Planning & Prioritizing Conservation Programs

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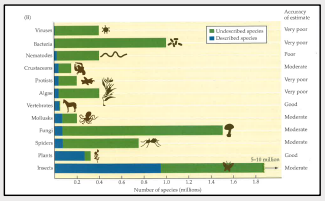
ZOO ATLANTA

amphibian ark

Recognized biodiversity
vs.
Unrecognized biodiversity



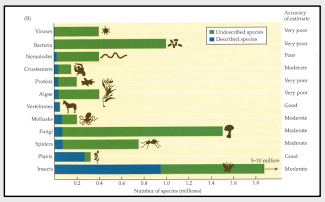
Estimated number of current species

NEWS

Hog-nosed rat: Victorian scientists among team to discover new mammal species in remote Indonesia

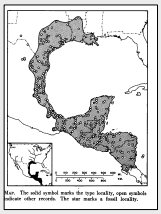
By Mark Doman

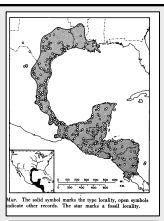
Updated October 06, 2015 12:04:23



Estimated number of current species

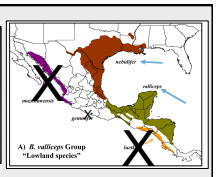
Can we conserve/protect unidentified species?

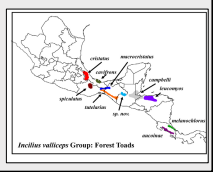




Biodiversity:

1 species
(Not endangered)
Vs.
10 species
(8 endangered)





Principles of Conservation

Biological diversity (species) has intrinsic value

Consider:

Reality of Ecological Goods & Services

Vs.

Emotional, Spiritual, Cultural Values

Are all species equivalently deserving of conservation efforts?


=

?

Rusty-patched Bumble Bee
USFWS: Endangered (2017)

Do, or should we, prioritize among species for conservation?
Which criteria?
Who decides?

Are all species equivalently deserving of conservation efforts?


=

=



or

?

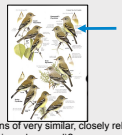
Are all species equal, or not?

Which species are most unique?

Lone "living fossil" species?

or

One species of a species flock with bizarre (= unique) morphology, behavior, or life history?



One of dozens of very similar, closely related species (but is endangered)?

or

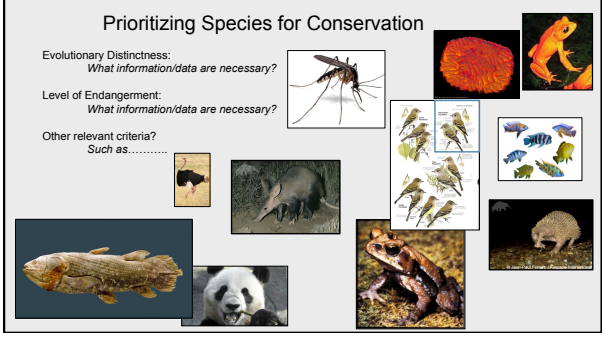
Largest living species of bird, with relatively few relatives.

Prioritizing Species for Conservation

Evolutionary Distinctness:
What information/data are necessary?

Level of Endangerment:
What information/data are necessary?

Other relevant criteria?
Such as……



Evolutionary (= phylogenetic) Distinctness

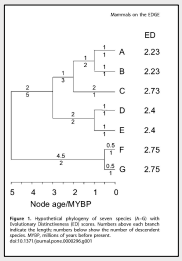
Isaac et al., 2007*

Isaac et al., 2007* "EDGE of Existence"
http://edgeofexistence.org/

ED = Evolutionary Distinctness
GE = Global Endangerment (Red List)

ED:
1. Branch length
2. No. descendent species

Species A = 1/1 + 1/2 + 1/3 + 2/5 = 2.23
Species G = 0.5/1 + 4.5/2 = 2.75



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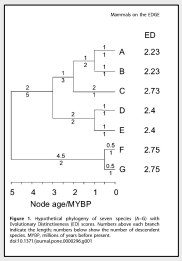
GE:
EX = n/a
EW = n/a
CR = 4
EN = 3
V = 2
NT = 1
LC = 0



EDGE = ln(1 + ED) + GE x ln(2)

Evolutionary (= phylogenetic) Distinctness
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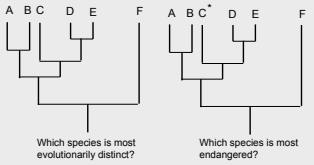
Concept:



Which species is most evolutionarily distinct?

