

Towards a European Moth Red List

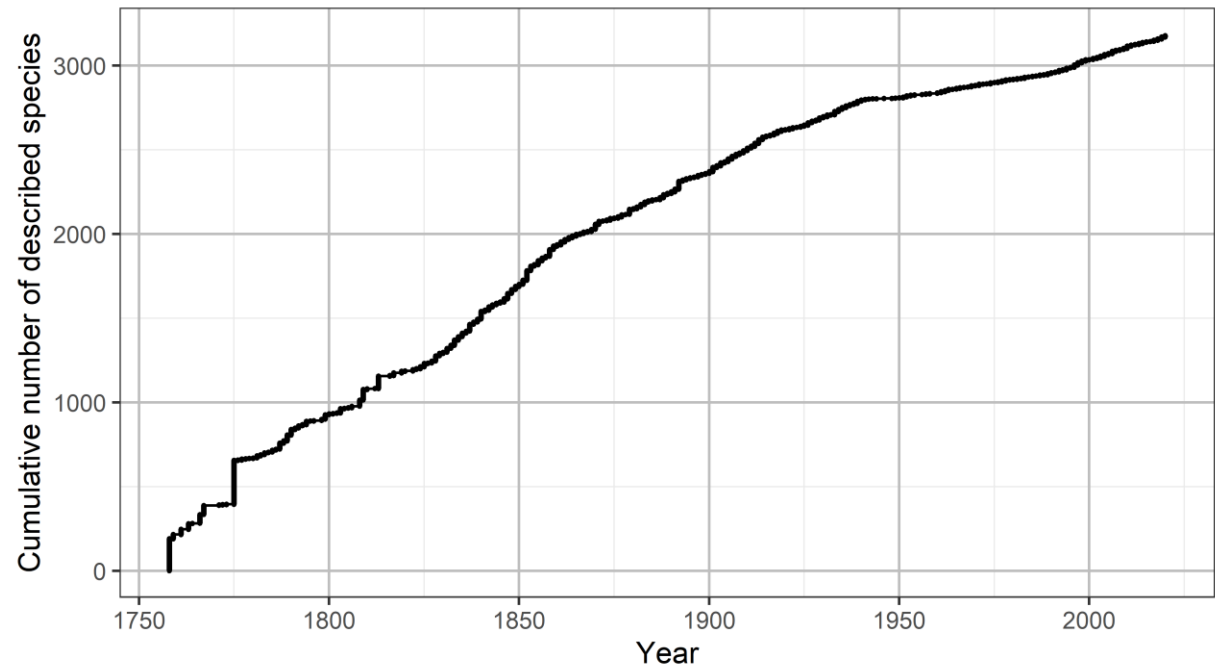


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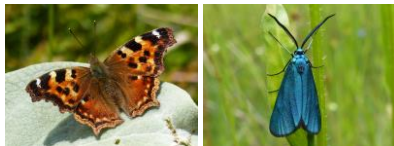
European Lepidoptera

- $\pm 8,700$ species
- 496 butterflies ¹
- $\pm 3,200$ larger moths
- $\pm 5,000$ micro moths ²



¹ Wiemers et al (2018)

² Karsholt and Razowski (1996)

