



# Key terms and concepts in the IUCN Red List Criteria



## An amphibian species

### Critically Endangered A2ace;B1ab(iii)

- At least 80% **reduction** in **population size** over the past 10 years or three **generations**.
- Restricted **extent of occurrence**.
- The population is either **severely fragmented** or occurs in just one **location**.
- **Continuing decline** in extent and/or quality of habitat.

# Key Terms

- Important to understand what these terms mean and how to calculate them appropriately.
- Not all of the criteria use all of the terms.
- Not essential to have data for ALL of these terms.

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).<sup>1</sup>

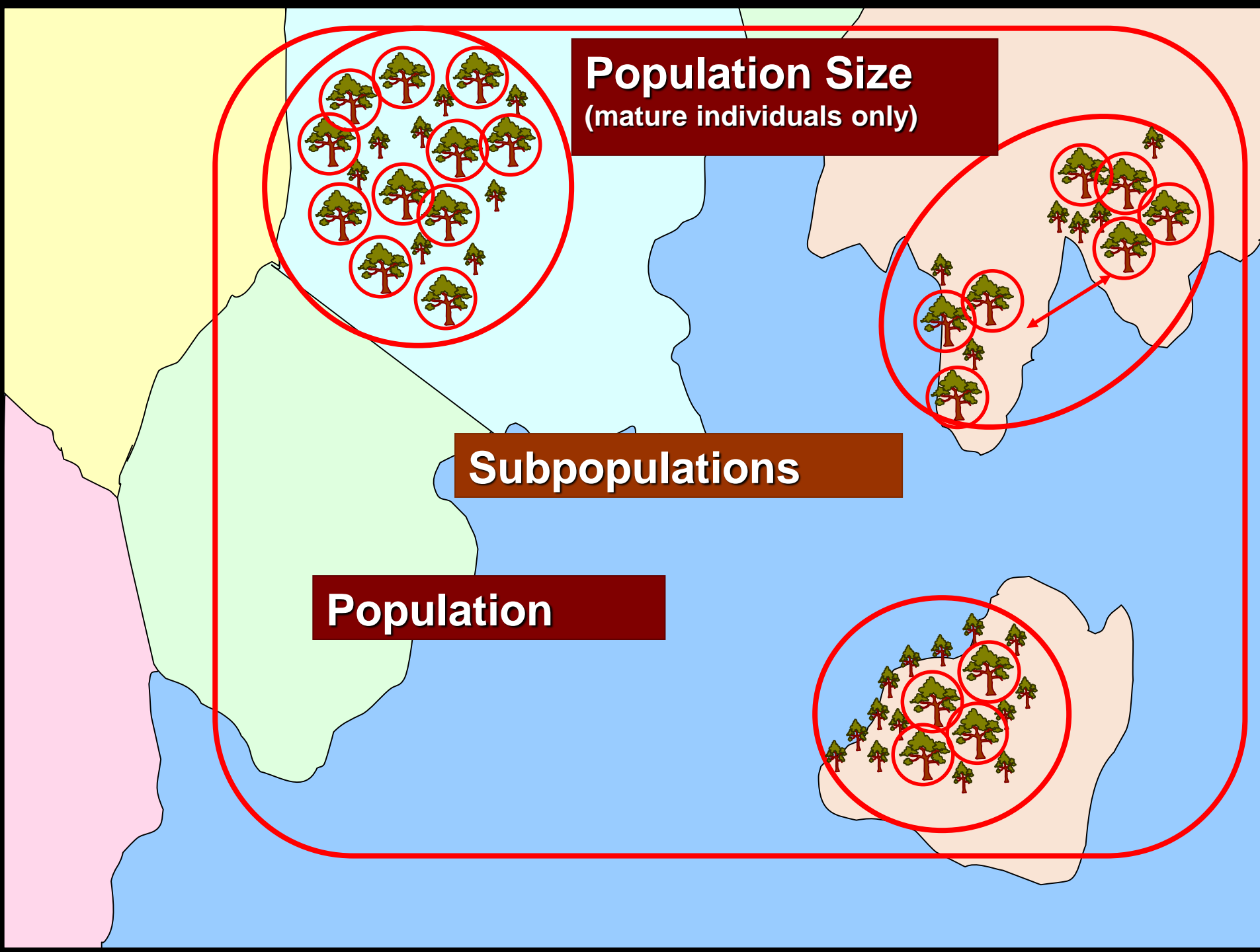
A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%
<p>A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND</p> <p>A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND the reduction may not be understood OR may not be reversible.</p> <p>A3 Population reduction suspected to be met in the past but not used for A3j.</p> <p>A4 An observed, estimated, 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> <p>based on any of the following:</p> <ul style="list-style-type: none"> <li>(a) direct observation [except A3j]</li> <li>(b) an index of abundance appropriate to the taxon</li> <li>(c) EOO area of occupancy</li> <li>(d) actual or inferred of exploitation</li> <li>(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.</li> </ul>			
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	< 100 km <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
B2. Area of occupancy	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented			≤ 10
(b) Continuing decline			
(c) Extreme fluctuation			subpopulation
C. Small population size and decline			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of the following:			
C1. An observed, estimated, projected or inferred decline of at least (up to a max. of 100 years in future) 25% in 3 years or 1 generation		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 decline			
(a) (i) Number of mature individuals			≤ 1,000
(ii) % of mature individuals in subpopulation		≤ 100%	100%
(b) Extreme fluctuations in the number of mature individuals			
D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 250	< 250	D1. < 1,000
D2. Only applies to the VU category. Restricted area of occupancy or number of locations, or a plausible future threat that could drive the taxon to CR or EX in a very short time.			D2. typically: AOO < 20 km <sup>2</sup> or number of locations ≤ 5
E. Quantitative Analysis			
	Critically Endangered	Endangered	Vulnerable
Increase or decrease in population size over 10 years or 3 generations	≥ 50% in 10 years or 3 generations (whichever is longer)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

