The IUCN Green List of Species

An Optimistic and Ambitious New Vision for Conservation

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SSC Species Survival Commission

Red List Committee
Standards and Petitions Committee
Green List Task Force

RED LIST

GREEN LIST OF SPECIES

References

Akçakaya HR, et al. 2018. **Quantifying species recovery and conservation success to develop an IUCN Green List of Species**. *Conservation Biology* 32, 1128-1138 https://doi.org/10.1111/cobi.13112

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Stephenson PJ, et al. 2019. **Defining indigenous species range to account for geographic and taxonomic variation in the history of human impacts**. *Conservation Biology* 33, 1211–1213. https://doi.org/10.1111/cobi.13400

Grace M, et al. 2019. **Using historical and paleoecological data to inform ambitious species recovery targets**. *Philosophical Transactions B*. https://doi.org/10.1098/rstb.2019-0297

IUCN Standards and Petitions Committee. 2019. Guidelines for Using the IUCN Red List Categories and Criteria. Version 14.

Akçakaya HR, et al. **Assessing ecological function in the context of species recovery** *(in review)*

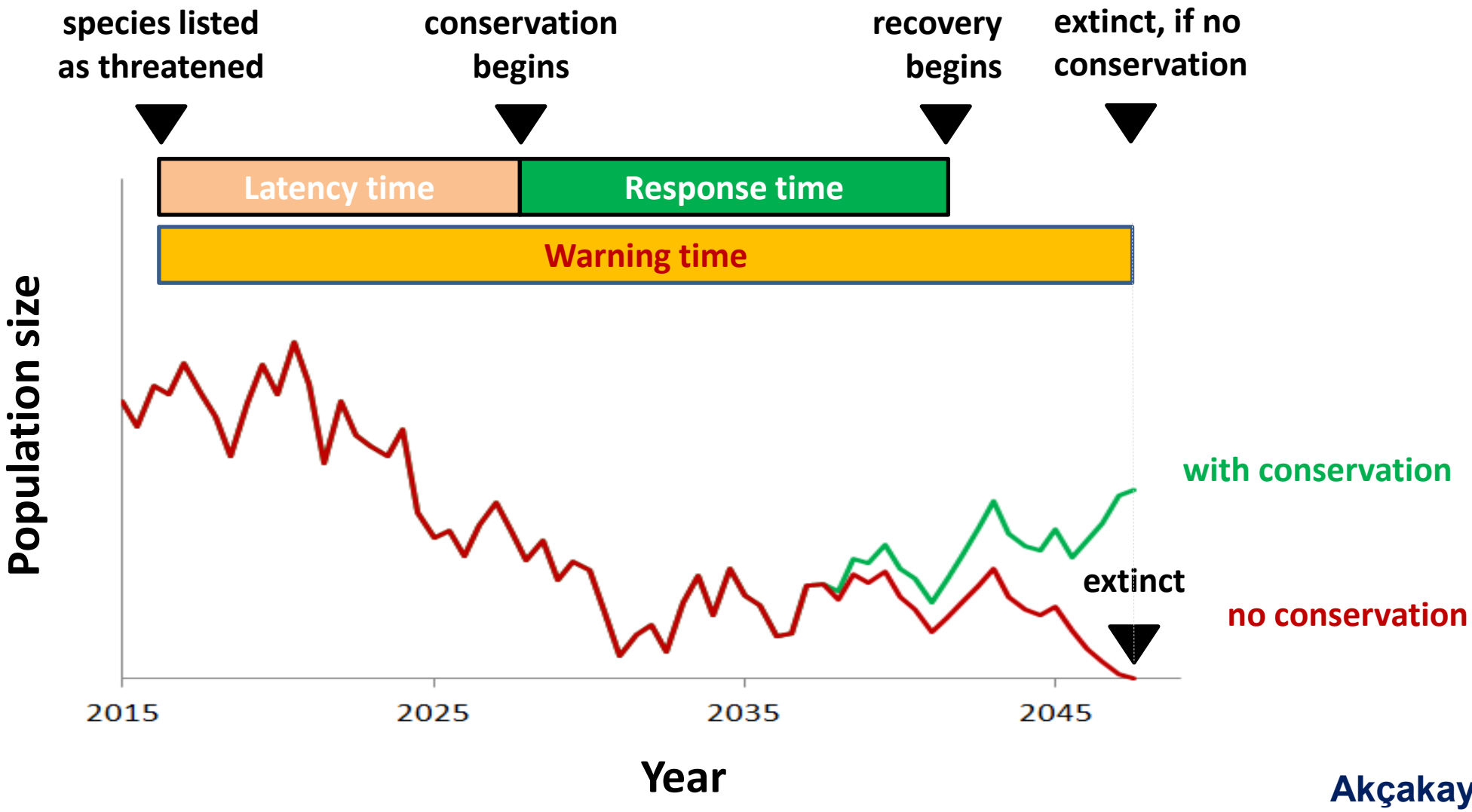
Updates

https://www.researchgate.net/project/IUCN-Green-List-of-Species-measuring-conservation-success

https://www.iucn.org/species/about/species-survival-commission/ssc-leadership-and-steering-committee/iucn-red-list-committee/iucn-green-list-species

#SpeciesGreenList

Preventing extinctions



Akçakaya et al. 2014
Nature Climate Change

Extinction Risk

IUCN Red List Criteria

A — Population reduction

B — Restricted geographic range

C — Small population size & decline

D — Very small or restricted population

E — Quantitative analysis

Quantitative thresholds

IUCN Red List Categories

- Extinct
- Extinct in the Wild
- Critically endangered
- Endangered
- Vulnerable
- Near-threatened
- Least concern

Threatened

Data deficient

At lower risk of extinction, BUT only because of ongoing conservation

- Improvement in status controversial
- Extinction risk does not capture dependence on conservation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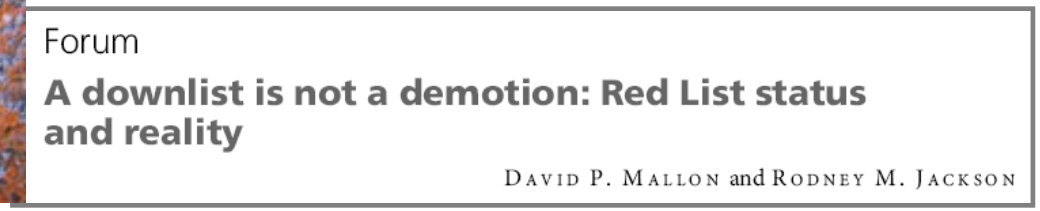
Scientists split over snow leopard status


Forum

A downlist is not a demotion: Red List status and reality

David P. Mallon and Rodney M. Jackson


Conservation Letters

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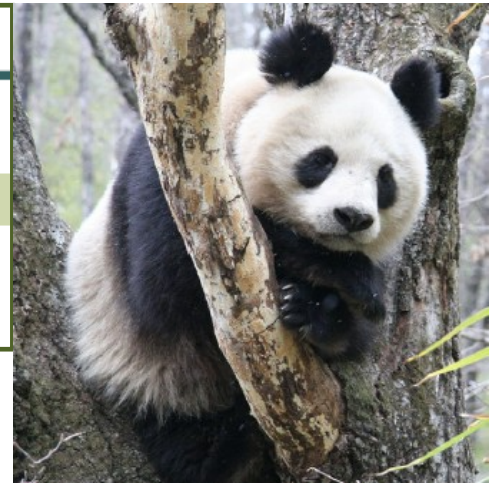
REVIEW

Panda Downlisted but not Out of the Woods

Ronald R. Swaisgood[1], Dajun Wang[2], & Fuwen Wei[3]



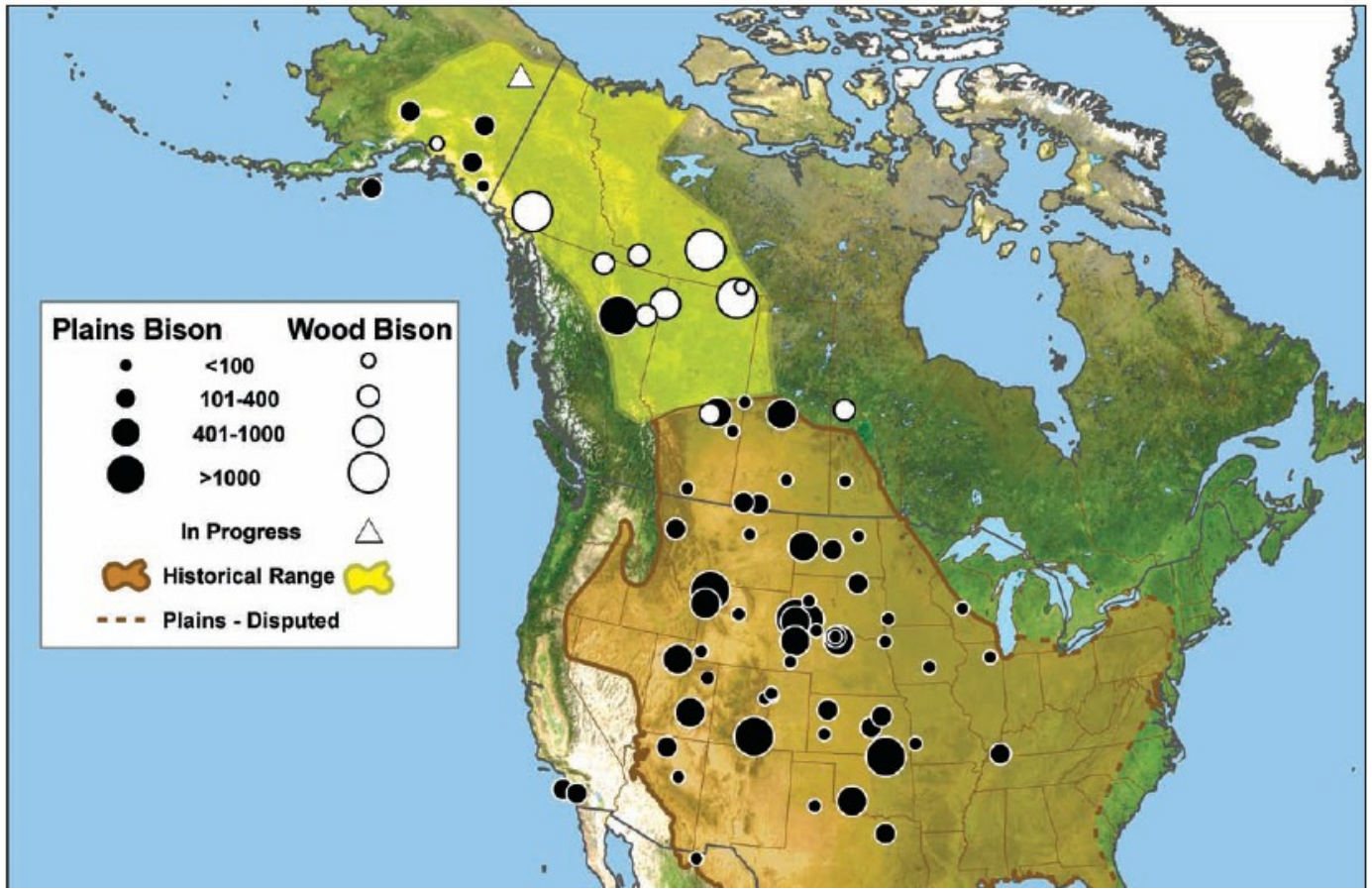
Not at risk of extinction, BUT safe only in a fraction of former range