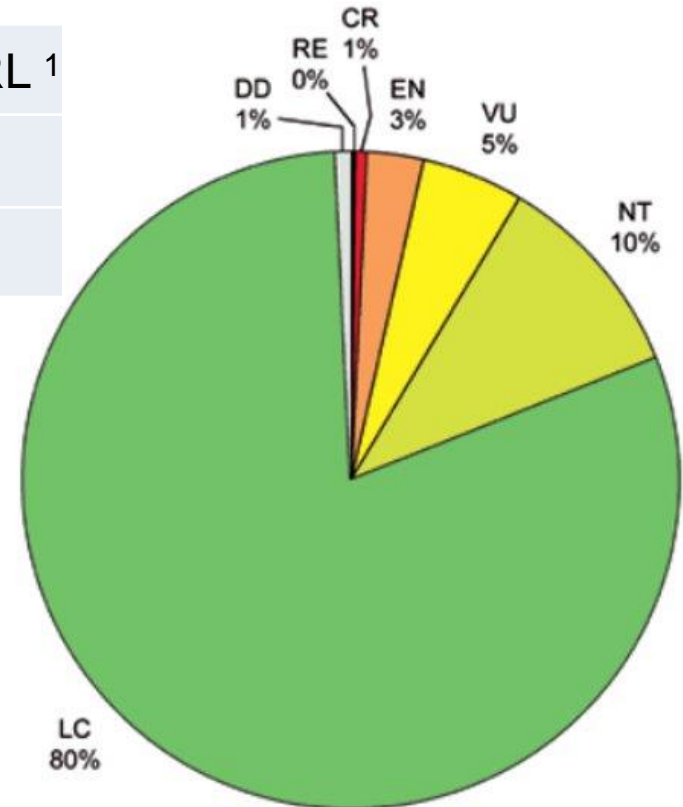


European Red List

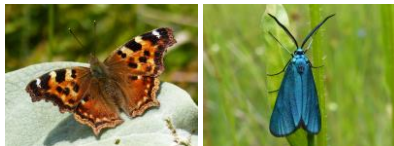
	No. species	% LC	% RL ¹	No. RL ¹
Butterflies	435	80	18.5	81
Larger moths	3,200

¹ Threatened (CR, EN, VU) and Near Threatened

Figure 3. Red List status of butterflies in Europe



van Swaay et al (2010)



Habitats Directive

- 31 butterflies
- 19 moths

18 larger moths

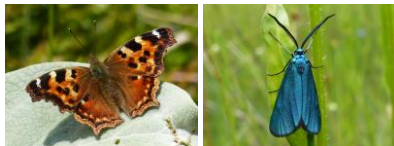
1 micro moth (*Glyphipterix loricatella*)



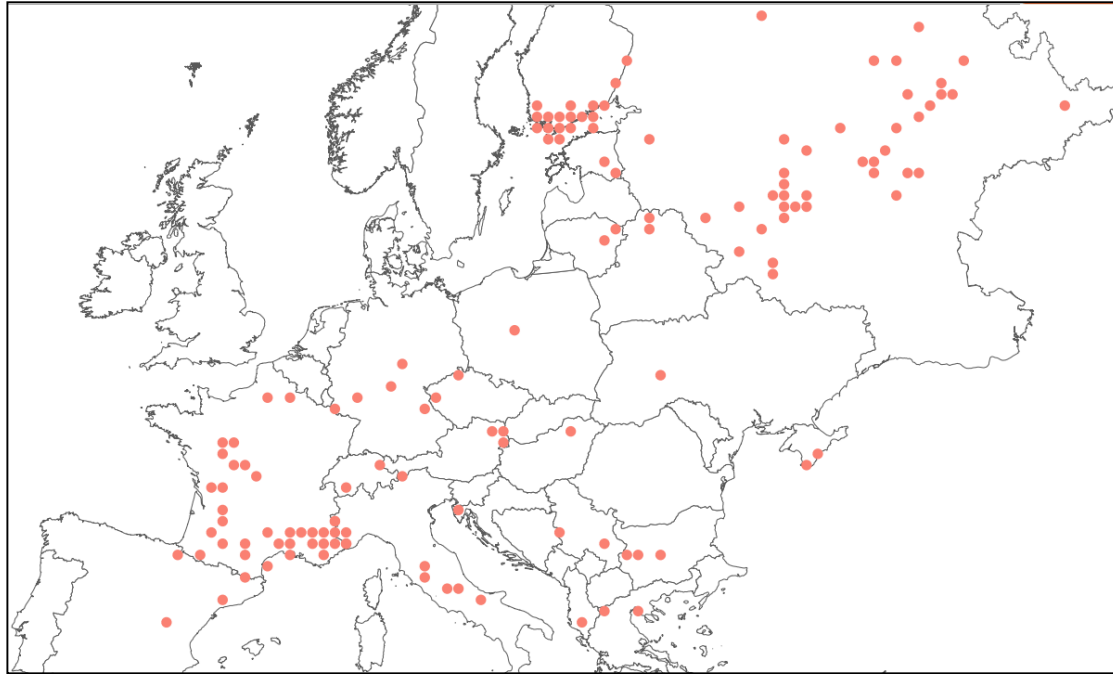
Investigating which species are threatened or near threatened on a European scale