<sup>1</sup> Use of this summary sheet requires full understanding of the IUCN Red List Categories and Criteria and Guidelines for Using the IUCN Red List Categories and Criteria. Please refer to both documents for explanations of terms and concepts used here.

**Population Size**  
(mature individuals only)

**Subpopulations**

**Population**



## Generation Length

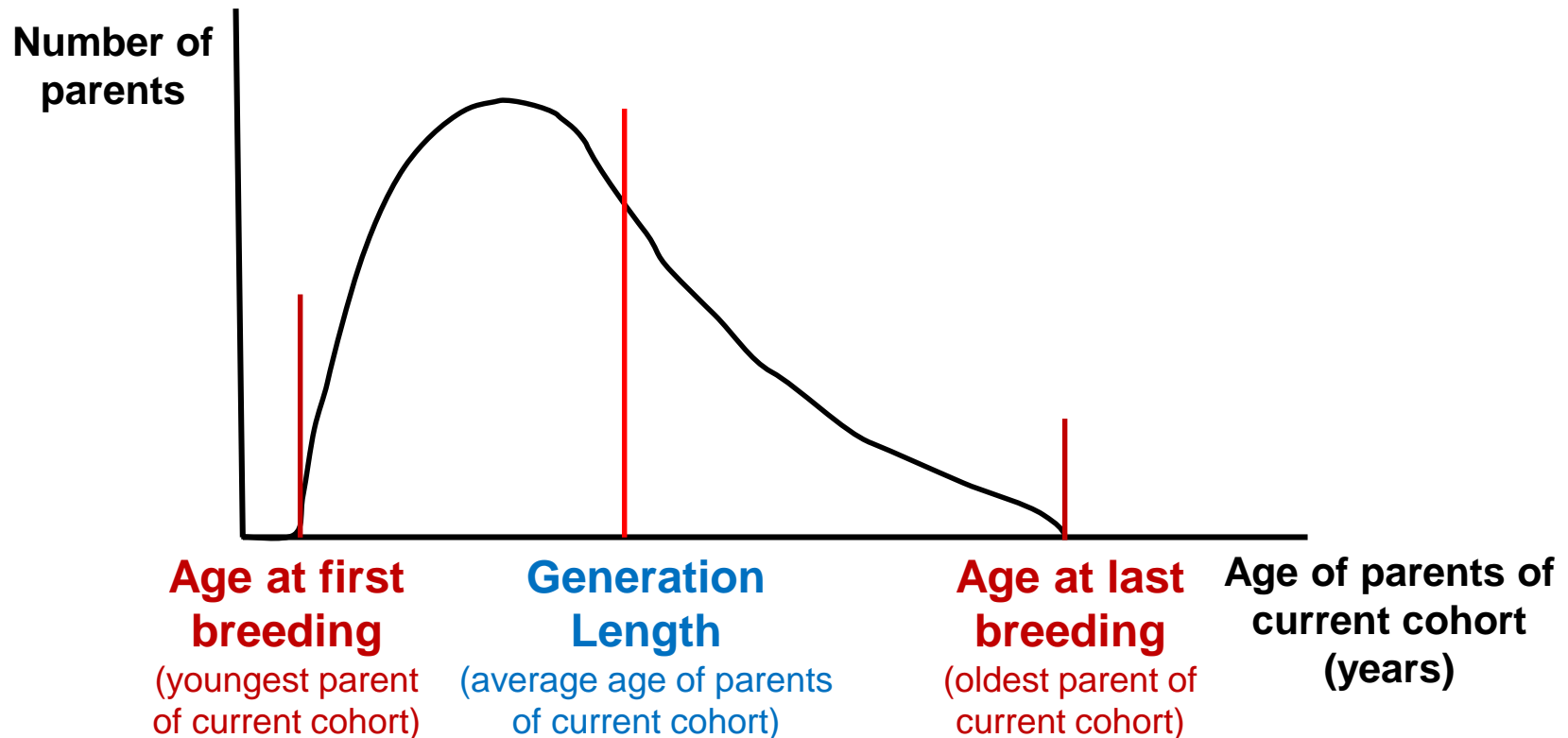
***Used to scale time-based  
measurements to account for different  
survival and reproduction rates***

***e.g.  $\geq 50\%$  population decline measured over  
3 generations***

## Generation Length

### Several definitions (all acceptable):

- Average age of parents of the current cohort (“cohort” = newborn individuals in the population)



## Generation Length

### Several definitions (all acceptable):

- Average age of parents of the current cohort (“cohort” = newborn individuals in the population)
  - Mean age at which a cohort of newborns produce offspring
  - Age at which 50% total reproductive output is achieved
  - Mean age of parents in a population at the stable age distribution
  - Time required for the population to increase by the replacement rate
- 
- **Scales time-based measurements to account for different survival/reproduction rates.**
  - **Reflects turnover rate of breeders.**
  - **Always use *natural* generation length.**

# Generation Length

Life table data (e.g., survival rate and fecundity for all age classes)

## Generation Length Workbook.xls

(<https://www.iucnredlist.org/resources/generation-length-calculator>)

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J

K

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M

N

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P

Q

R

Calculating Generation Length

Enter information only in the cells labelled S(i) and F(i) (columns B and C).

See information on the right side.