Map by Brandon Sideleau; © Adam Britton
http://crocodilian.com/cnhc/cst_cpor_dh_map.htm

Species with many extirpated and threatened populations, and a few populations with negligible risk of extinction

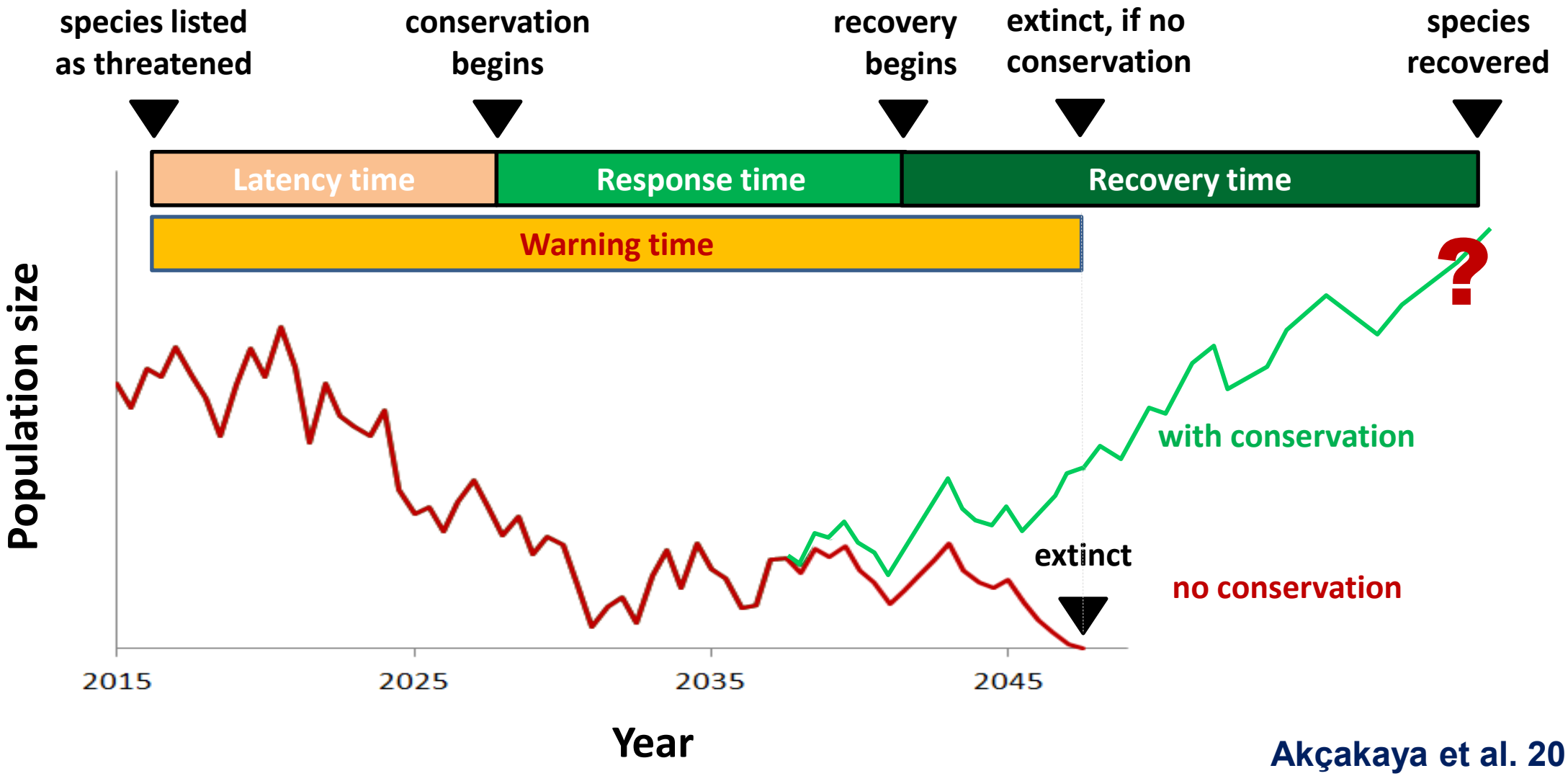
Not at risk of extinction, BUT "ecologically extinct"

Populations reduced to very low densities at which they do not fulfill their ecological functions ("functionally extinct")



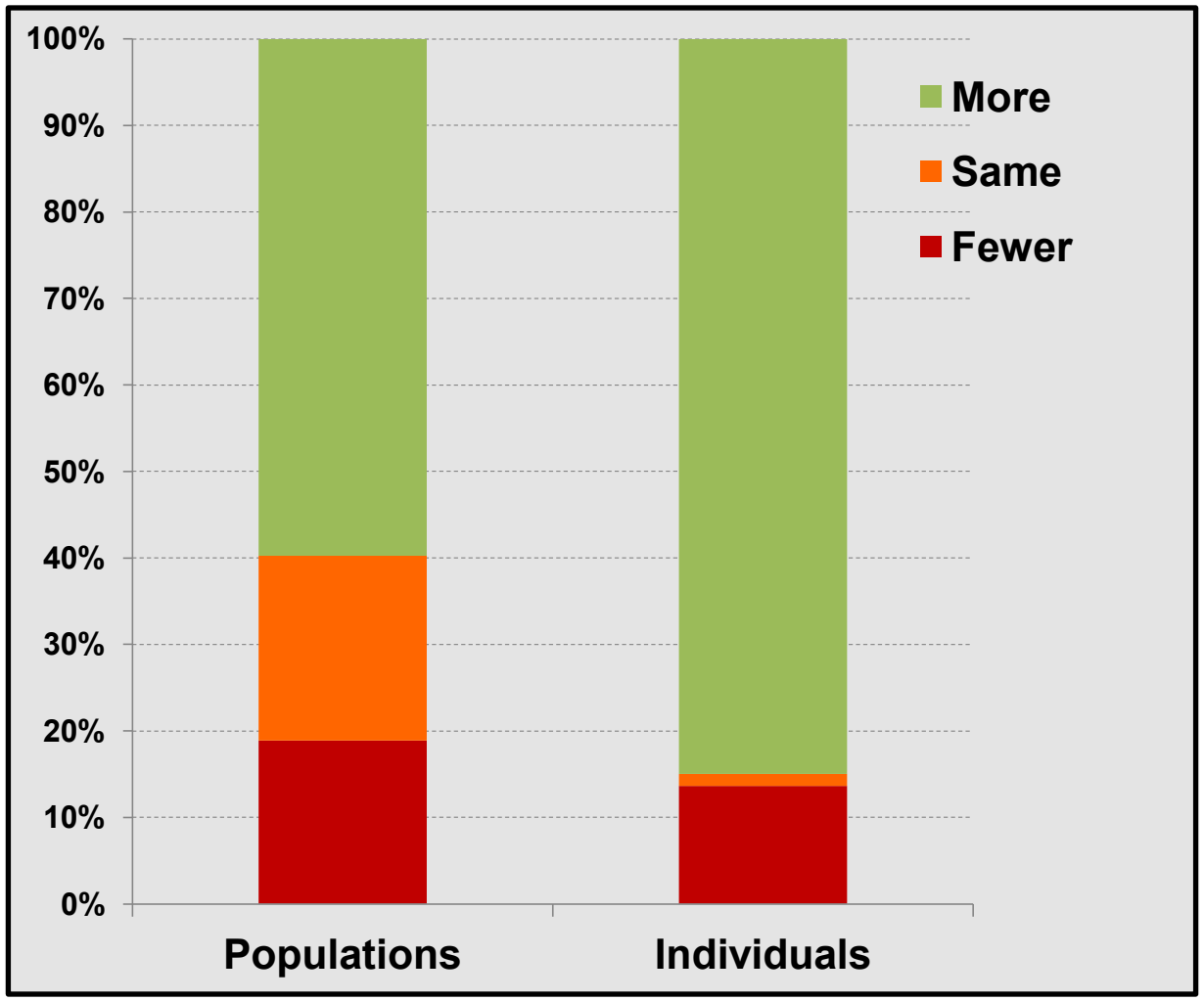
American Bison: Status Survey and Conservation Guidelines 2010. IUCN.

Is avoiding extinction enough?



Akçakaya et al. 2014
Nature Climate Change

Setting Recovery Targets



Data source: Neel et al. 2012. *BioScience*

A critical step of the conservation planning process.

Not standardized.

e.g., recovery targets for many ESA-listed species are at or below the current levels

Recovery

- **No objective, practical & ambitious definition of recovery** applicable across taxonomic groups
- **"Extinct"** vs. **"Recovered"**
- **Much conceptual confusion** (e.g., "3Rs")

Concepts, methods and other terms related to recovery and population targets

adaptability	ecological interactions	functional	PVA
adaptable	ecological role	genetic diversity	redundancy
adaptive response	ecologically self-sustaining	genetic robustness	reference conditions
Allee effects	economic benefits	healthy populations	replicated populations
baseline	ecosystem representation	historical level	representative
captive management	ecosystem services	historical range	resilience
connectivity	environmental health	intensive management	self-sustaining
conservation dependent	evolutionary potential	local adaptations	social dynamics
demographic sustainability	extinction risk	managed populations	species interactions
ecological function	fragmentation	MVP	sustainable
ecological integrity		pre-impact	threatened
		pristine	viable