- 10-year period (2011-2020)
- Following IUCN criteria
- Indispensable help from regional/national experts

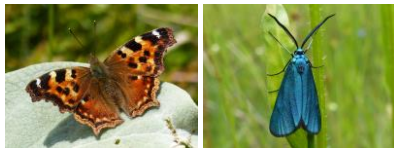
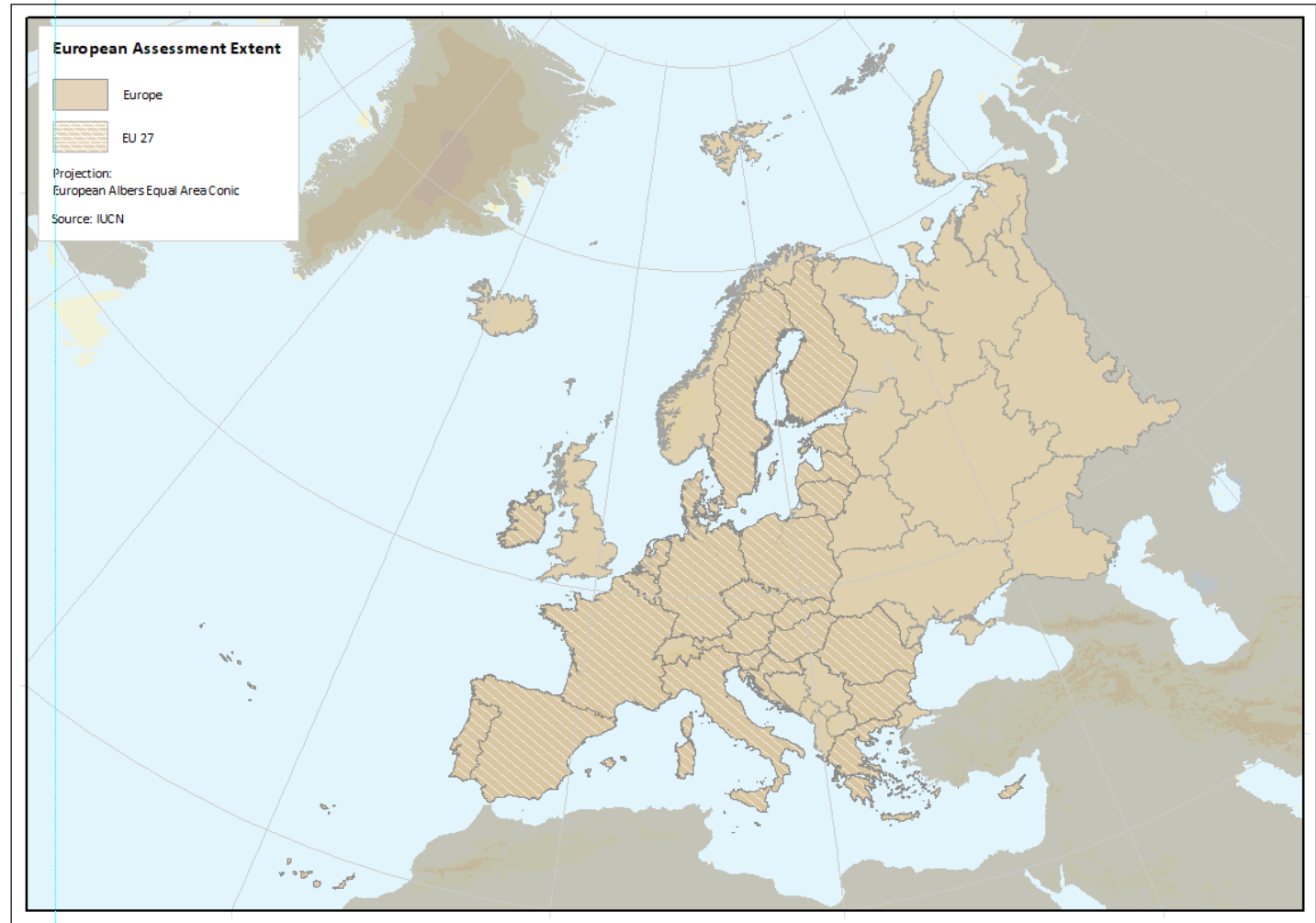
Not contacted yet, and willing to help?
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European – not national perspective