Age class (YEARS)	Survival rate	Fertility or fecundity	Age	Survivorship	Maternity			
<i>i</i>	<i>S(i)</i>	<i>F(i)</i>	<i>x</i>	<i>lx</i>	<i>mx</i>	<i>lx mx</i>	<i>x lx mx</i>	
0	0.1	0	0	1	zero by defn.	0	0	0
1	0.1	0	1	0.1	0	0	0	0
2	1	30	2	0.01	0	0	0	0
3	1	30	3	0.01	30	0.3	0.9	
4	1	30	4	0.01	30	0.3	1.2	
5	1	30	5	0.01	30	0.3	1.5	
6	1	30	6	0.01	30	0.3	1.8	
7	1	30	7	0.01	30	0.3	2.1	
8	1	30	8	0.01	30	0.3	2.4	
9	1	30	9	0.01	30	0.3	2.7	
10	1	30	10	0.01	30	0.3	3	
11	1	30	11	0.01	30	0.3	3.3	
12	1	30	12	0.01	30	0.3	3.6	
13	1	30	13	0.01	30	0.3	3.9	
14	1	30	14	0.01	30	0.3	4.2	
15	1	30	15	0.01	30	0.3	4.5	
16	1	30	16	0.01	30	0.3	4.8	
17	1	30	17	0.01	30	0.3	5.1	
18	0	0	18	0.01	30	0.3	5.4	
19	0	0	19	0	0	0	0	0
20	0	0	20	0	0	0	0	0
21	0	0	21	0	0	0	0	0
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23	0	0	23	0	0	0	0	0
24	0	0	24	0	0	0	0	0
25	0	0	25	0	0	0	0	0
26	0	0	26	0	0	0	0	0
27	0	0	27	0	0	0	0	0
28	0	0	28	0	0	0	0	0
