Accidental arks: conserving monopisthocotylan parasite species through European weatherfish captive breeding

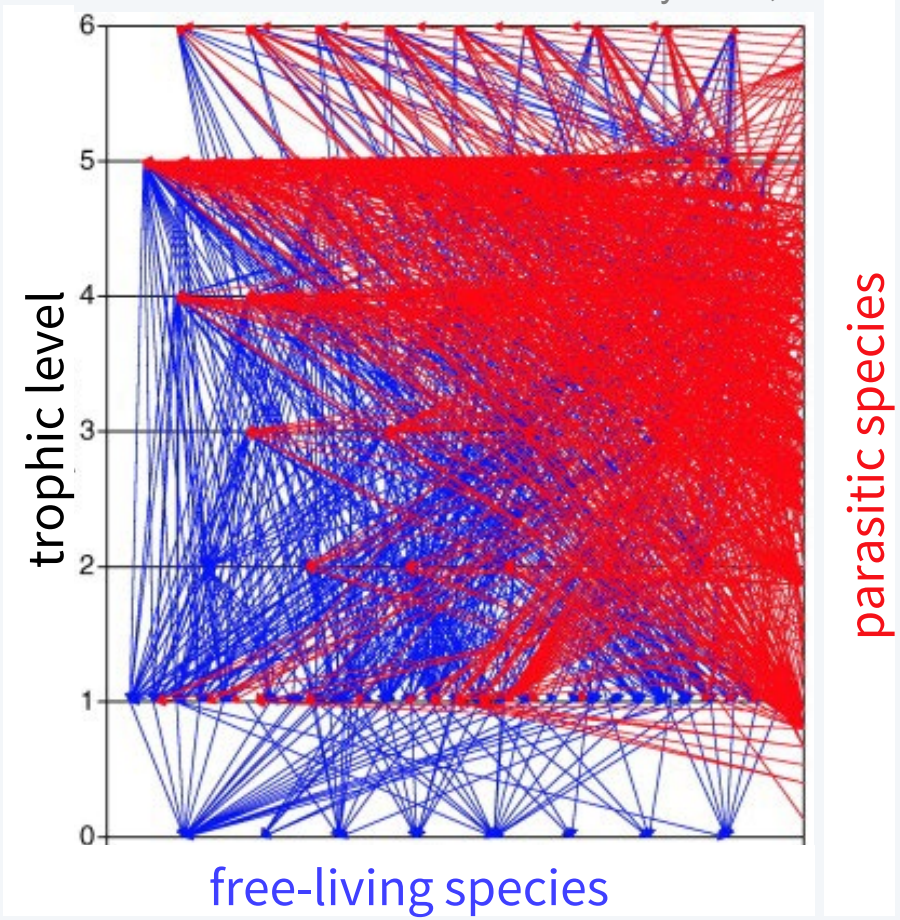
Gobbin T.P.; Kmentova N.; Auwerx J.; Martel A.; Nelson A.; Terriere N.; Van Wichelen J.; Vanhove M.P.M.

Parasites & Ecosystems

Wildlife parasites are fascinating and… important for ecosystems!

- **Substantial part of the biomass**
- **Provide many ecosystem services:**
  - Increasing biodiversity
  - Regulating of host populations
  - Reducing impact of toxic pollutants
  - Linking food webs
    (75% of the links)

Lafferty et al., 2006



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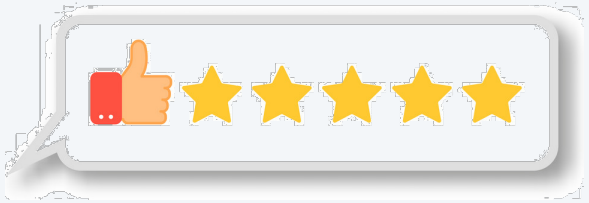

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Wildlife parasites contribute to ecosystem robustness and resilience

Parasites & Ecosystems

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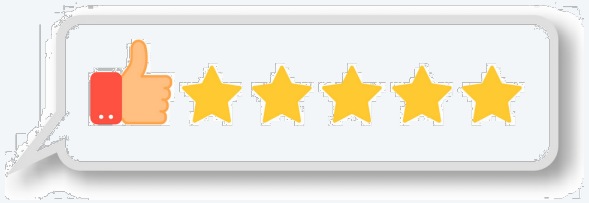
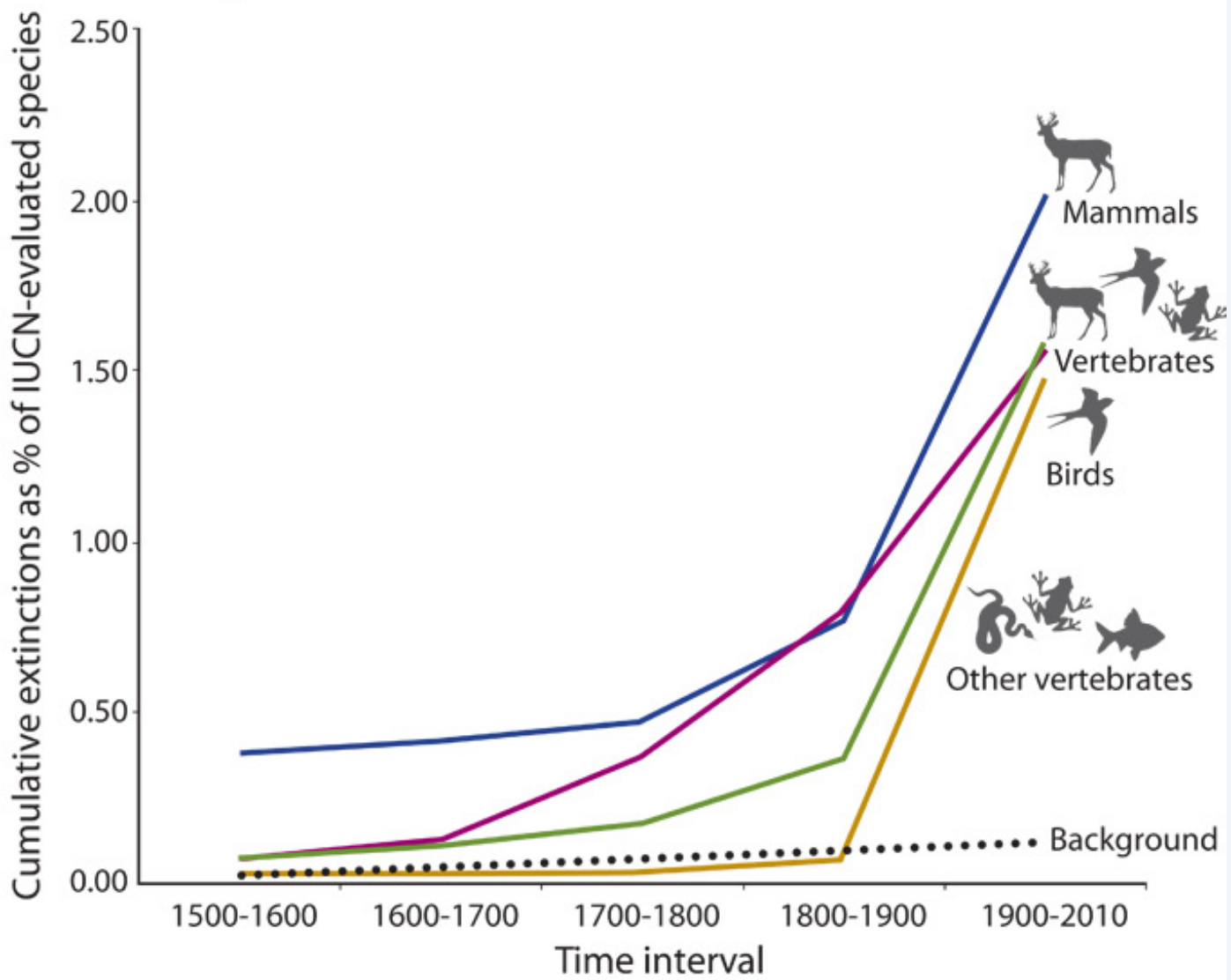