- EU27
- Pan-European
- Pan European border defined by the United Nations Statistics Division



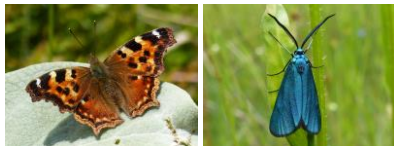
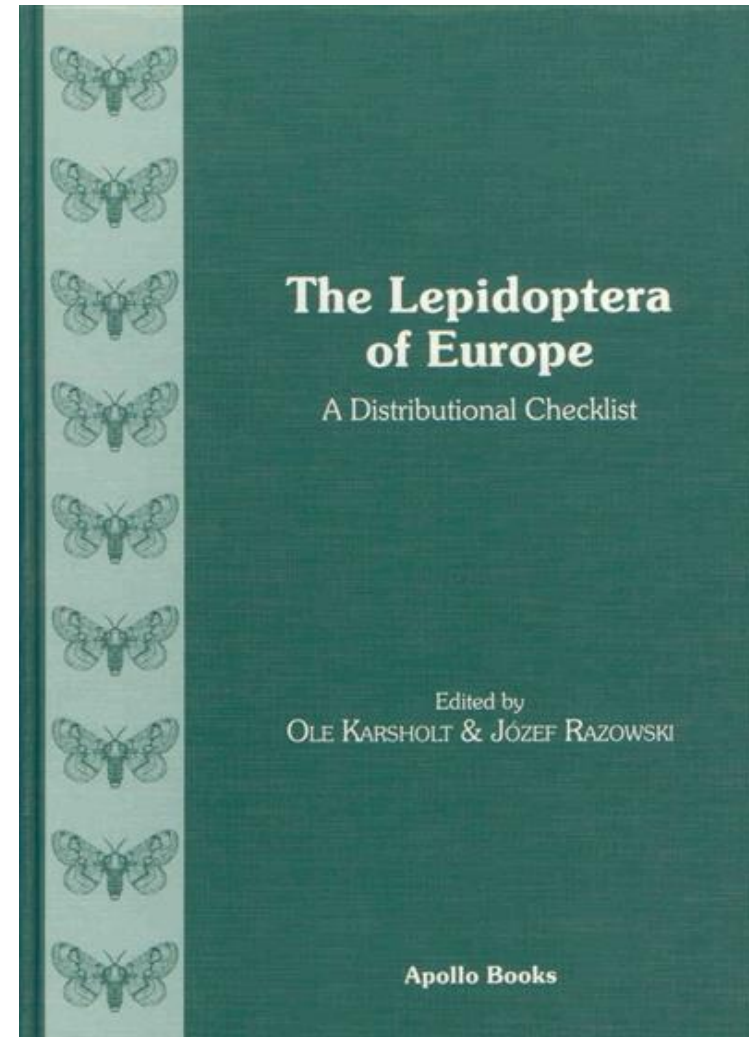
Where to start?

