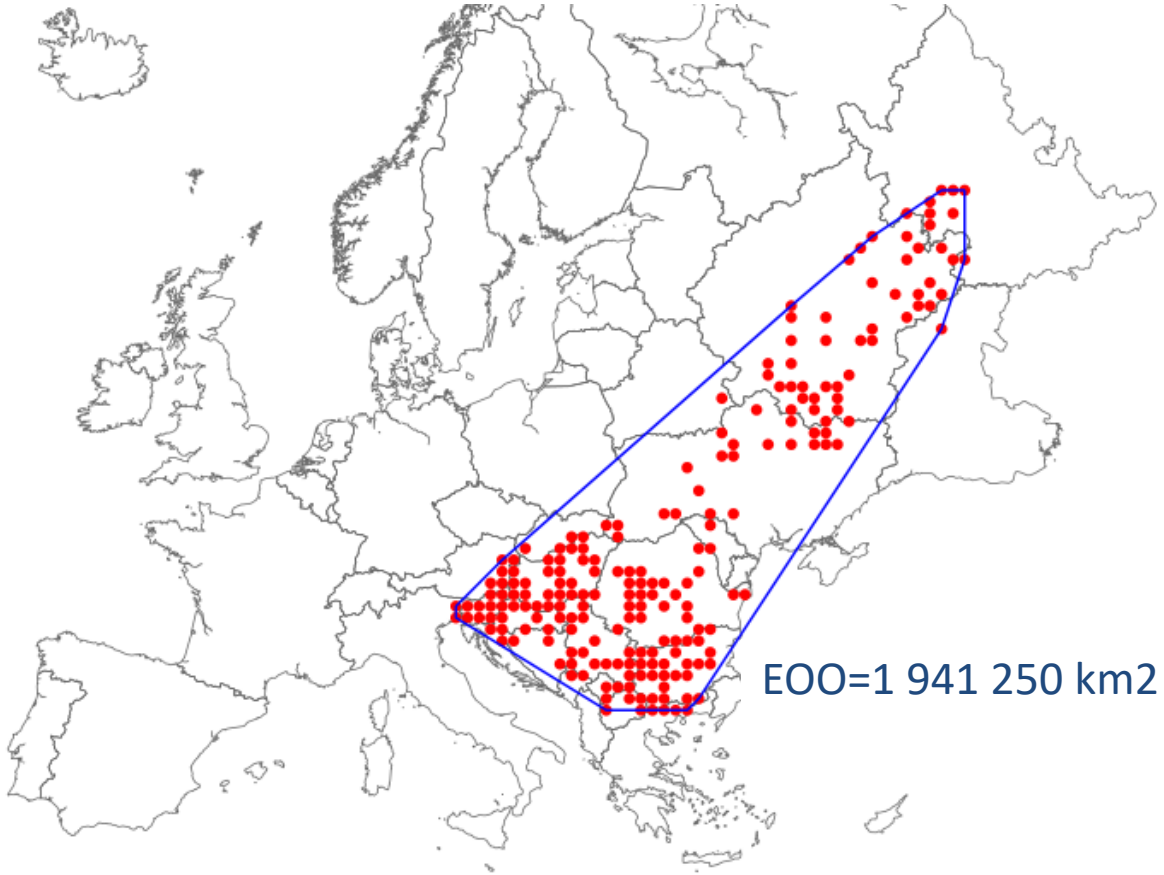
RL 2022 range map



IUCN Red List criteria

- AOO (Area of Occupancy): count area (in km2) of present 2x2km squares
- EOO (Extent of Occurrence): area (in km2) of convex hull around present distribution