- **Substantial part of the biomass**
- **Provide many ecosystem services:**

- **Have an intrinsic value**
  - are part of genetic and species diversity
  - represent a (large) portion of evolutionary history

Biodiversity crisis



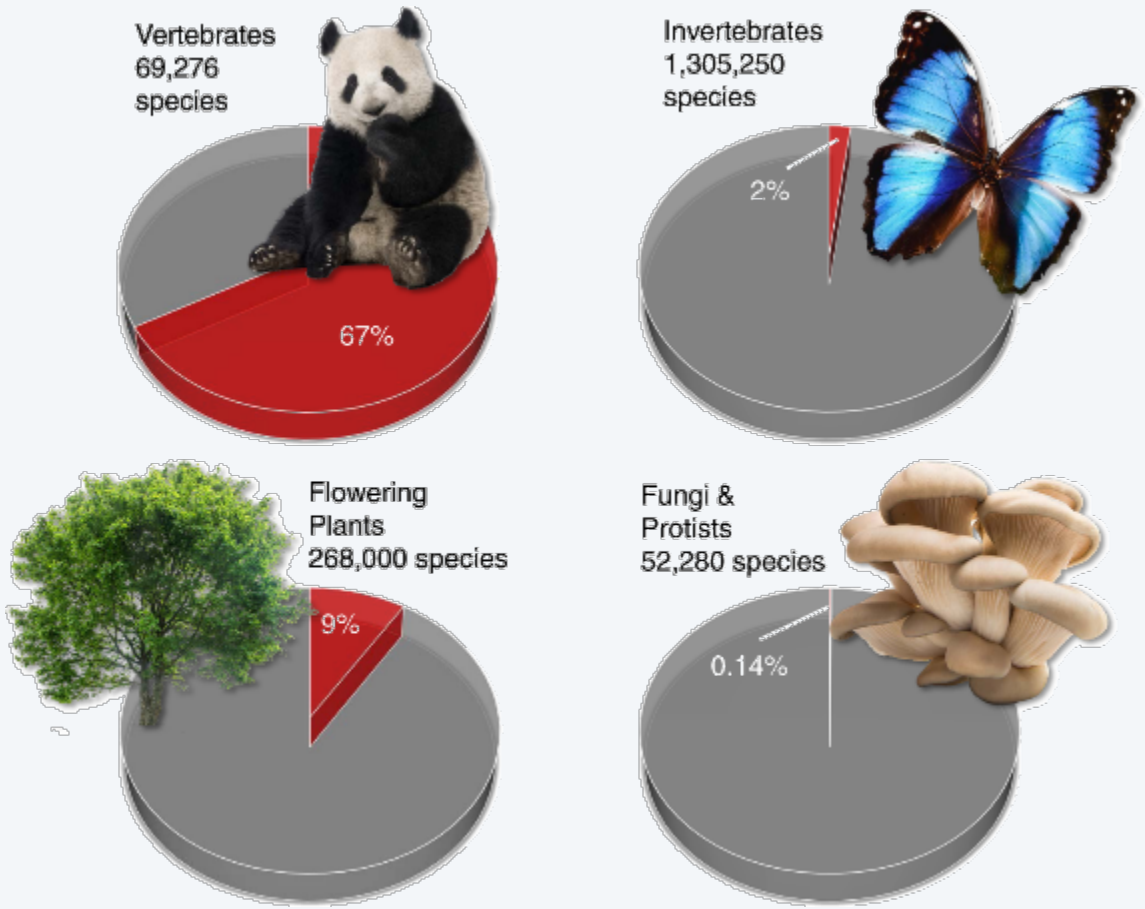
Extinction rate
is currently 1,000–10,000 times greater than past natural (background) rates of extinction

Bias towards vertebrates!

What about parasites?