Country occurrence

- Karsholt and Razowski (1996)
- Lepiforum.de

Combined databases

- GBIF
- National/regional databases



Current database

All records

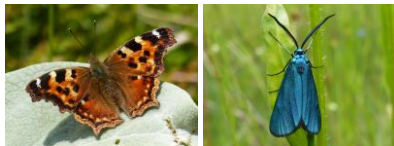
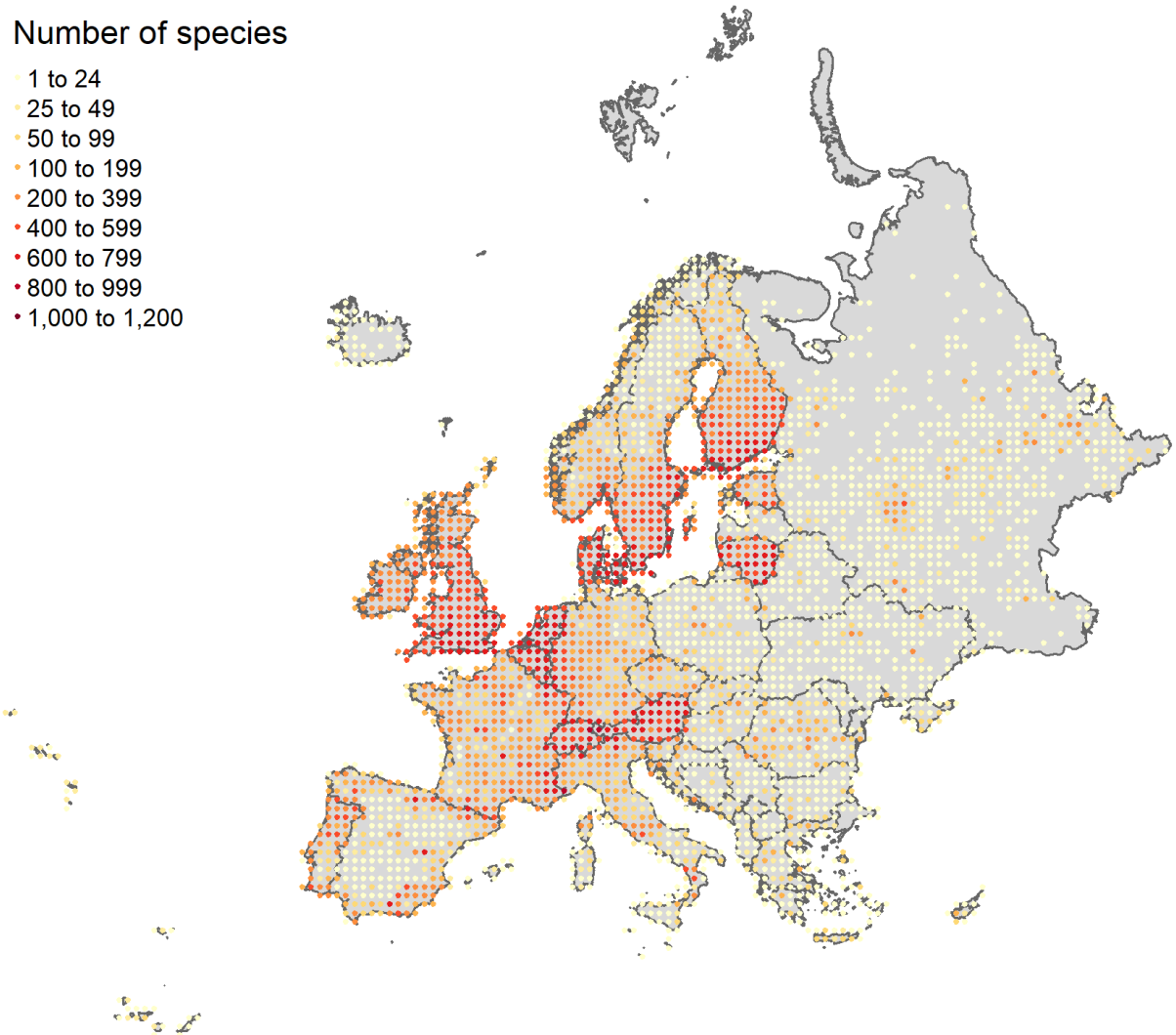
- 9.5 million
- 2,655 species
- No data c. 535 species

2011-2020

- >5 million
- 2,492 species
- No data for another 163 species (c. 700 in total)