Recovery

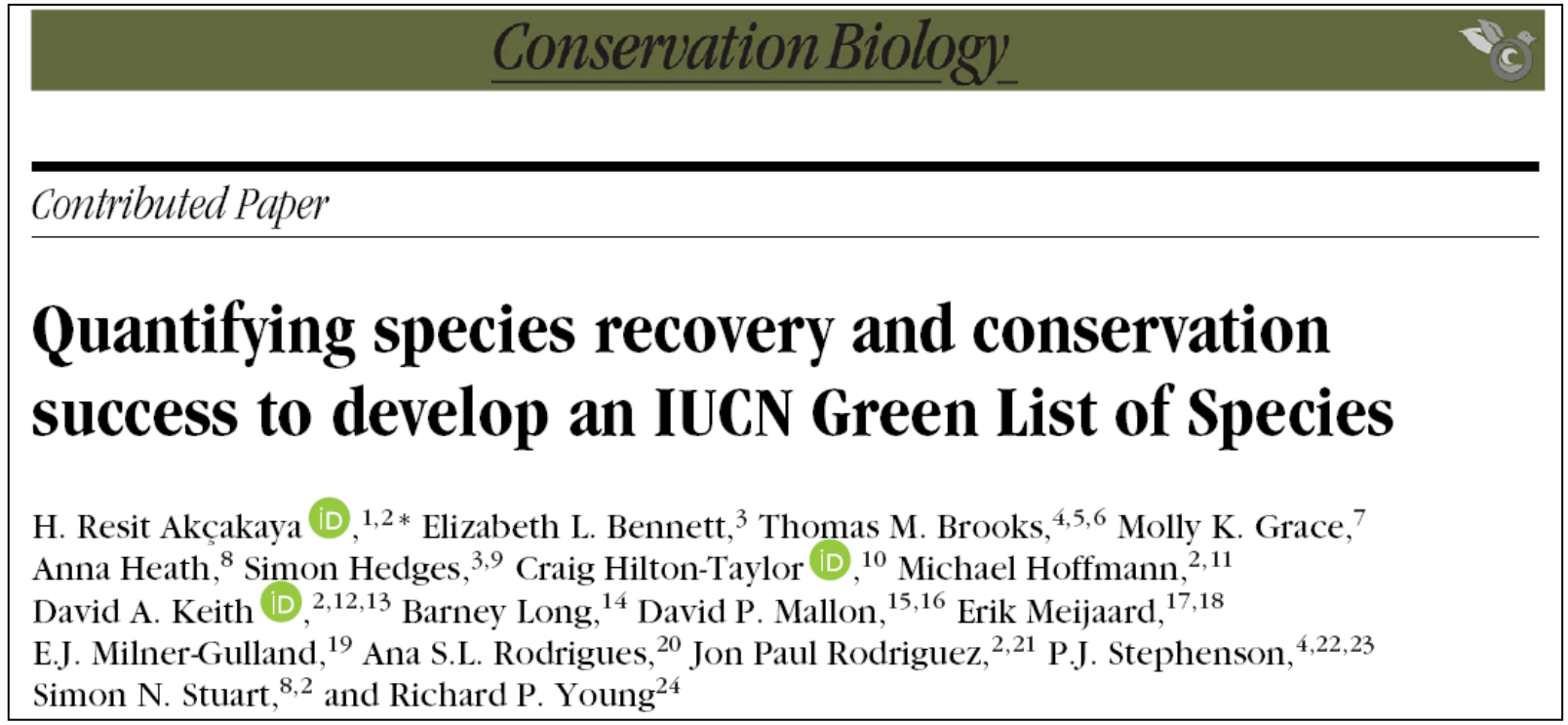
Three main dimensions

- **Viability** (persistence, resilience, etc.): low risk of extinction is the minimum requirement
- **Functionality**: role or function in the ecosystem
- **Representation**: occurring in a representative set of ecosystems throughout its native range

Defining the recovered state

A species is “fully recovered” if it is **viable**, and ecologically **functional**, in every **part** of its indigenous and projected **range**.

Akçakaya et al. 2018;
Conservation Biology



Conservation Biology

Contributed Paper

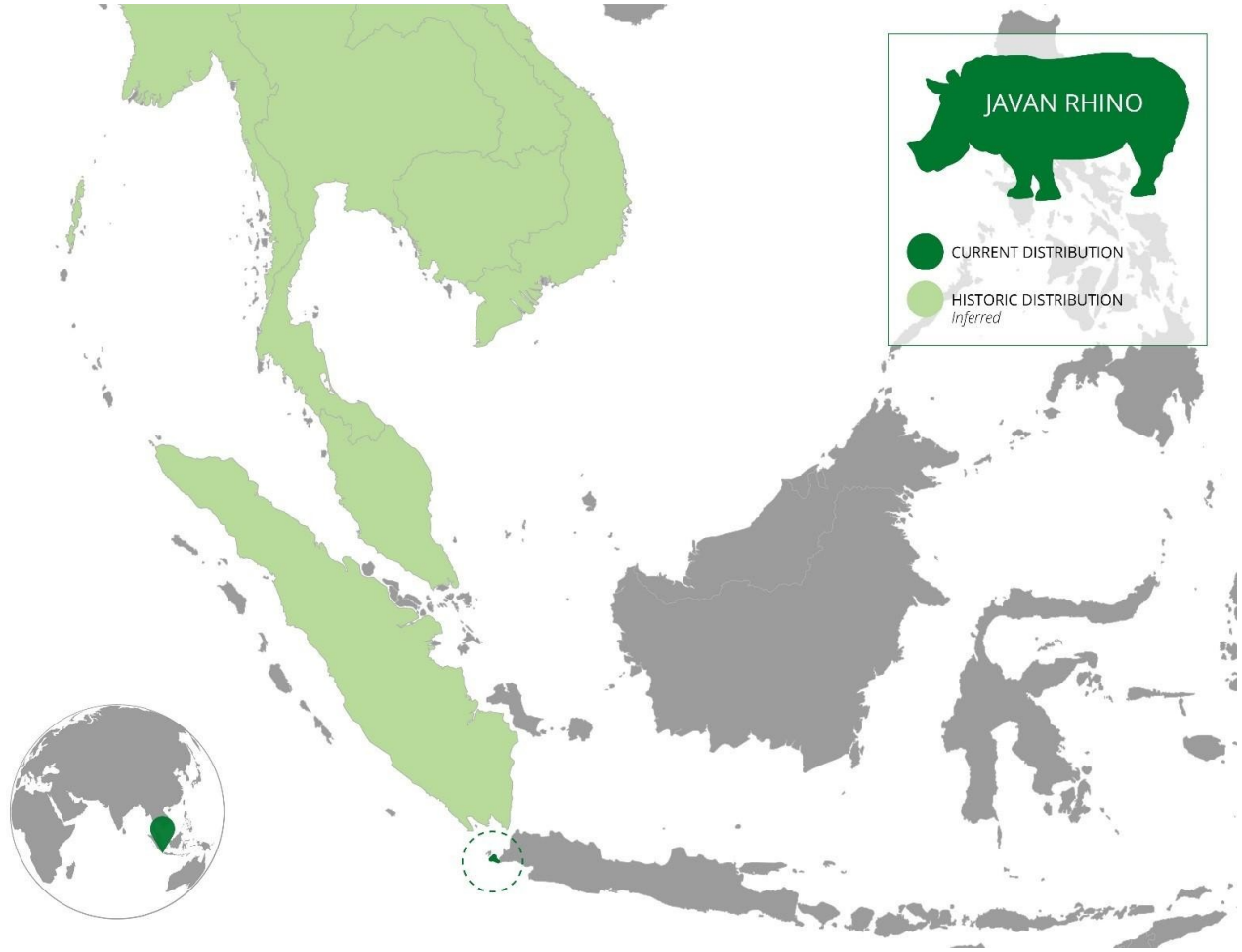
Quantifying species recovery and conservation success to develop an IUCN Green List of Species

H. Resit Akçakaya,[1,2*] Elizabeth L. Bennett,[3] Thomas M. Brooks,[4,5,6] Molly K. Grace,[7] Anna Heath,[8] Simon Hedges,[3,9] Craig Hilton-Taylor,[10] Michael Hoffmann,[2,11] David A. Keith,[2,12,13] Barney Long,[14] David P. Mallon,[15,16] Erik Meijaard,[17,18] E.J. Milner-Gulland,[19] Ana S.L. Rodrigues,[20] Jon Paul Rodriguez,[2,21] P.J. Stephenson,[4,22,23] Simon N. Stuart,[8,2] and Richard P. Young[24]

Representation: Range

Indigenous range: known or inferred distribution at a temporal benchmark

Projected range: areas expected to become suitable due to climate change



Representation: Range

Indigenous range: known or inferred distribution at a temporal benchmark

- Globally fixed? (e.g., 1750?)
- Regionally fixed?
- Species-specific?
- Region x Species?

Philosophical Transactions B. (in press) https://doi.org/10.1098/rstb.2019-0297

Using historical and palaeoecological data to inform ambitious species recovery targets

Molly Grace[1*], H. Resit Akçakaya[2,3], Elizabeth Bennett[4], Craig Hilton-Taylor[5], Barney Long[6], E.J. Milner-Gulland[1], Richard Young[7], Michael Hoffmann[8]

Conservation Biology

Comment

A full and authentic reckoning of species' ranges for conservation: response to Akçakaya et al. 2018

Eric W. Sanderson

Wildlife Conservation Society – Global Conservation Programs, 2300 Southern Blvd., Bronx, NY 10460, U.S.A., email esanderson@wcs.org

Conservation Biology

Comment

Defining the indigenous ranges of species to account for geographic and taxonomic variation in the history of human impacts: reply to Sanderson 2019

P. J. Stephenson,[1] Molly K. Grace,[2] H. Resit Akçakaya,[3] Ana S. L. Rodrigues,[4] Barney Long,[5] David P. Mallon,[6] Erik Meijaard,[7] Jon Paul Rodriguez,[8] Richard P. Young,[9] Thomas M. Brooks,[10] and Craig Hilton-Taylor[11]

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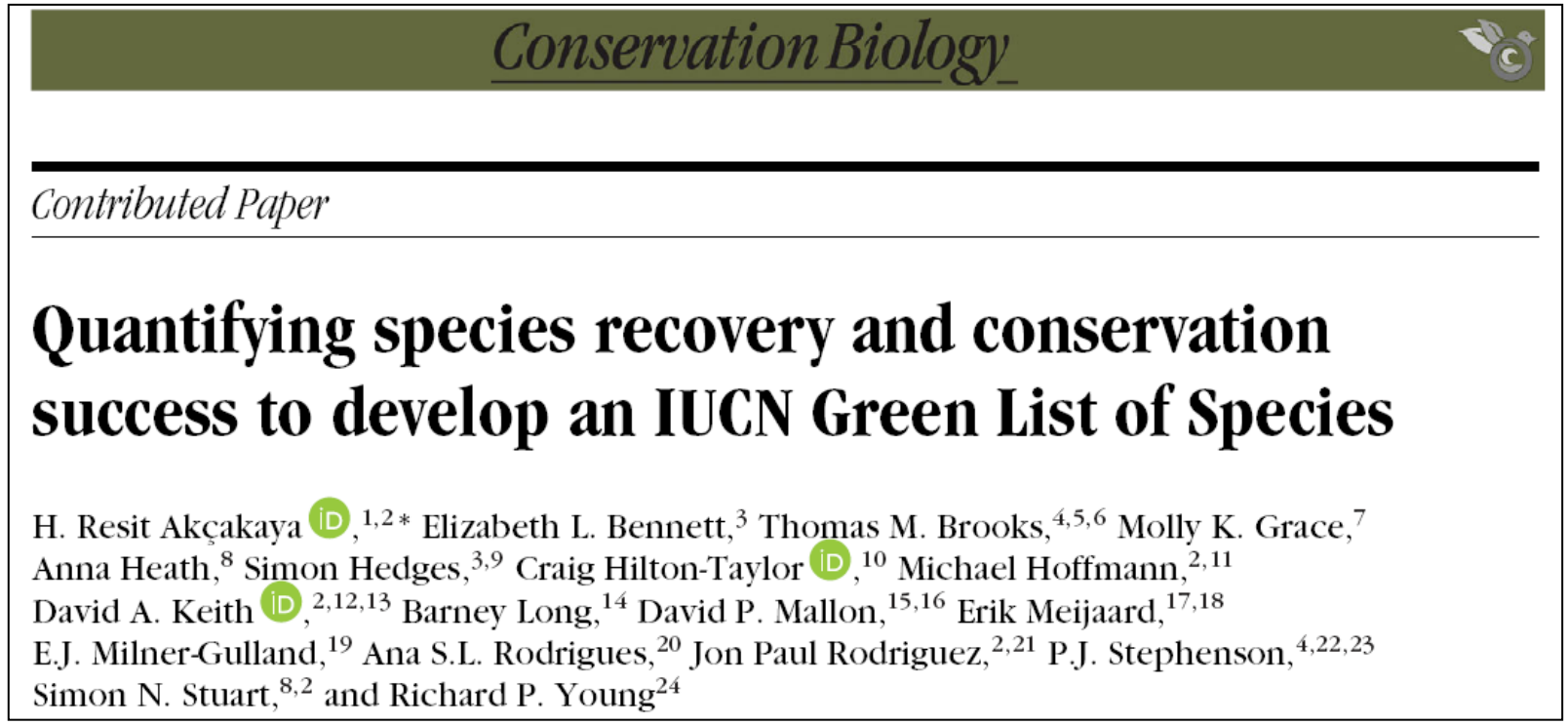