Biodiversity crisis

percentages of species assessed on IUCN Red List (2018)



Eisenhauer et al., 2019

Very little is known about the extinction risk of invertebrates (<3% species assessed)

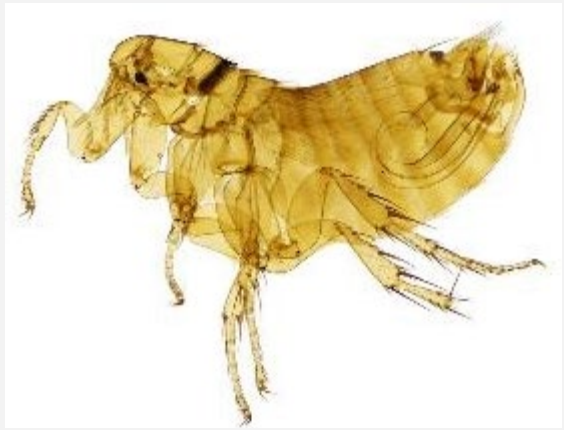
In this context, parasites are even more neglected

Extinction risk of parasites

ANIMALIA - INSECTA GLOBAL

Haematopinus oliveri

Unknown CR



ANIMALIA - INSECTA GLOBAL, EUROPE

Manx Shearwater Flea

Ceratophyllus fionnus

Unknown CR

IUCN Red List

- **0** platyhelminths
- **0** nematodes
- **0** acanthocephalans
- **2** arthropods
- Few (bird) brood parasites

IUCN = International Union for Conservation of Nature

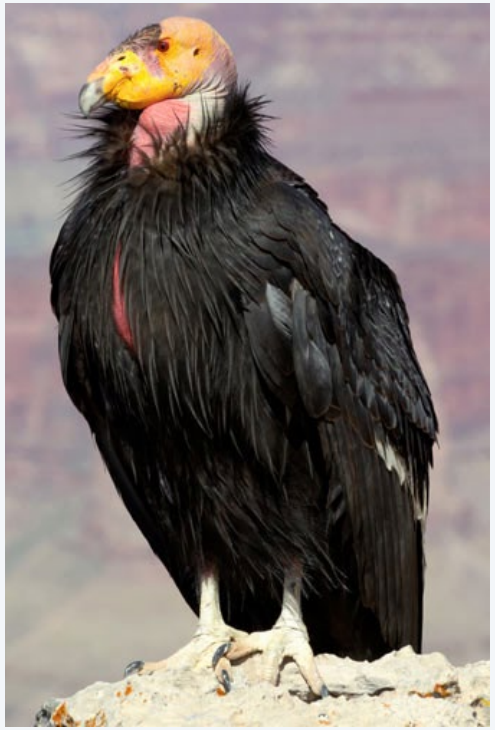
Conservation

Among possible conservation action:

- Breeding and reintroduction
- Relocation / Translocation

Gopher tortoise
(*Gopherus polyphemus*)

Black rhinoceros
(*Diceros bicornis*)



Californian condor
(*Gymnogyps californianus*)

Conservation

Commonly, (species-specific) parasites are intentionally removed during conservation actions targeting their hosts

Gophertortoise tick
(*Amblyomma tuberculatum*)

Gopher tortoise
(*Gopherus polyphemus*)

Amblyomma personatum
Dermacentor rhinocerinus

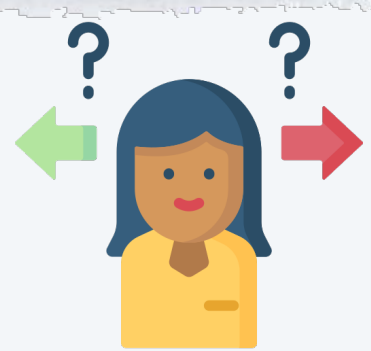
Black rhinoceros
(*Diceros bicornis*)

California condor louse
(*Colpocephalum californici*)

Californian condor
(*Gymnogyps californianus*)

→ increases the extinction risk of parasites
→ conservation-induced extinction

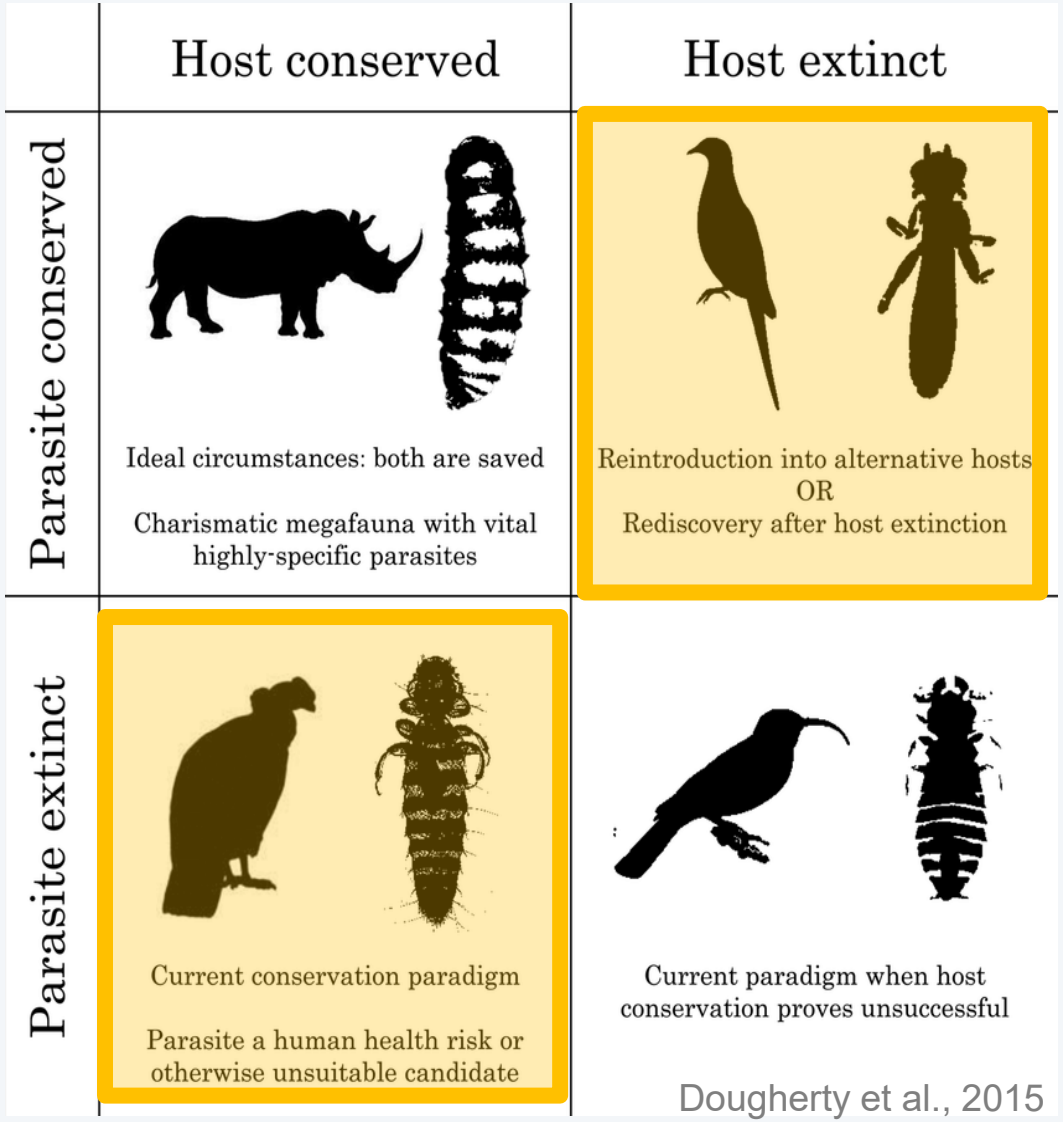
Dilemma of conserving parasites



Protect endangered free-living species at the risk of causing parasite decline/extinction?