Number of species

- 1 to 24
- 25 to 49
- 50 to 99
- 100 to 199
- 200 to 399
- 400 to 599
- 600 to 799
- 800 to 999
- 1,000 to 1,200

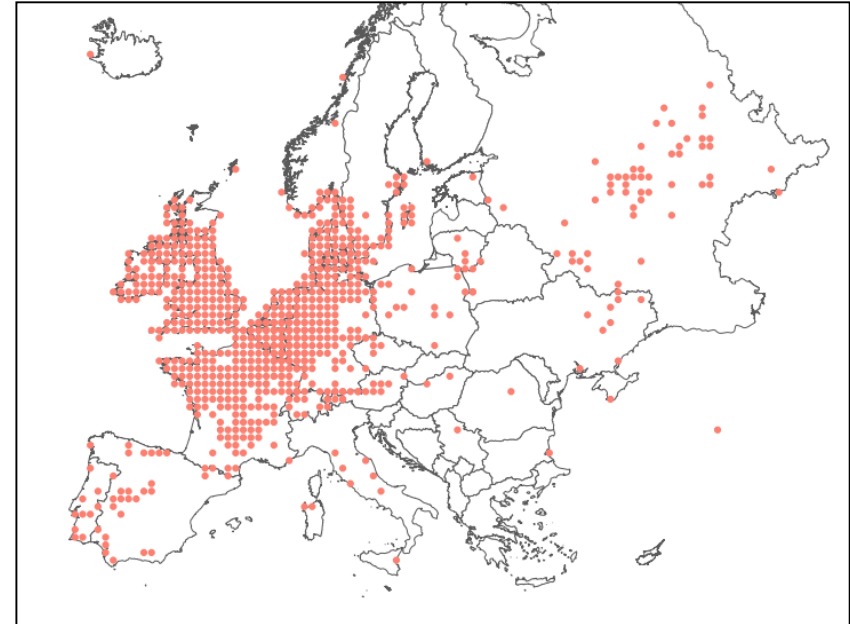


Widespread species

1. *Autographa gamma* Silver Y
2. *Noctua pronuba* Large Yellow Underwing
3. *Tyria jacobaeae* Cinnabar
4. *Macroglossum stellatarum* Hummingbird Hawk-moth
5. *Camptogramma bilineata* Yellow Shell

<5 records: systematic check of literature undertaken

6-30 records: above underway



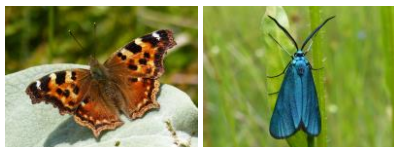
Tyria jacobaeae Cinnabar



SUMMARY OF THE FIVE CRITERIA (A-E) USED TO EVALUATE IF A TAXON BELONGS IN AN IUCN RED LIST THREATENED CATEGORY (CRITICALLY ENDANGERED, ENDANGERED OR VULNERABLE).¹

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%
<div> <div> <p>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.</p> <p>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.</p> <p>A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) <i>[(a) cannot be used for A3]</i>.</p> <p>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.</p> </div> <div> <p><i>based on any of the following:</i></p> <p>(a) direct observation <i>[except A3]</i></p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.</p> </div> </div>			

- Need population trend data (in Europe) for species to use
- Not available for moths, maybe only HD species?

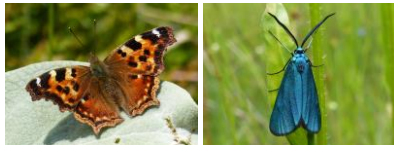
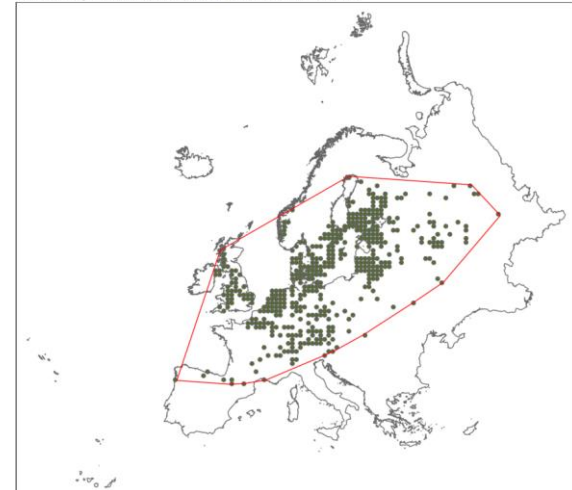