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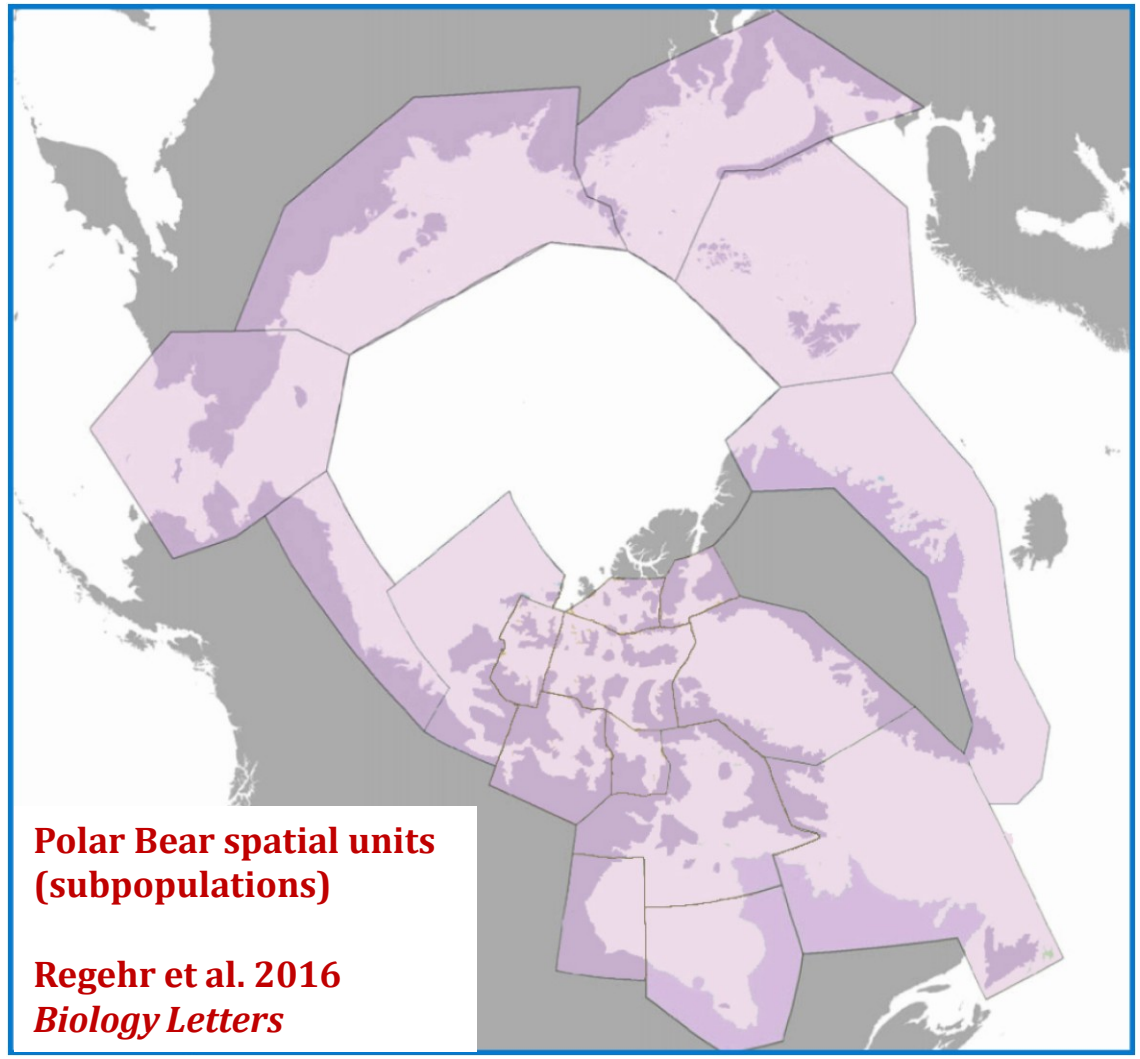
Representation: Parts of the Range

To represent the different **ecological settings, conditions, and contexts** that the species occurs in

Spatial units (subdivisions), based on

- Subpopulations, ESUs, DPSs, subspecies;
- Ecoregions, habitat types;
- Geographical features (lakes, watersheds, etc.) as proxies
- Locations (as defined in the Red List)



Polar Bear spatial units (subpopulations)

Regehr et al. 2016
Biology Letters

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Akçakaya et al. 2018;
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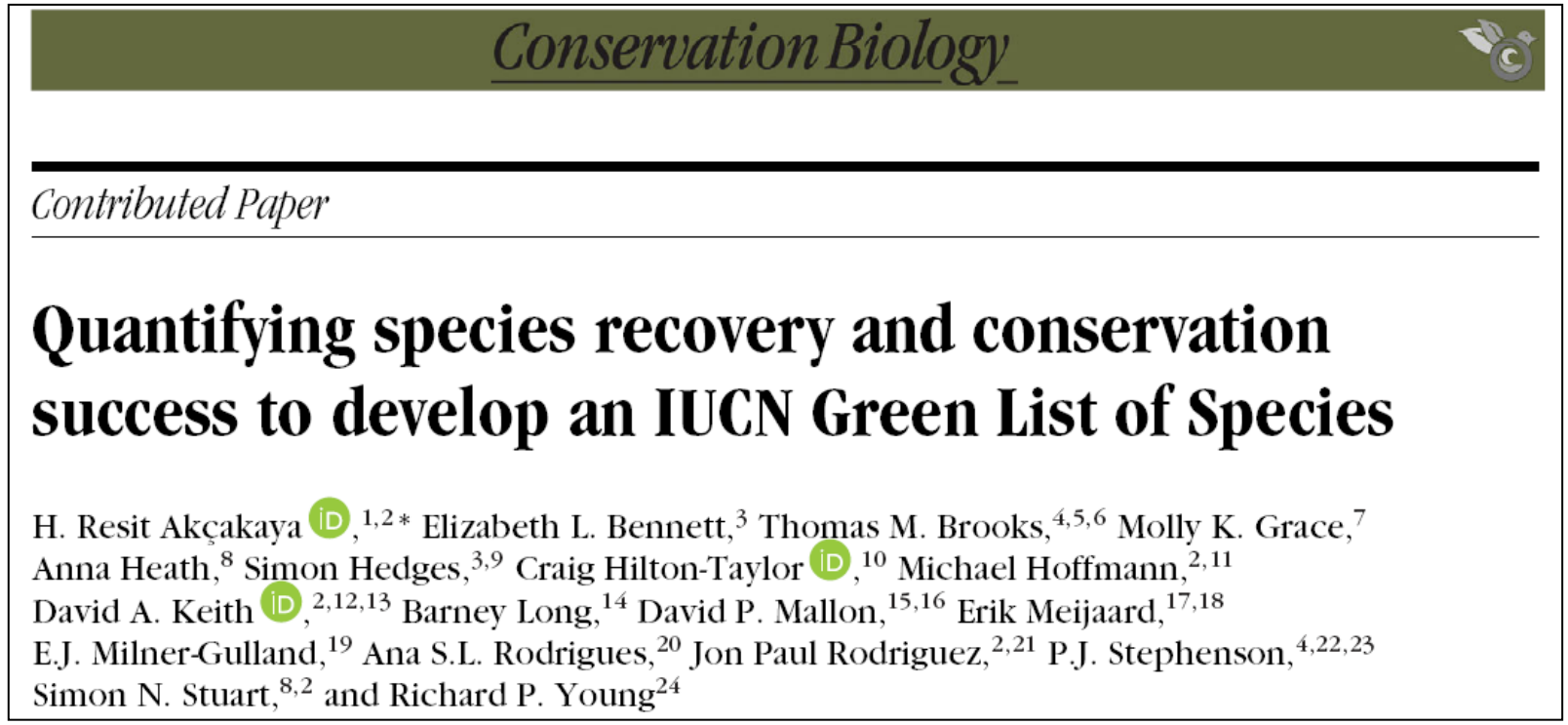

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Viability: Low Extinction Risk

- Persistence; Resilience; Demographic sustainability
- Attributes necessary for long-term persistence
  - Large
  - Stable
  - Replicated
  - Healthy
  - Genetically robust
  - Adaptive capacity

Viability: Low Extinction Risk

Practical definition of viability in each spatial unit:

LC or (NT and not declining)

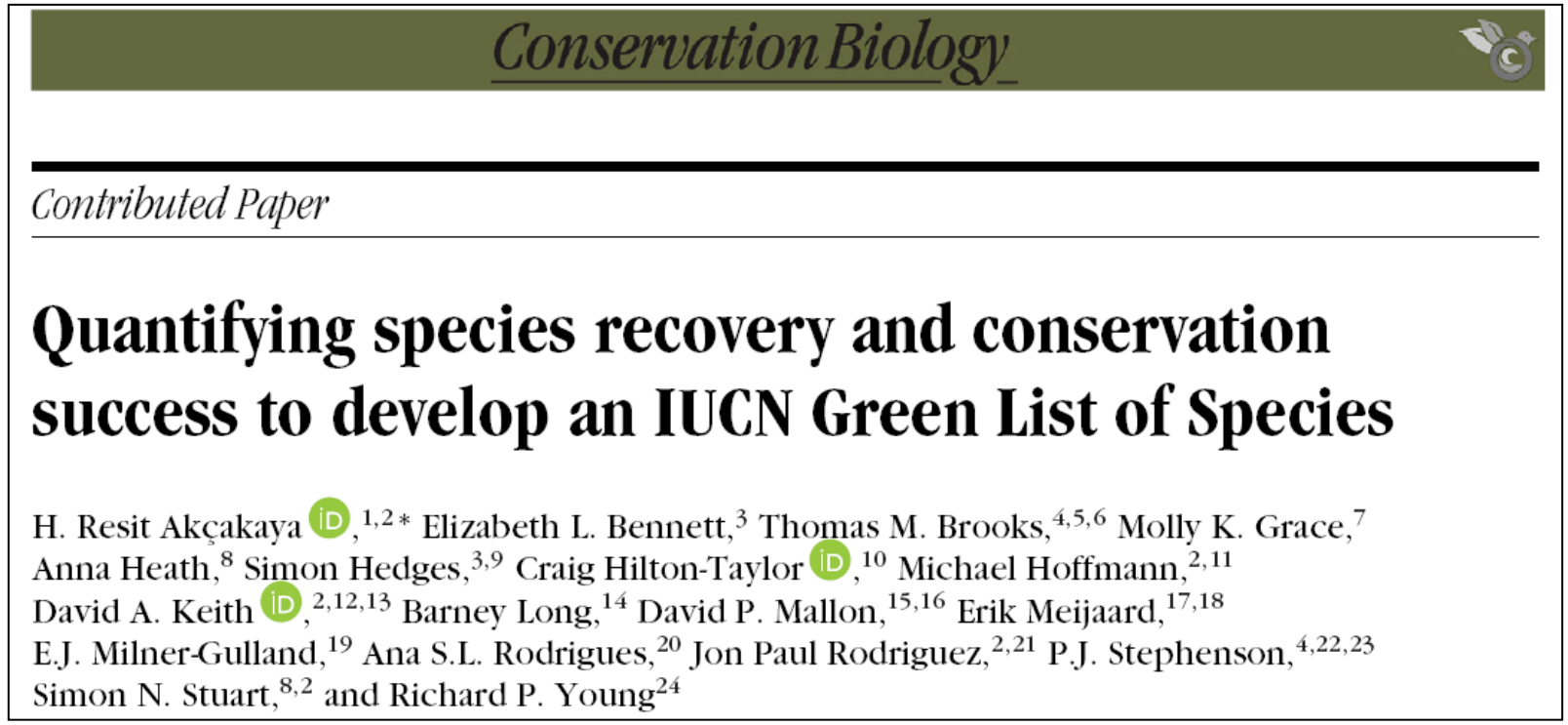
according to IUCN Red List rules
+ regional guidelines

incorporating rescue effects

Defining the recovered state

A species is “fully recovered” if it is **viable**, and ecologically **functional**, in every **part** of its indigenous and projected **range**.