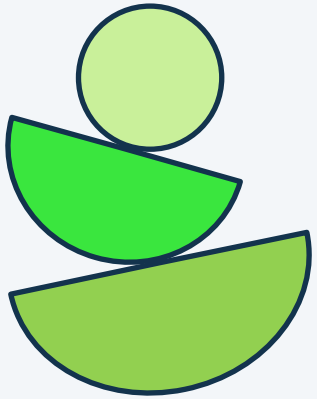
OR

Protect endangered parasite species at the risk of decreasing host fitness?

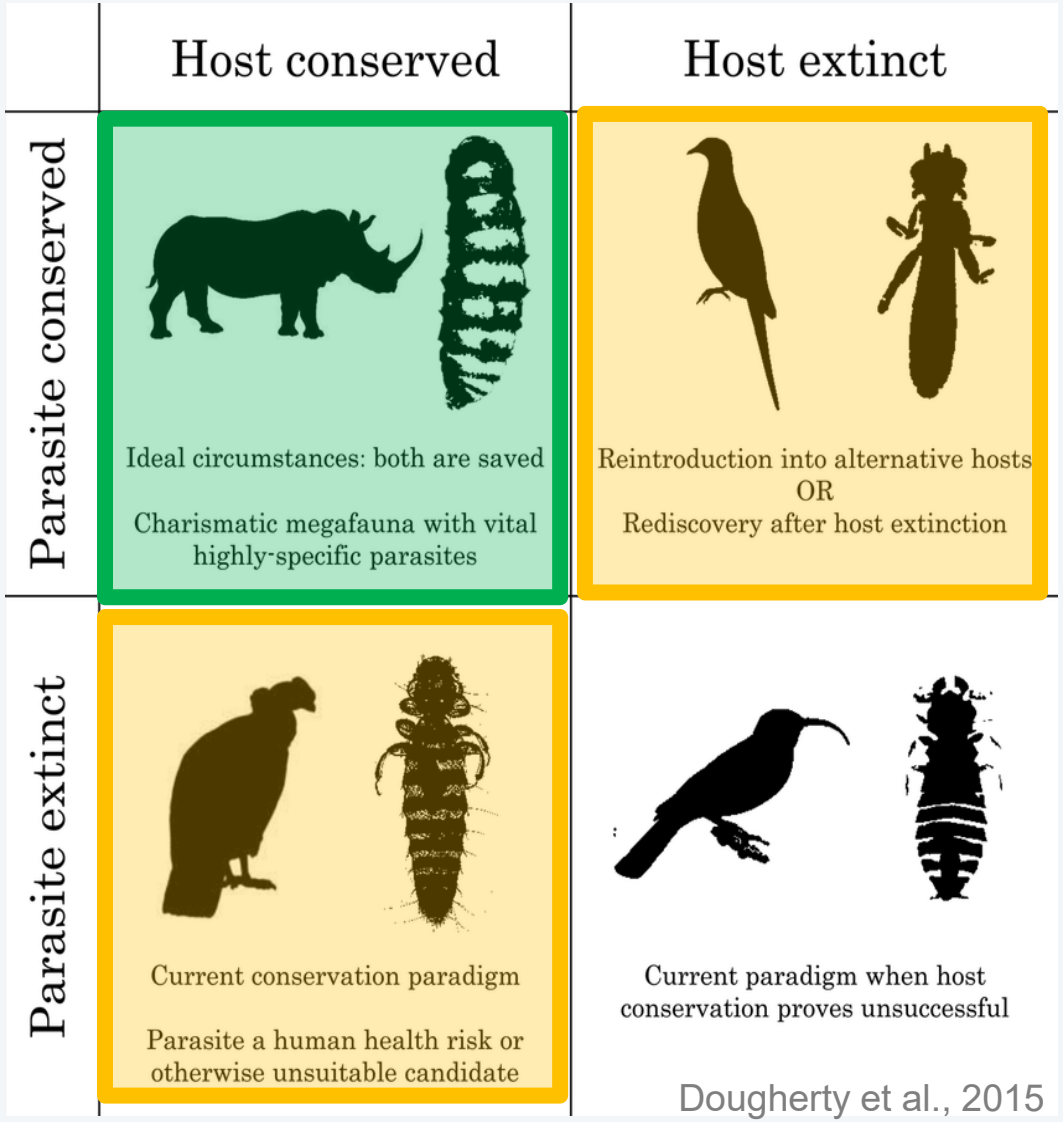


Dougherty et al., 2015

Dilemma of conserving parasites



Conservation of one species
should NOT hamper
the conservation of other species!