B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

	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			

- Need accurate data (maximum 2 by 2 square kilometre) for EOO and AOO
- Also information about A, B or C

Abraxas sylvata; EOO: 5958704 km²; AOO: 9420 km²



IUCN Criteria B

Abrostola canariensis EOO: 1160 km²; AOO: 20 km²



Abrostola canariensis



Photo: Egbert Friedrich/Lepiforum.de

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

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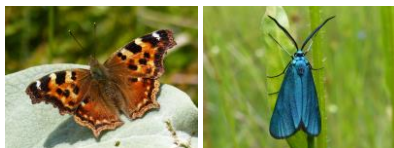
AND at least 2 of the following 3 conditions:

(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			



C. Small population size and decline			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals			

- Do we have species where we know the exact numbers?
- When an insect species has <10,000 mature individuals it could already be on the verge of extinction. Maybe some endemic species have populations below this threshold?



IUCN Criteria D and E

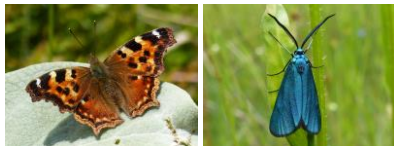
D. Very small or restricted population

	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 50	< 250	D1. < 1,000
D2. <i>Only applies to the VU category</i> Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	D2. typically: AOO < 20 km ² or number of locations ≤ 5

E. Quantitative Analysis

	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

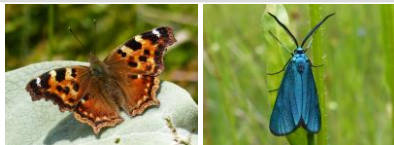
- D: More or less the same as C
- E: Might be possible



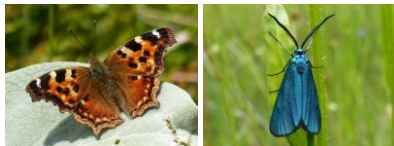
Current stage

- Distribution data collection
- Know where every species occur
- Calculate EOO and AOO 2011-2020
 - 2,350 species might be threatened
 - Not enough data (yet)
- Send out questionnaire

Species	native	<1% presence	1-5% presence	5-15% presence	>15% presence	unknown presence	extinct < 2011	80-100% decrease trend	50-80% decrease trend	30-50% decrease trend	more or less stable trend	>200% increase trend	unknown increase trend	attention increase trend	strong fluctuations	
<i>Abraxas grossulariata</i>																notes
<i>Abraxas sylvata</i>																notes
<i>Abrostola tripartita</i>																notes
<i>Abrostola triplasia</i>																notes

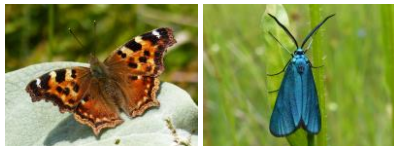


- Questionnaire to regional/national experts
- Combine all knowledge to determine IUCN status (preliminary list of threatened species now generated)
- Regional workshops for threatened species
- Draft species accounts for SIS Connect: Geographical Range, Population, Habitats and Ecology, Threats, Conservation Actions, Rationale for Red List Assessment
- Final report in 2024



We need your help!

- Share (digitally available) data (preferably upload to GBIF) with the project team
- Fill in the questionnaire about your region
- Help us with regional occurrence and trends of species
- Help us with images of larger moths (especially those outside NW Europe): chrismanley010@gmail.com; spreadsheet of missing images; sign permission form
- Start European monitoring scheme to update the next Red List with population trend data? Standardised moths counts using <https://butterfly-monitoring.net/ebms-app>



Thanks to experts/organizations for any (forthcoming) contributions!



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Zygaena fausta