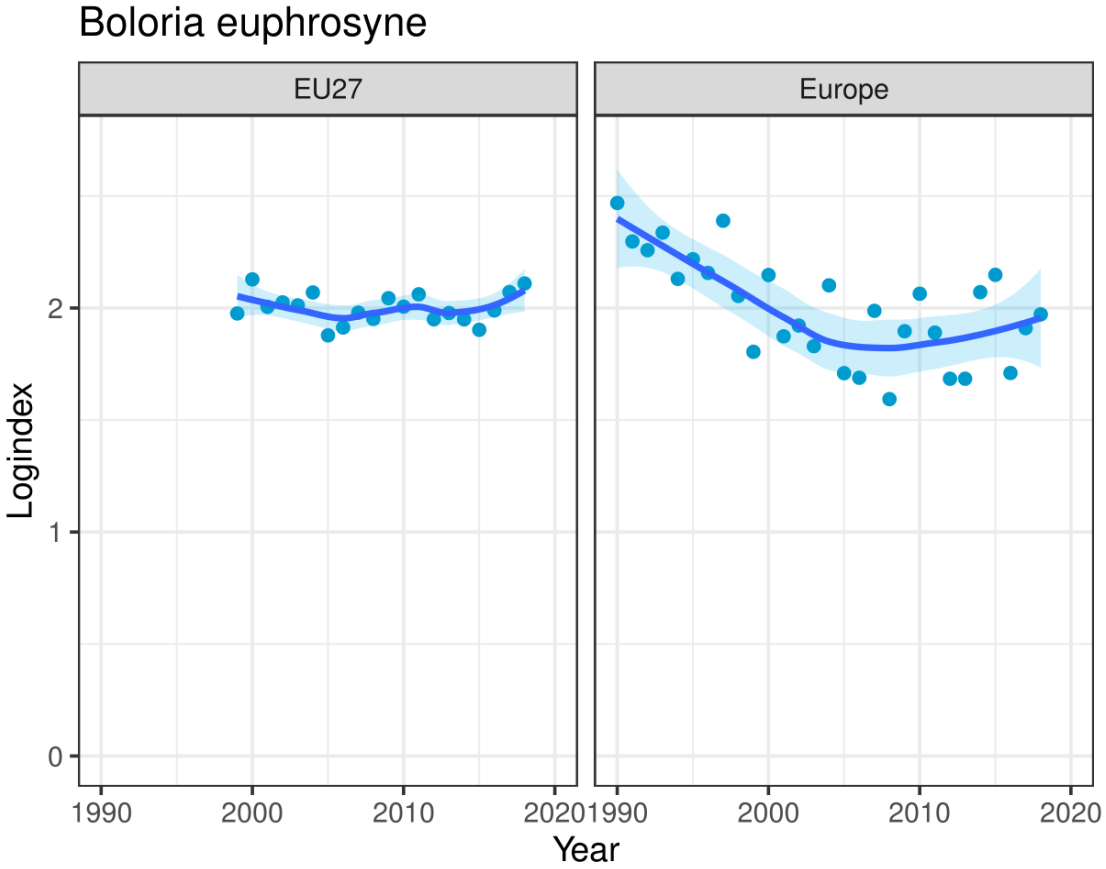
De Vlinderstichting



EOO=1 941 250 km2

Population trend

- 10-year trend of ABLE project (2009-2018)



Distribution trend

Ecological Applications, 20(8), 2010, pp. 2157–2169

Regional avian species declines estimated from volunteer-collected long-term data using List Length Analysis

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Can be deployed using Liszt-package in R

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Methods in Ecology and Evolution

British Ecological Society

Methods in Ecology and Evolution 2014

doi: 10.1111/2041-210X.12254

Statistics for citizen science: extracting signals of change from noisy ecological data

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List Length Method susceptable to change in recording intensity

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2010 Red List

AOO

EOO

Species_name_2019	EN_Red_List_Category_Europe_2010	EN_Red_List_Category_EU27_2010	aoo_europe	aoo_eu27	eoo_europe	eoo_eu27	dist trend Europe LL Bayes q50	ope_Bayes_sign	dist trend LL Bayes EU q50	27_Bayes_sign	p_eur_change_perc	p_eur_change_sign	p_eu27_change_perc	p_27_change_sign
Carcharodus alceae	LC	LC	28844	26564	8133128	5788820	1,07		1,08		1,4	sig	1,39	
Carcharodus baeticus	LC	LC	1036	1036	1873271,5	1873272	0,66	sig	0,66	sign				
Carcharodus floccifera	NT	LC	2816	2492	5765891,5	4326351	0,98		0,98					
Carcharodus lavatherae	NT	NT	2448	2200	2666002	2342917	0,92	sig	0,92	sig	0,66		0,66	
Carcharodus orientalis	LC	LC	640	540	883490,5	427414	0,67	sig	0,68	sign				
Carcharodus stauderi														
Carcharodus tripolinus	LC	LC	192	192	146421,5	146421,5	4,63		4,63					
Carterocephalus palaem	LC	LC	18616	13804	8040896	4579298	1,00		1,00		0,8		0,65	sig
Carterocephalus silvicol	LC	LC	9268	8568	3558966,5	1537553	0,79	sig	0,52	sig	0,58	sig	0,58	sig

Significant?

Population trend

Distribution trend Significant?

De Vlinderstichting

A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.

A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) *[(a) cannot be used for A3]*.