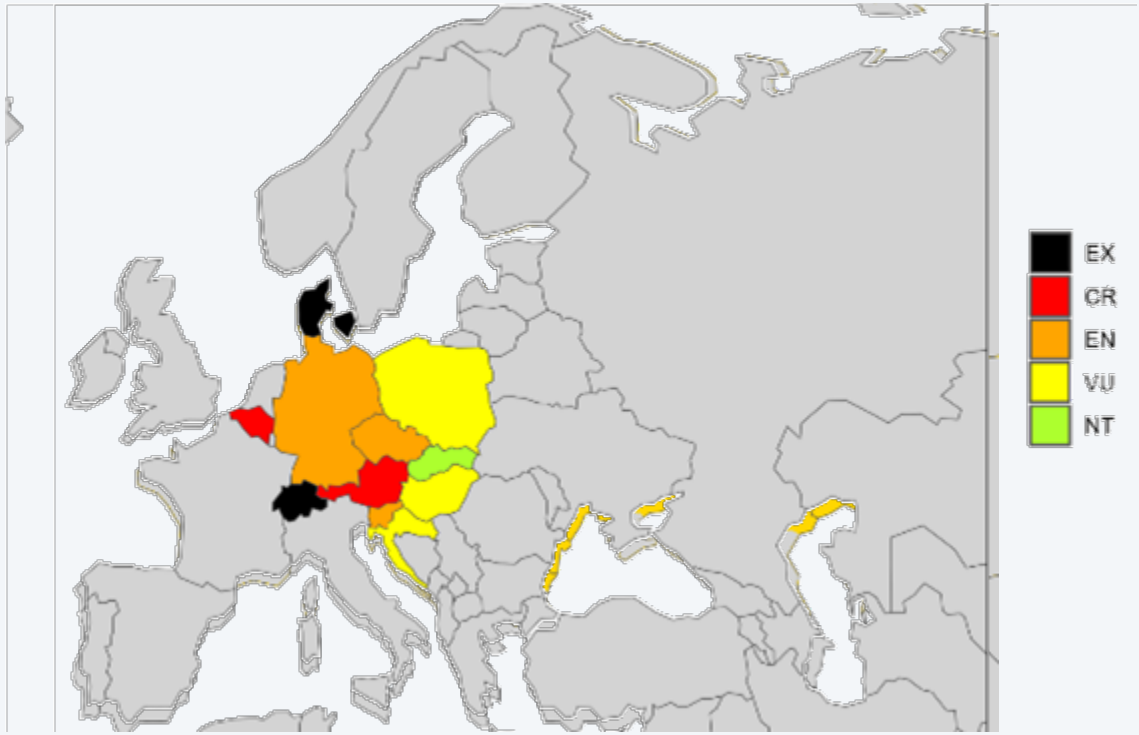


Dougherty et al., 2015

European weatherfish

European weatherfish (*Misgurnus fossilis*)

Decreased in large parts of its native range → endangered
(habitat loss, pollution, invasion of two Asian congeners)

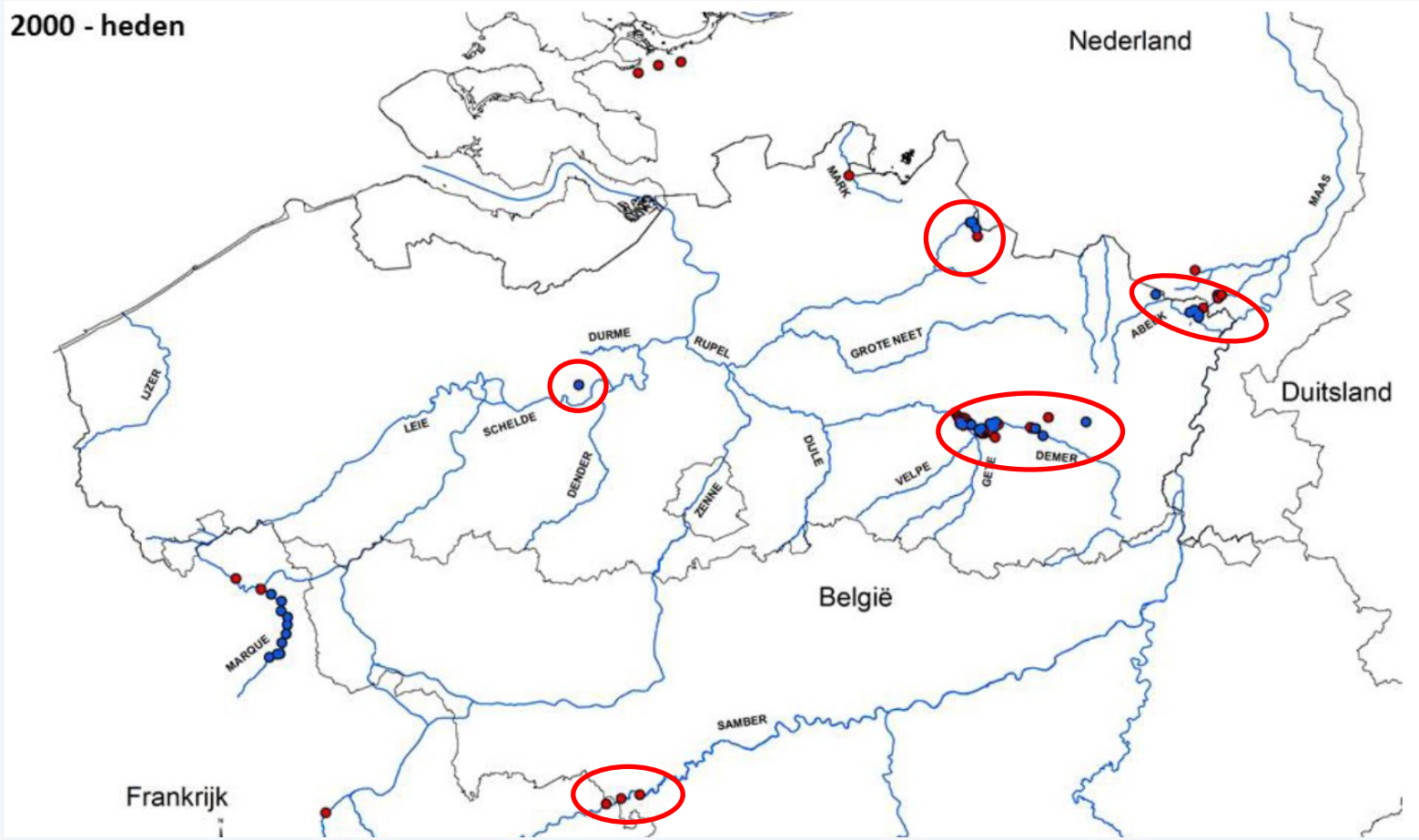


European weatherfish

Belgium: critically endangered (few small populations left)