29	0	0	29	0	0	0	0	0
30	0	0	30	0	0	0	0	0
31	0	0	31	0	0	0	0	0
32	0	0	32	0	0	0	0	0
33	0	0	33	0	0	0	0	0
34	0	0	34	0	0	0	0	0

Generation length = 11 years

Survival rate, *S(i)*

Proportion of individuals surviving an age class; 1-(annual mortality)  
e.g., *S(0)* is the proportion surviving from birth to 12 months  
*S(1)* is the proportion surviving from 12 to 24 months

Fecundity or fertility, *F(i)*

Average annual number of offspring produced per individual in that age class  
e.g., *F(0)* is the number of offspring produced per individual aged 0 to 12 months  
*F(1)* is the number of offspring produced per individual aged 12 to 24 months

Generation length

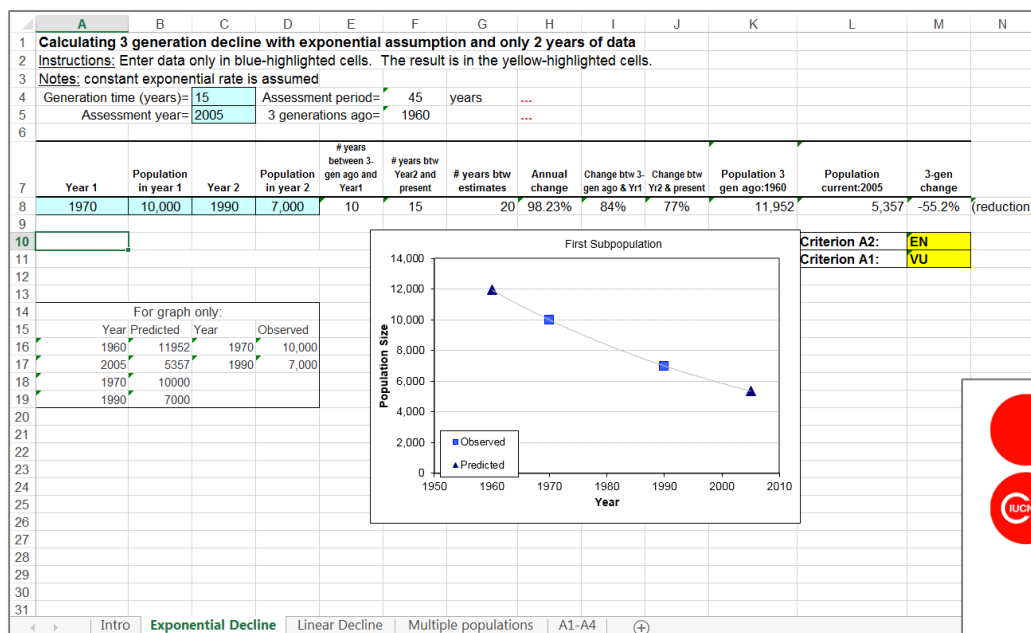
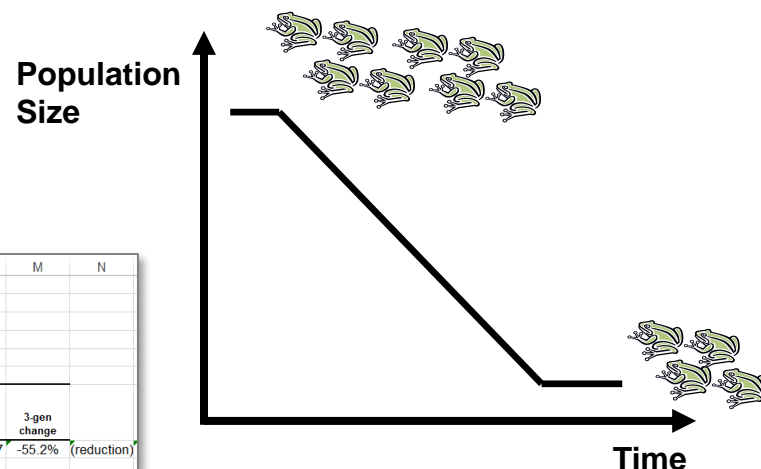
There are several different definitions of generation length or generation time. The calculation here is for the mean age at which a cohort of individuals produce offspring.