Which species is most endangered?

Evolutionary (= phylogenetic) Distinctness
Isaac et al., 2007*

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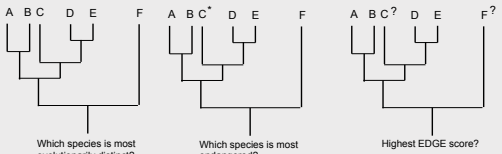


Which species is most evolutionarily distinct?

Which species is most endangered?

Highest EDGE score?

Most evolutionarily distinct mammal

?

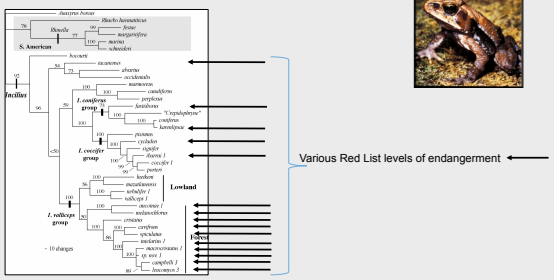
Most evolutionarily distinct mammal

?

Aardvark: distinct, but not endangered
ED = 88.9
EDGE = 4.5

3 species of Echidnas: distinct & endangered
ED = 55.2
EDGE = 6.8

Mesoamerican Toads (*Incilius*)



Various Red List levels of endangerment

Evolutionary (= genetic) Distinctness

Malone et al., 2000

Extinction = loss of ~16% genetic diversity of the clade

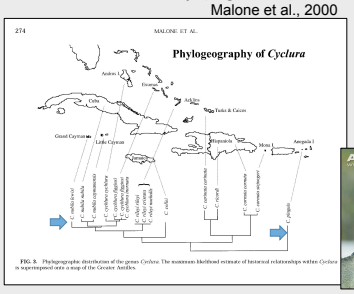


TABLE 3
Conservation Priorities

	% Endiversity loss	IUCN assessment
Cyclura pinguis	16.336 ± 0.277	Critically endangered
Cyclura nubila	16.206 ± 0.663	Critically endangered
Cyclura cornuta	12.230 ± 0.630	Vulnerable
Cyclura carinata	6.825 ± 0.567	Critically endangered
Cyclura nubila	6.837 ± 0.558	Vulnerable
Cyclura riwoodi	4.807 ± 0.578	Critically endangered
Cyclura cychlura	6.424 ± 0.581	Vulnerable
Cyclura oliveri	3.307 ± 0.564	Endangered
Cyclura nubila lewisi	3.307 ± 0.564	Critically endangered

Note. Species are ranked by the amount of impact that their extinction would have on the biodiversity of the genus using Conserve 3.2.1. Confidence limits of $P = 0.05$ are based on 100 bootstrap replicates. The 1996 IUCN assessment of each species (and *Cyclura nubila lewisi*, see text) is included.

Other Criteria for Prioritization?

10. **Biological distinctiveness:** Does the taxon exhibit, for example, a distinctive reproductive mode, behaviour, aspect of morphology or physiology, within the Class Amphibia?

Aspect of biology identified that is unique to species?

Aspect of biology shared with < 6 other species?

No aspect of biology known to be exceptional.

11. **Cultural/socio-economic importance:** Does the taxon have a special human cultural value (e.g. as a national or regional symbol, in a historic context, featuring in traditional stories) or economic value (e.g. food, traditional medicine, tourism) within its natural range or in a wider global context?

Yes

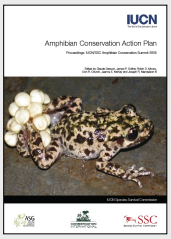
No

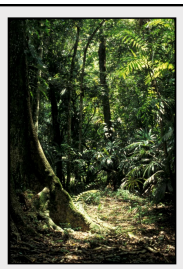
12. **Scientific importance:** Is the species vital to current or planned research other than species-specific ecology/biology/conservation? (e.g. human medicine, climate change, environmental pollutants and conservation science).

Research dependent upon species ?

Research dependent upon <6 species, including this species?

No research dependent upon this species.