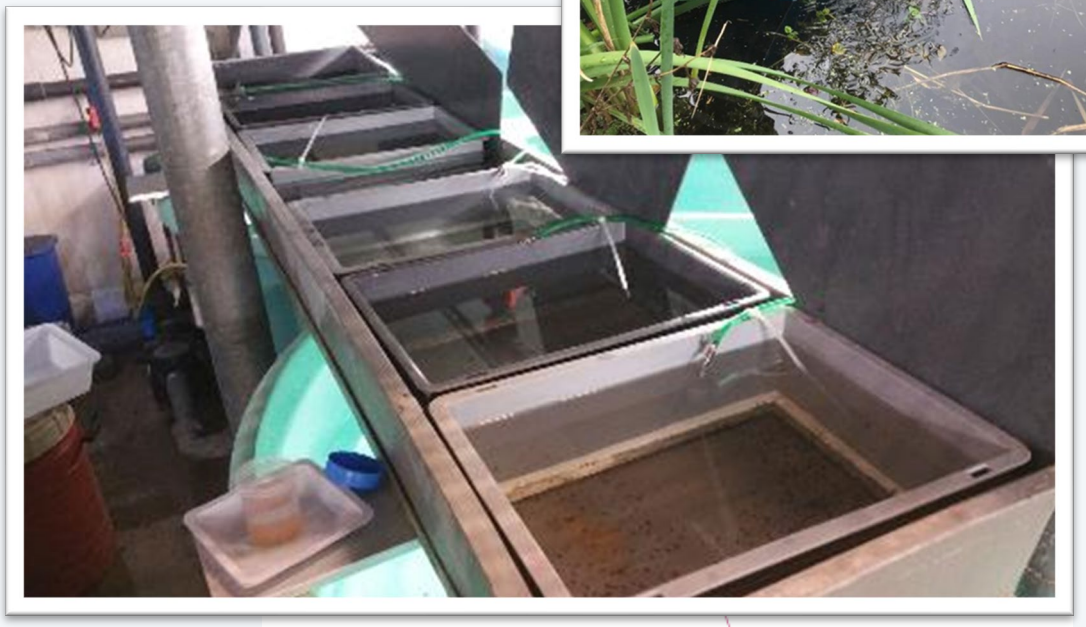
CR

Critically Endangered



European weatherfish

Belgium: critically endangered (few small populations left)
Since 2021: protection plan in Flanders



Ex-situ breeding

- to restock existing Flemish populations
- to establish new ones in suitable habitats

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Vlaanderen is wetenschap

Parasites of the European weatherfish

What about their parasites?

18 fish from 2024 (9 adults + 9 juveniles)
9 fish from 1881-1973 (9 adults)

natural sciences .be

Parasites of the European weatherfish

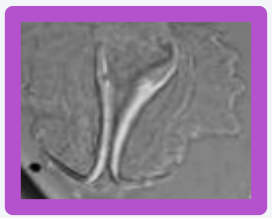
Gyrodactylus misgurni
(Gyrodactylidea)

Actinocleidus cruciatus
(Dactylogyridea)

Gyrodactylus fossilis
(Gyrodactylidea)

Parasites of the European weatherfish

(unofficial) extinction risk in Czech Republic & Slovakia



HELMINTH CLASS/IUCN CATEGORY Helminth species	Host species	River basin[1]	Proposed IUCN category for Czech / Slovak Rep.[2]
MONOGENEA/CRITICAL			
Ancyrocephalus cruciatus (Wedl, 1857)	*M. fossilis*	E. O. D	EN / CR
Dactylogyrus chondrostomi Malevitskaja, 1941[3]	*C. nasus*	D	CR / SU
Dactylogyrus dirigerus Gusev, 1966	*C. nasus*	D	CR / SU
Dactylogyrus ergensi Molnár, 1964	*C. nasus*	D	CR / SU
Dactylogyrus nybelini Markevitch, 1933[3]	*C. nasus*	D	CR / SU
Dactylogyrus simplicimalleata Bychowsky, 1961[3]	*P. cultratus*	D	CR / VU
Gyrodactylus fossilis Lupu et Roman, 1956	*M. fossilis*	E. O. D	EN / CR
Gyrodactylus macrocornis Ergens, 1963	*C. nasus*	D	CR / SU
Gyrodactylus misgurni, Ling Mo-en 1962	*M. fossilis*	D	helminth not recorded / CR
Gyrodactylus paramisgurni Ergens, 1966	*C. nasus*	D	CR / SU
Paradiplozoon vojteki (Pejčoch, 1968)	*P. cultratus*	D	CR / VU

CR
Critically Endangered

EN
Endangered

Baruš et al., 1997

Winning pair

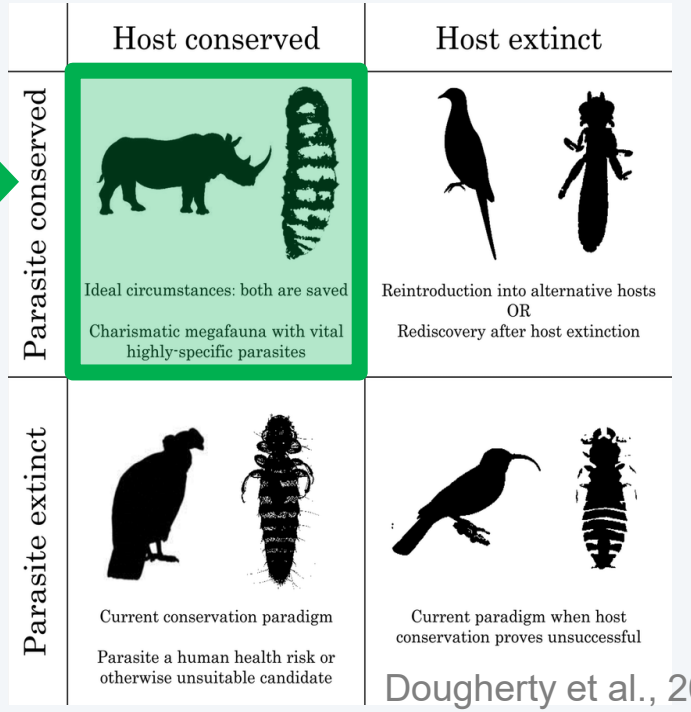
Normally, under moderate abundance, flatworms do not kill their hosts (instead: breeding populations)

→ not necessary to actively remove them during host conservation actions

Without parasite removal, conservation actions for hosts can benefit parasites, too!