Sum {*i* · *m<sub>i</sub>* } 4.8  
Sum {*x* · *l<sub>i</sub>* · *m<sub>i</sub>* } 50.4  
*μ* 10.5



# Reduction

**Reduction** is a % decline in population size over the time period specified in criterion A (10 years or 3 generations).

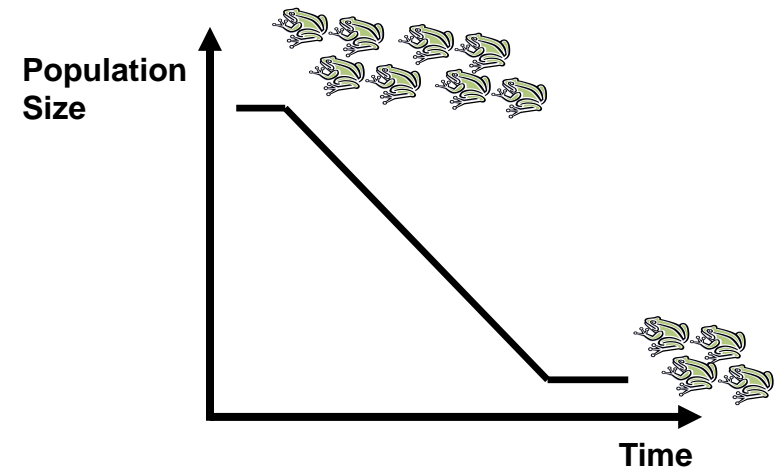


**CriterionA\_Workbook.xls**

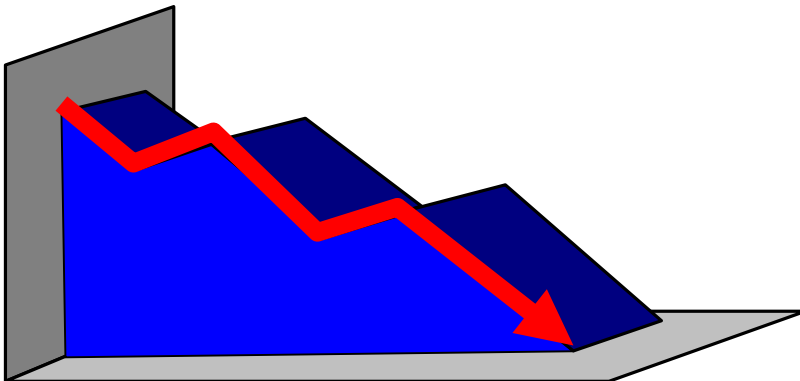
(<https://www.iucnredlist.org/resources/criterion-a>)

## Reduction

**Reduction** is a % decline in population size over the time period specified in criterion A (10 years or 3 generations).