Akçakaya et al. 2018;
Conservation Biology



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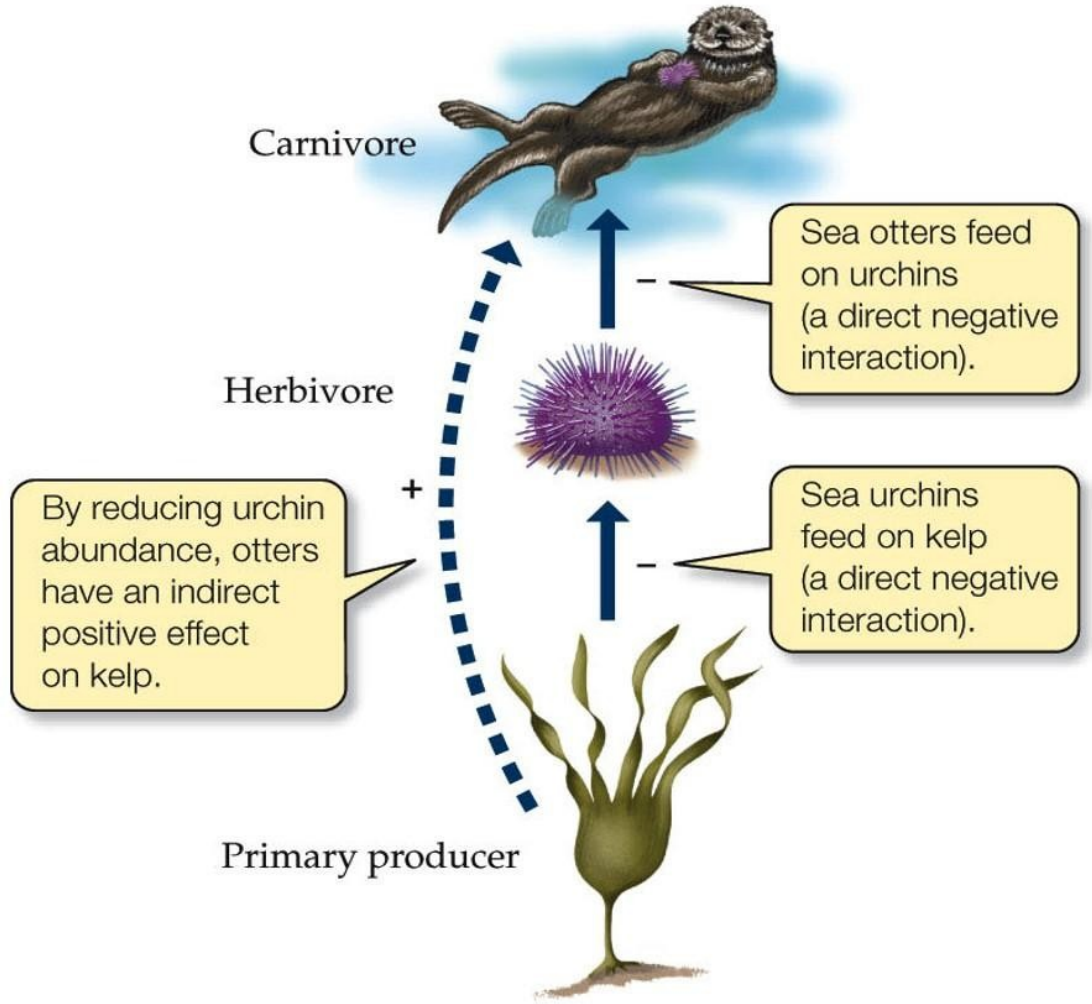
Functionality

"A fully recovered species exhibits the full range of its ecological interactions, functions, and other roles in the ecosystem"

Akçakaya et al. 2018;
Conservation Biology

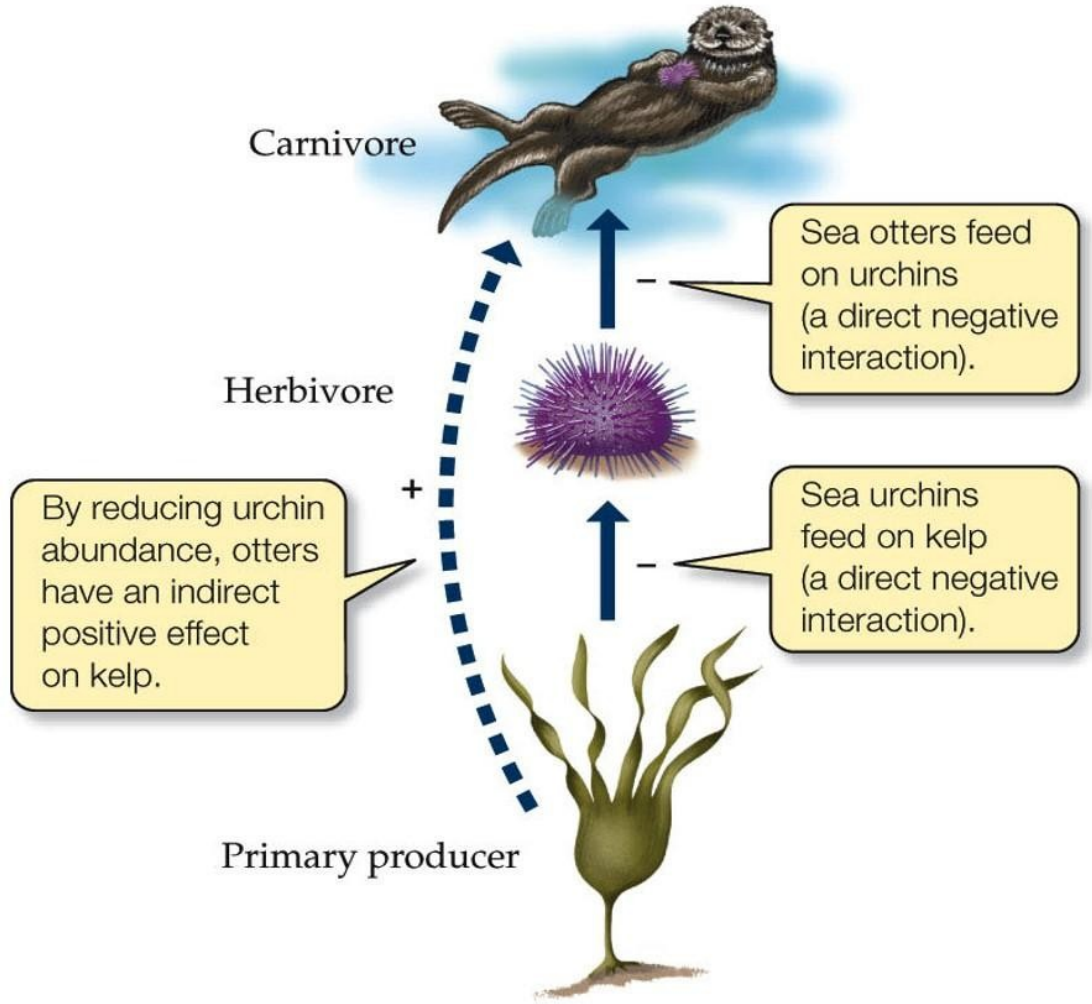
- Long history of considering function in conservation
- But no explicit and systematic use of ecological function as a criterion of species recovery



e.g., Estes & Palmisano 1974

Ecological Function of a Species

- The species' interactions with other species,
- Its influence on ecosystem processes,
- Intra-specific interactions, behavior and social dynamics that are characteristic of the species.



Akçakaya et al. in review

e.g., Estes & Palmisano 1974

Quantifying Recovery

In each “part” (spatial unit):

State	Description	Weight
Absent	does not occur in (but did or will)	0
Present	occurs, but not viable or functional	1
Viable	low risk of extirpation, but not functional	2
Functional	population size, density, structure allows ecological functions or roles	3

Quantifying Recovery

The Green List Score (G)

$$G = \frac{\sum_s W_s}{W_F \times N} \times 100$$

s : each spatial unit
W_S : the weight of the state in the spatial unit
W_F : the weight of the "Functional" category
N : the number of spatial units