In situ

Ex situ


In situ
Ex situ
CONSERVATION BREEDING SPECIALIST GROUP
IUCN
IUCN Species Survival Commission Guidelines on the Use of Ex situ Management for Species Conservation
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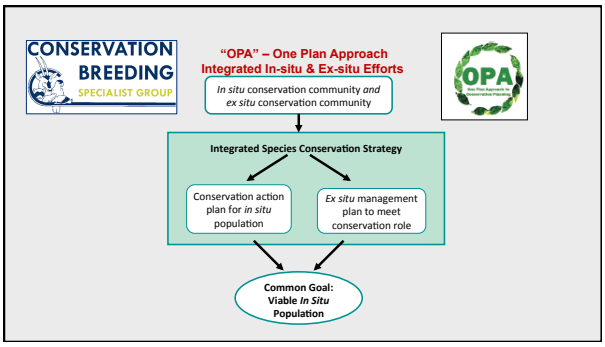
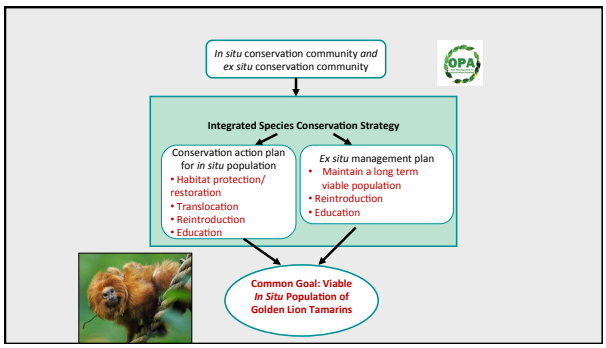
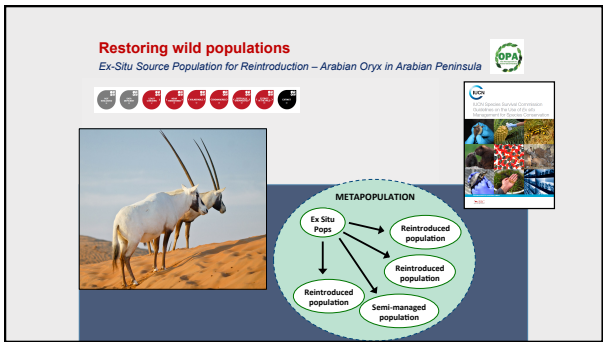
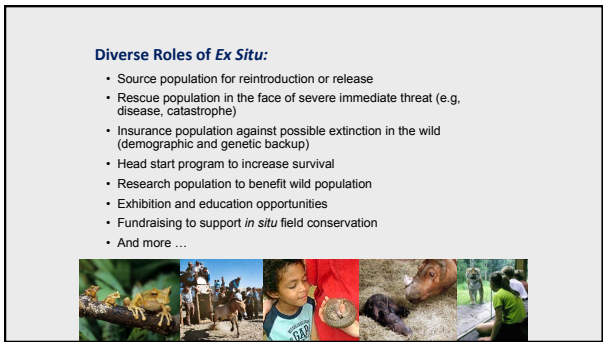

CONSERVATION BREEDING SPECIALIST GROUP
"OPA" – One Plan Approach
Integrated In-situ & Ex-situ Efforts
In situ conservation community and ex situ conservation community
Integrated Species Conservation Strategy
Conservation action plan for in situ population
Ex situ management plan to meet conservation role
Common Goal: Viable In Situ Population
OPA


Conservation NGOs
Zookeepers
Wildlife Managers
Wildlife Rescuers
Veterinarians
Local Communities
Harvesters
Researchers
Educators
Recovery Teams


In situ conservation community and ex situ conservation community
Integrated Species Conservation Strategy
Conservation action plan for in situ population
• Habitat protection/ restoration
• Translocation
• Reintroduction
• Education
Ex situ management plan
• Maintain a long term viable population
• Reintroduction
• Education
Common Goal: Viable In Situ Population of Golden Lion Tamarins


Restoring wild populations
Ex-Situ Source Population for Reintroduction – Arabian Oryx in Arabian Peninsula
METAPOPULATION
Ex Situ Pops
Reintroduced population
Reintroduced population
Reintroduced population
Semi-managed population


Diverse Roles of Ex Situ:
• Source population for reintroduction or release
• Rescue population in the face of severe immediate threat (e.g, disease, catastrophe)
• Insurance population against possible extinction in the wild (demographic and genetic backup)
• Head start program to increase survival
• Research population to benefit wild population
• Exhibition and education opportunities
• Fundraising to support in situ field conservation
• And more …

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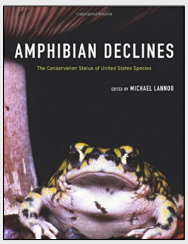
Conservation Needs Assessment Tool

http://www.conservationneeds.org/



Ambystoma maculatum

http://conservationneeds.org/AssessmentResults.aspx?AssessmentID=4026&SpeciesID=5508&CountryID=98