→ Integrate parasitological assessments into conservation good practices

→ Collaborate with (host) conservation experts



Dougherty et al., 2015

Parasite perception

You protect what you like, and you like what you understand

→ Raise awareness on the importance of wildlife parasites

To better communicate with the public, we need to know

- what people **like** about wildlife parasites
  → **take advantage of this**
- what people **don't like** about wildlife parasites
  → **work to change this**

Parasite perception

WORLD ARCHIVES OF SPECIES PERCEPTION - PARASITES

Share your perception of hidden biodiversity!

https://tinyurl.com/wasp-parasite

More info:
http://www.wasp-project.net/wasp-p

Thank you

Aquatic Biodiversity lab @ Hasselt University (B)
Instituut voor Natuur- en Bosonderzoek (B)

tiziana.gobbin@uhasselt.be
https://tizianapaolagobbin.wordpress.com

WASP-P

Survey on perception of wildlife parasites

tinyurl.com/wasp-parasite

UHASSELT

- Hasik AZ., Ilvonen JJ, **Gobbin TP**, Suhonen J, Beaulieu JM, Poulin R, Siepielski AM (2025) **Parasitism as a driver of host diversification**. *Nature Reviews Biodiversity* doi: 10.1038/s44358-025-00045-w

- **TP Gobbin**, M Van Steenberge, N Vranken, MPM Vanhove (2024) **Worms of change: anthropogenic disturbance changes the ectoparasite community structure of Lake Victoria cichlids**. Preprint available on bioRxiv doi: 10.1101/2024.04.14.589059

- **TP Gobbin**, MPM Vanhove, O Seehausen, ME Maan, and A Pariselle (2024), **Four new species of *Cichlidogyrus* (Platyhelminthes, Monogenea, Dactylogyridae) from Lake Victoria haplochromine cichlid fishes, with the redescription of *C. bifurcatus* and *C. longipenis*.** *Parasite* 31(46). 10.1051/parasite/2024039

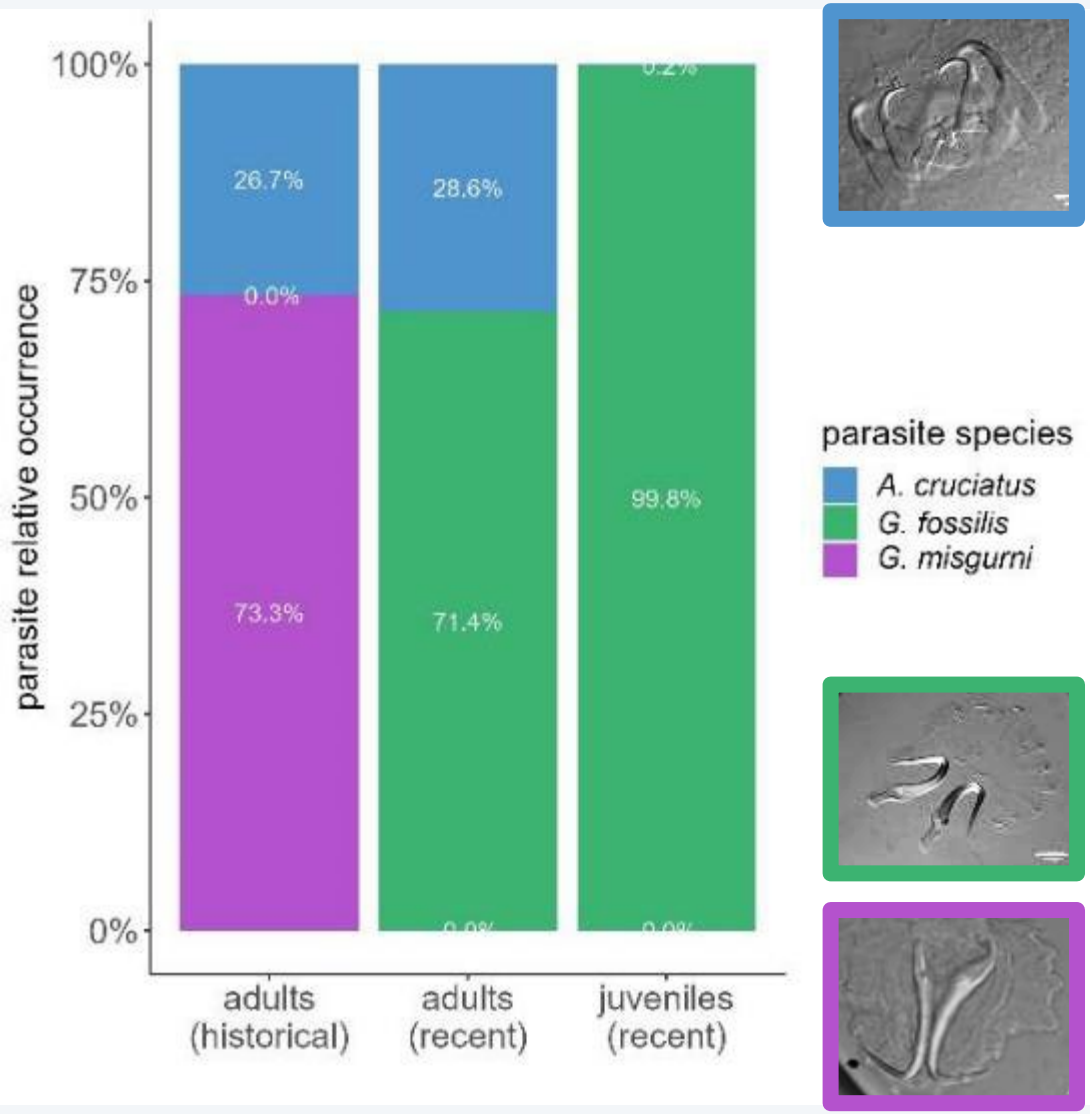
- **TP Gobbin**, MPM Vanhove, R Veenstra, ME Maan, and O Seehausen (2023). **Variation in parasite infection between replicates of speciation in Lake Victoria cichlid fish.** *Evolution* 77(7), 1682-1690. doi:10.1093/evolut/qpad080

- **TP Gobbin**, MPM Vanhove, A Pariselle, ME Maan, and O Seehausen (2020). **Temporally consistent species differences in parasite infection but no evidence for rapid parasite-mediated speciation in Lake Victoria cichlid fish.** Journal of Evolutionary Biology 33(5): 556. doi:10.1111/jeb.13615

- **TP Gobbin,** MPM Vanhove, O Seehausen, and ME Maan (2020). **Microhabitat distributions and species interactions of ectoparasites on the gills of cichlid fish in Lake Victoria, Tanzania.** *International Journal for Parasitology* 51(2-3), 201-204. doi:10.1016/j.ijpara.2020.09.001

- **TP Gobbin**, R Tiemersma, G Leone, O Seehausen, and ME Maan (2020), **Patterns of ectoparasite infection in wild-c[illegible] and laboratory-bred cichlid fish, and their hybrids, implicate extrinsic rather than intrinsic causes of speci[illegible] differences in infection**, *Hydrobiologia* 848(16), 3817-3831. doi:10.1007/s10750-020-04423-7.