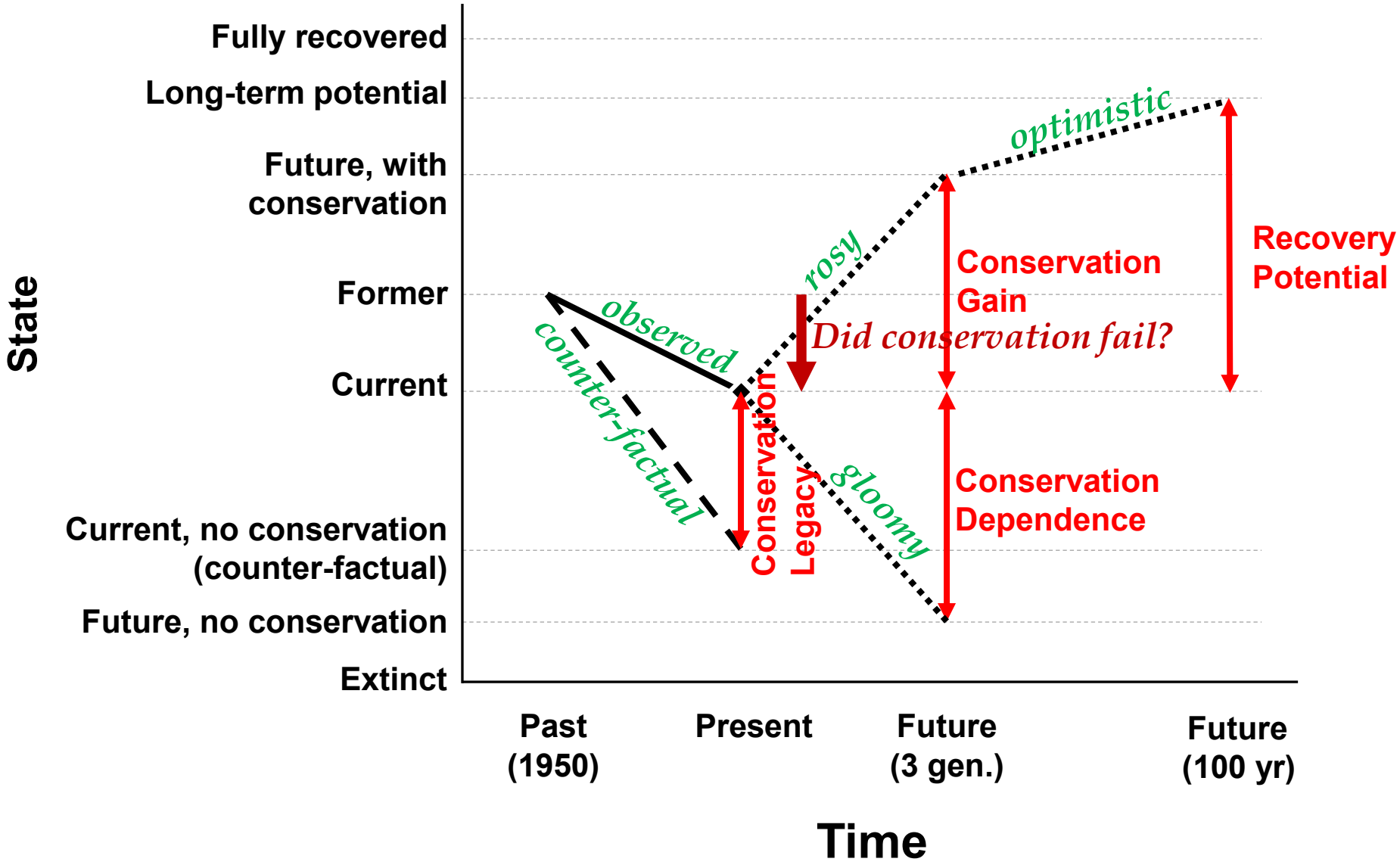
State	Weight
Absent	0
Present	1
Viable	2
Functional	3

Maximum score: 100, functional in all parts of range (Fully recovered)

Minimum score: 0, absent in all parts of the range (Extinct)

Akçakaya et al. 2018
Conservation Biology

Quantifying Conservation Success



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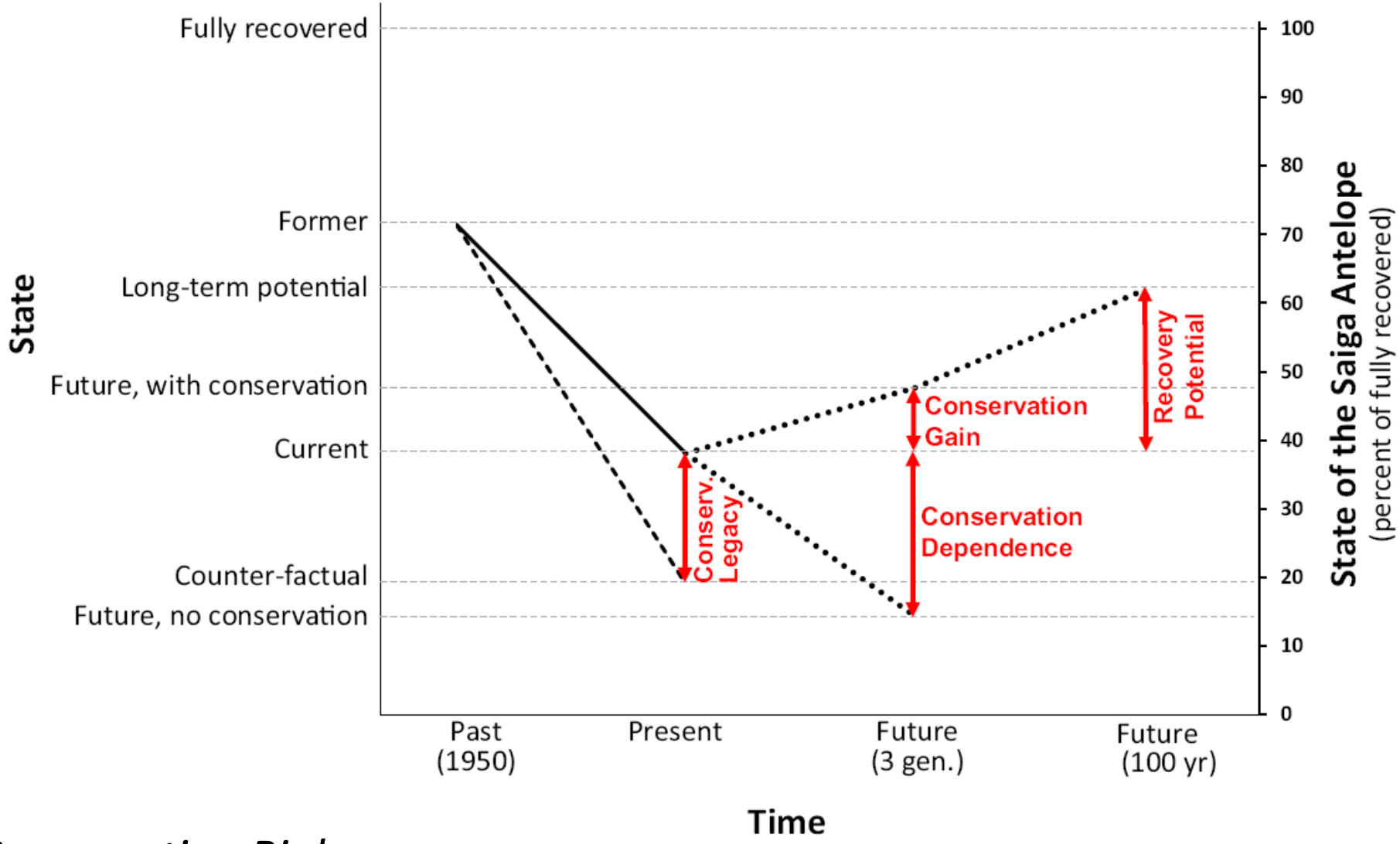
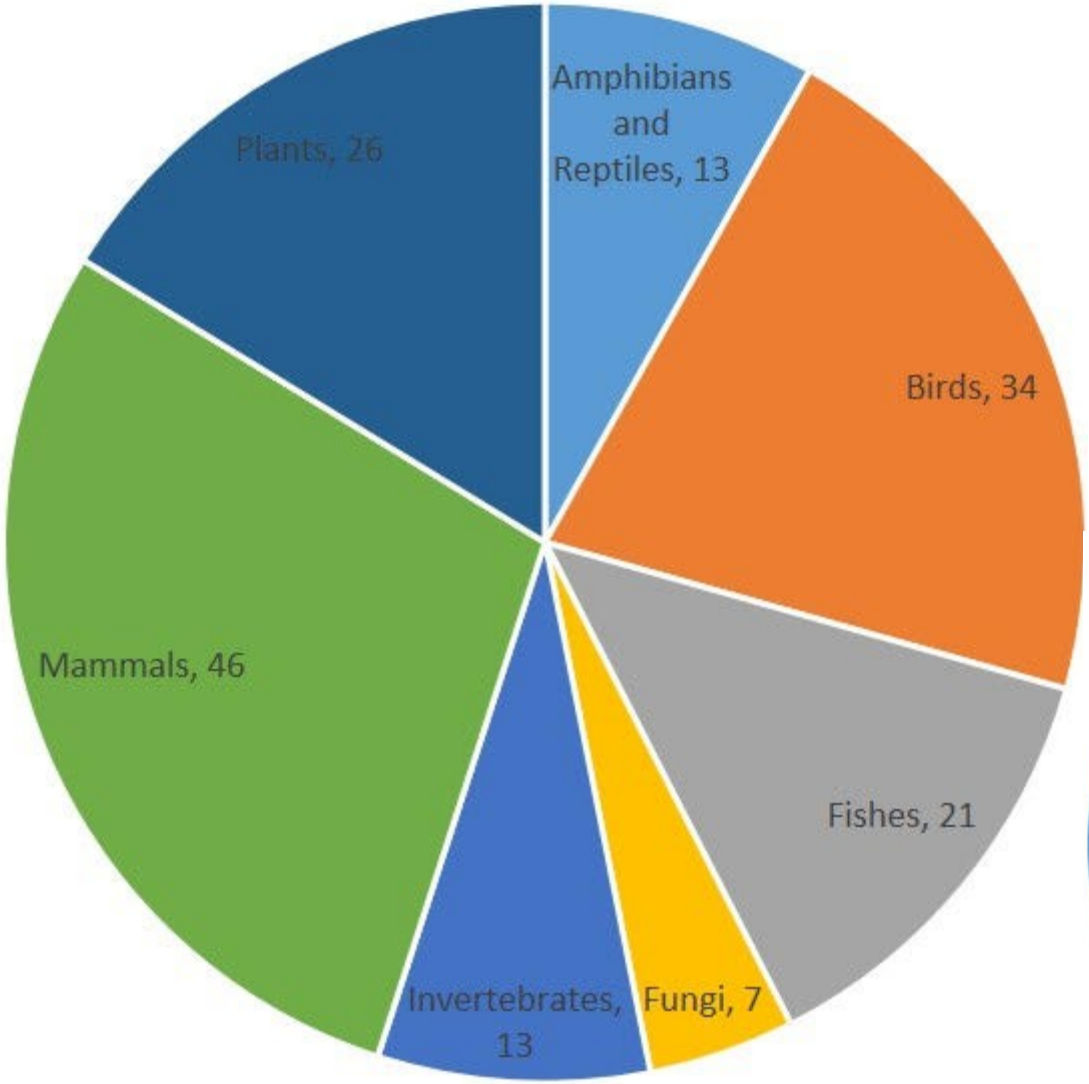