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation *[except A3]*

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality

(d) actual or potential levels of exploitation

(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

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B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)			
	Critically Endangered	**Endangered**	**Vulnerable**
B1. Extent of occurrence (EOO)	< 100 km^2	< 5,000 km^2	< 20,000 km^2
B2. Area of occupancy (AOO)	< 10 km^2	< 500 km^2	< 2,000 km^2
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented **OR** Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals			
(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals			

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Red List

- We have all ingredients: European trend (population and distribution trend), AOO, EOO
- We did a preliminary assessment, now we have to discuss with experts, as they have good local knowledge:
  - Is trend correct and real (or a bias)?
  - Number of locations
  - Fragmentation
  - Fluctuations

RL category	Draft Number of species 2022	Number of species 2010
EX	1	
RE		1
CR	1	3
EN	21	12
VU	29	22
NT	20	44
LC	336	349
DD	2	4

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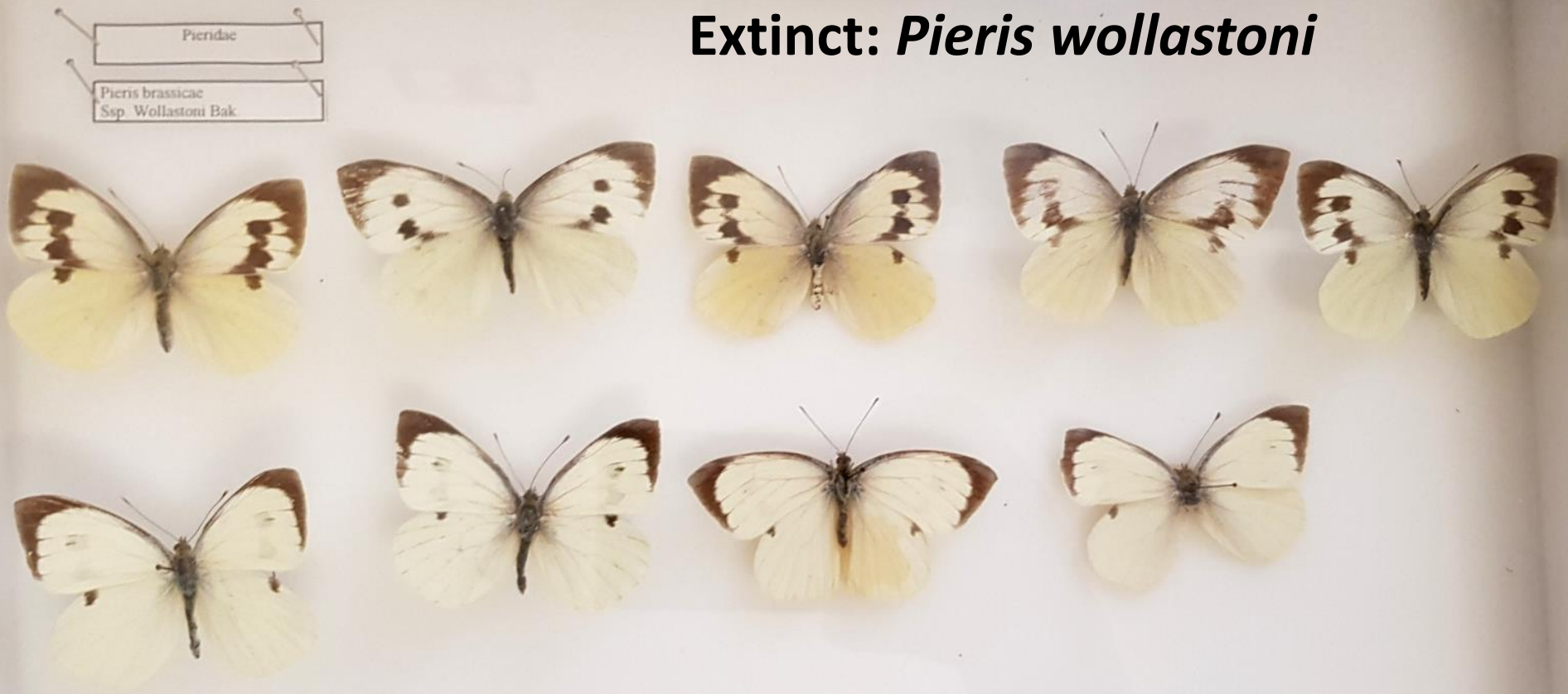
Extinct: *Pieris wollastoni*




Endangered: *Gonepteryx maderensis*


n Endangered to Least concern:
s xiphia


From Least concern to Vulnerable?
Boloria eunomia

Red List

- We had one workshop on Macaronesian species
- Four workshops planned: Mediterranean, Balkans, Boreal and Central Europe
- But we have to follow the criteria strict
- Review by IUCN office and IUCN SSC Butterfly and Moth SG
- Upload all results to SIS

De Vlinderstichting

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