Parasites of the European weatherfish



Concerns for *G. misgurni*
not observed in recent specimens

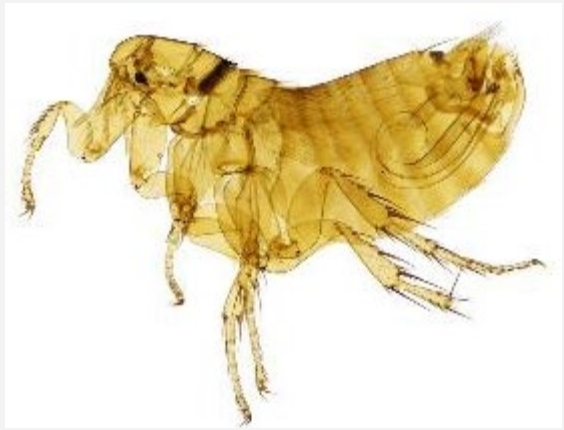
Concerns for *A. cruciatus*
prevalence did not change, but intensity decreased

Extinction risk of parasites

ANIMALIA - INSECTA GLOBAL

Haematopinus oliveri

Unknown CR



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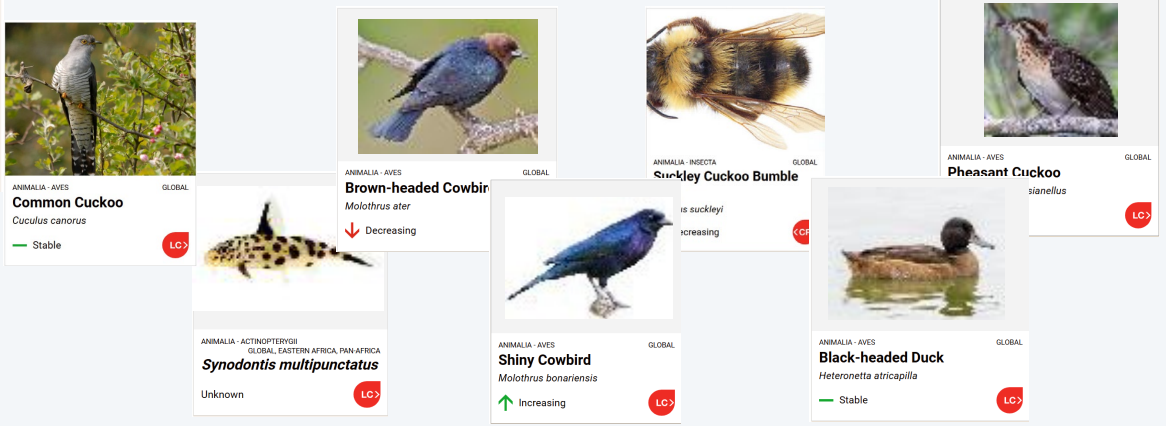
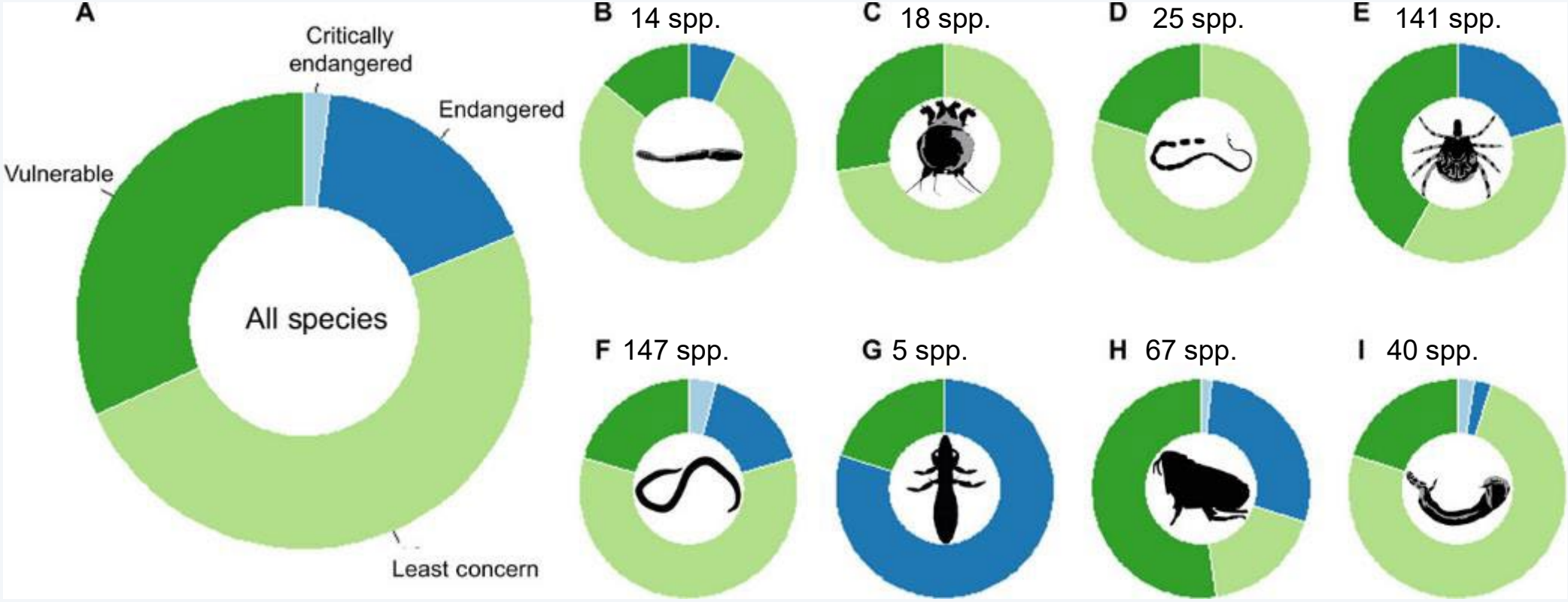


IUCN = International Union for Conservation of Nature

Extinction risk of parasites

Wildlife parasites are probably more endangered than their hosts

Carlson et al., 2017



Estimations based on habitat loss