Akçakaya et al. 2018 *Conservation Biology*

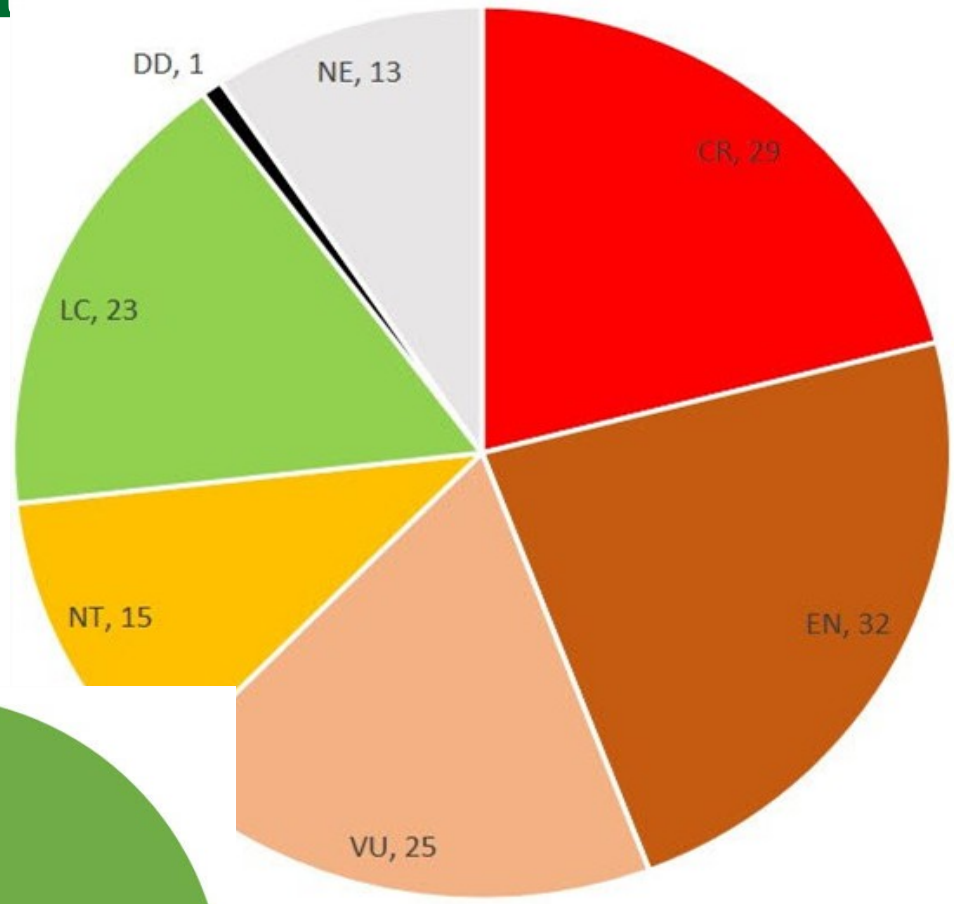
The IUCN Green List of Species

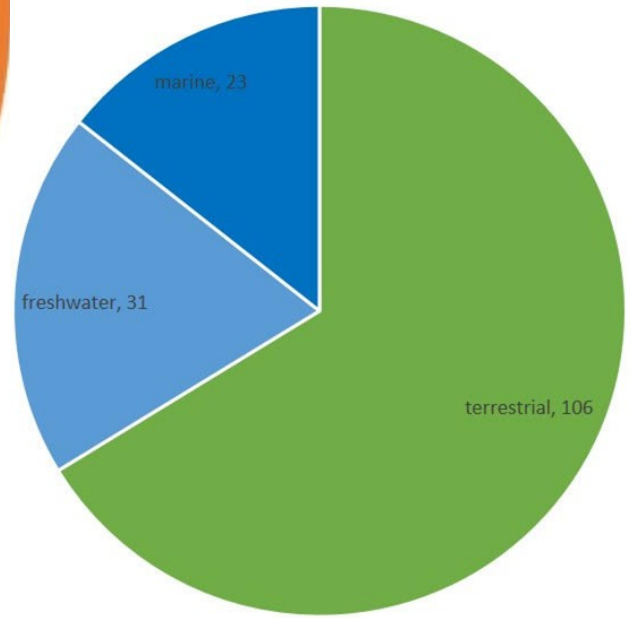
- Consists of the 4 conservation metrics:
  - Conservation Legacy
  - Conservation Dependence
  - Conservation Gain
  - Recovery Potential
- Can be applied to any species, regardless of
  - Red List status (EW to LC) or population trends (decline, increase)
  - Whether it was or will be subject to conservation measures

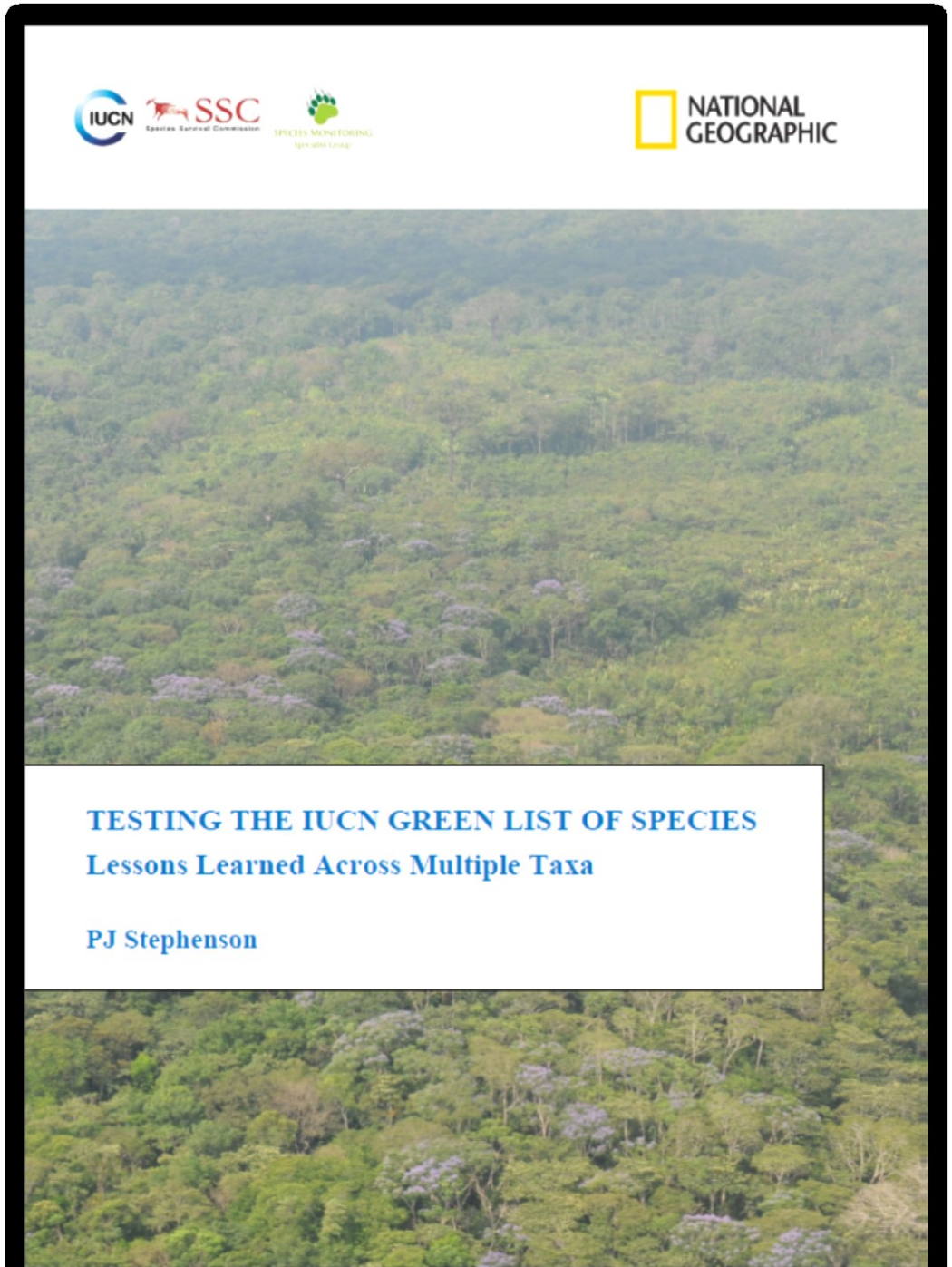
Test Assessments



160 species







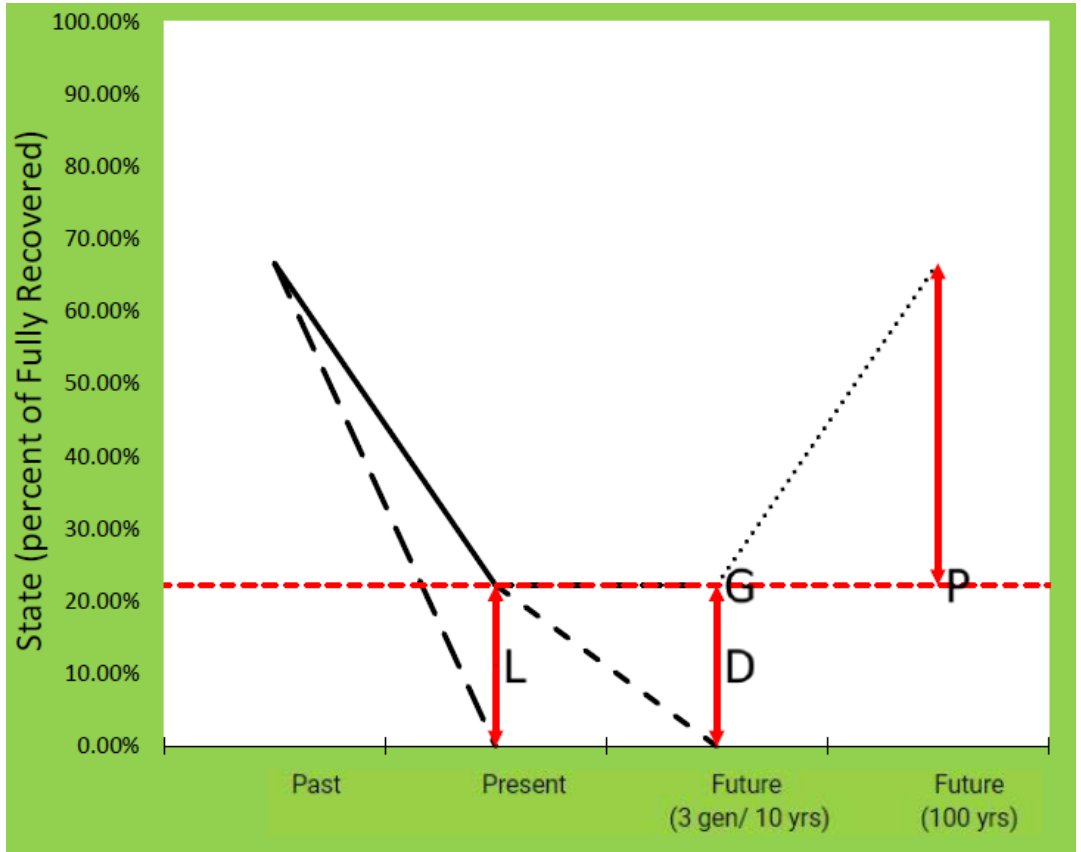
Stephenson, P.J. (2019). *Testing the IUCN Green List of Species: Lessons Learned Across Multiple Taxa.* IUCN SSC Species Monitoring Specialist Group, Gingins, Switzerland and National Geographic Society, Washington DC, USA.

Example: Powesheik skipperling

Red List: CR
Range: USA, Canada

Powesheik skipperling
Oarisma powesheik

- Conservation Legacy: numerically low, but important because extinction was prevented
- No Conservation Gain (in the next 10 years)
- But, Conservation Dependence very high: would go extinction without future conservation



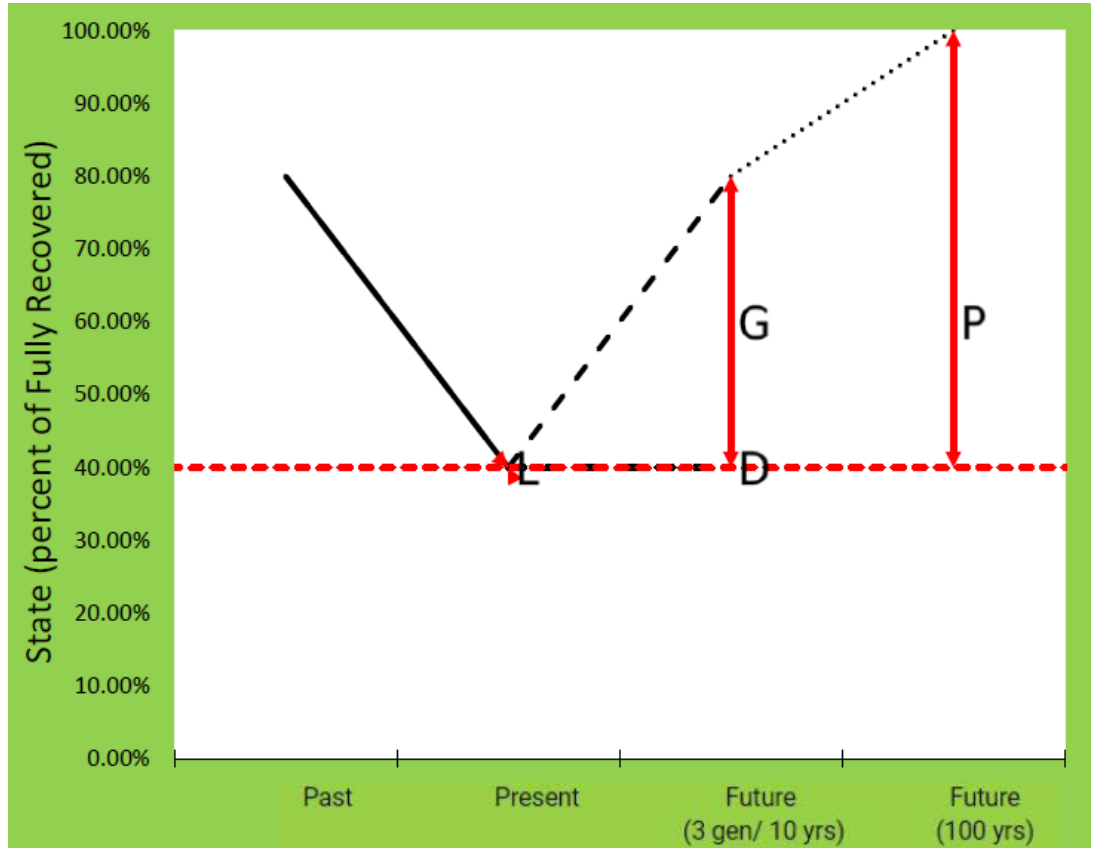
Source: Stephenson, P.J. (2019). *Testing the IUCN Green List of Species: Lessons Learned Across Multiple Taxa.*

Example: Estuarine pipefish

Red List: CR
Range: South Africa

Estuarine pipefish
Syngnathus watermeyeri

- Conservation Legacy = 0
  - past conservation did not make a difference
- Conservation Dependence = 0
  - not expected to decline significantly even if there is no conservation action
- But, Conservation Gain and Potential very high:
  - could recover to 100% (functional in all special units)



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The IUCN Green List of Species

- Improvement in status: not a cause for cutting funding
- Conservation dependence (reliance) documented


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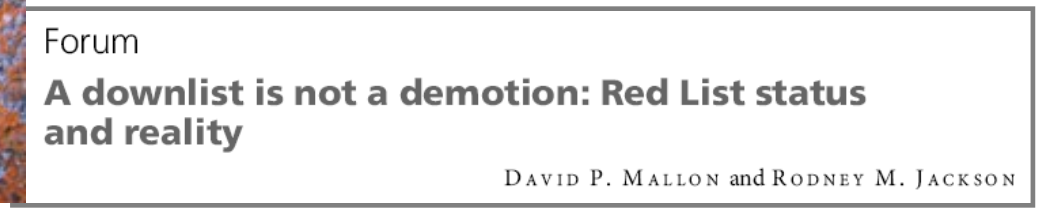
Science & Environment

Scientists split over snow leopard status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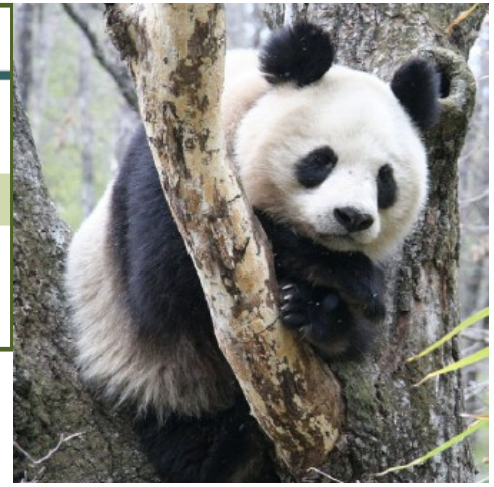

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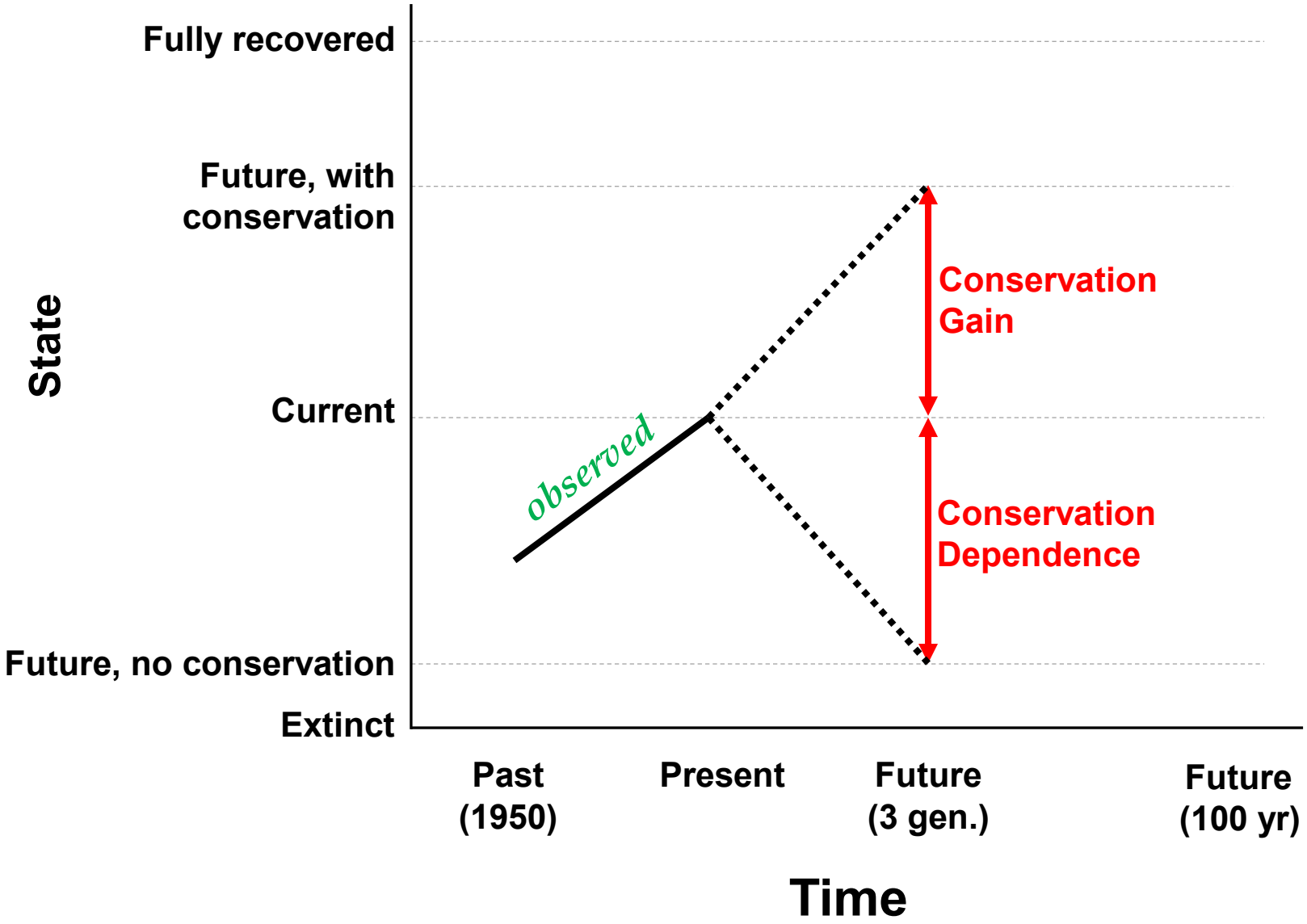


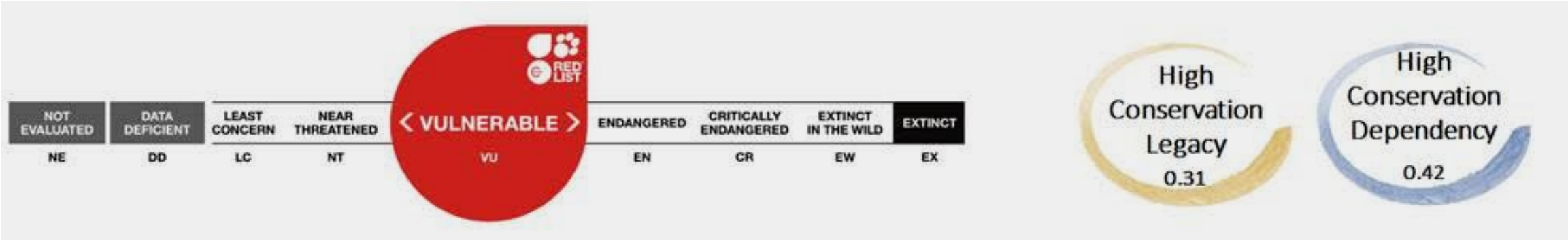
The IUCN Green List of Species:
Relation to the Conservation Planning Process

- Not replacing the CP process that brings stakeholders together
- Rather, reflecting the goals and aspirations set in that process
- Short-term targets and priorities (5-20 years) ⇒ **Conservation Gain**
- These are nested within a longer-term vision ⇒ **Recovery Potential**
- Built upon evaluation of past conservation ⇒ **Conservation Legacy**
- Necessity of continuing conservation ⇒ **Conservation Dependence**
- Degree of recovery ⇒ **Green List score (Species Recovery Index)**

The IUCN Green List of Species:
Many Remaining Challenges

e.g.,

- Temporal benchmark(s) for indigenous range
- Methods for projected range
- Methods and proxies for determining functionality
- Methods for developing scenarios (counterfactual and future)
- Categorization of metrics (e.g., *conservation-dependent*)
- Communicating results (displaying metrics on iucnredlist.org)
- Large-scale testing



The IUCN Green List of Species:
Key contributions to conservation science & practice

- Defining “fully recovered”
- Functionality: integrating species & ecosystem levels
- Representation: integrating population & species scales
- Encouraging ambitious and objective recovery goals
- Addressing perverse incentives (focus on RL status)
- Quantifying “conservation-dependent” (conservation-reliant)
- Recognizing and measuring conservation success (even when the species remains threatened)
- Promoting optimism

Conservation Optimism
@conservationoptimism

Acknowledgements

Partners & Funding

Green List of Species Task Force

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