## Continuing Decline

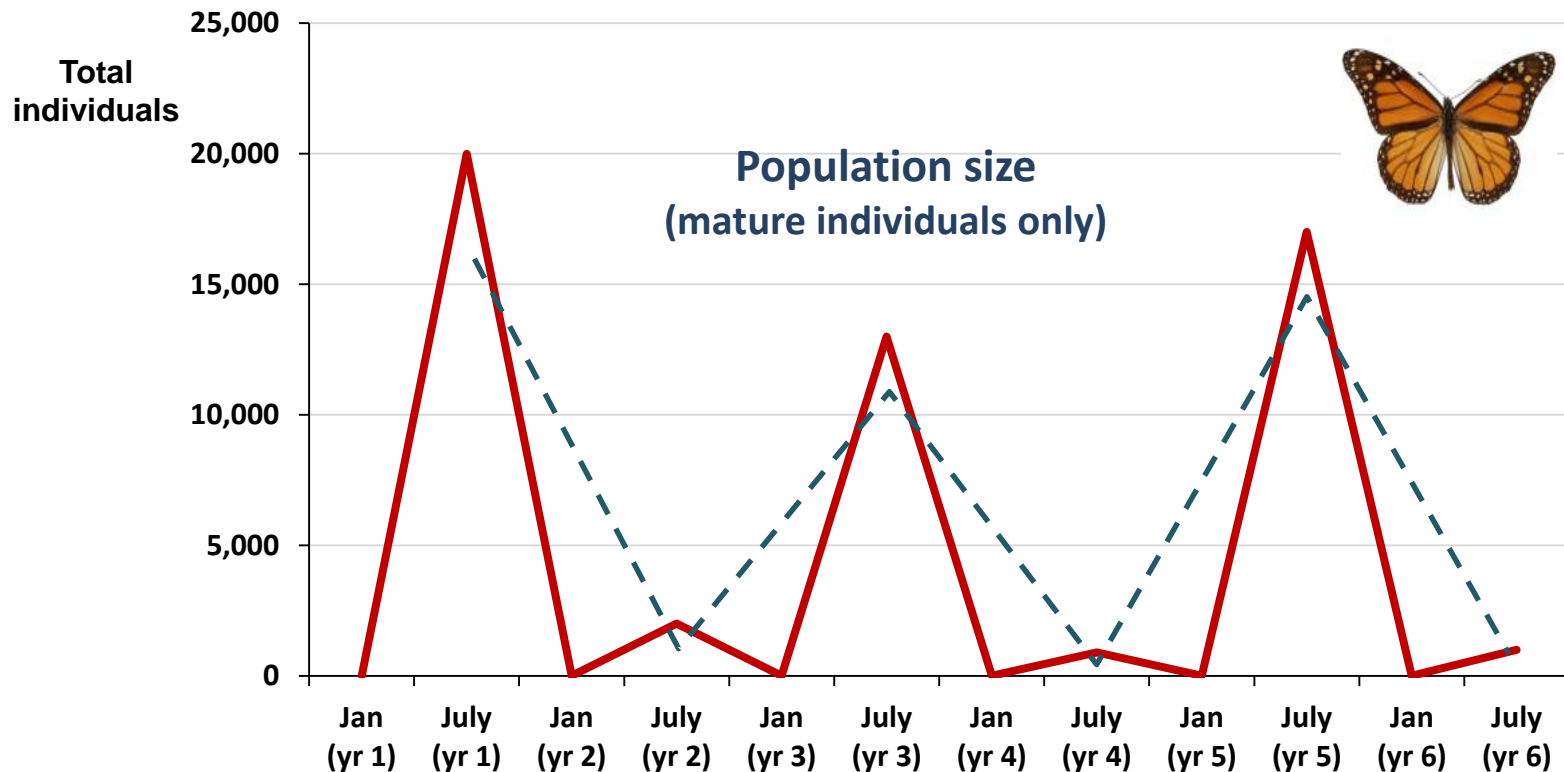


**Continuing Decline** is a recent, current or projected future decline which is liable to continue unless remedial measures are taken.

	Reduction	Continuing Decline
<b>Timing:</b>	<ul style="list-style-type: none"><li>• One-off event</li><li>• Ongoing</li></ul>	<ul style="list-style-type: none"><li>• Decline is expected to continue unless something is done to stop it.</li></ul>
<b>Applies to:</b>	<ul style="list-style-type: none"><li>• Population size</li></ul>	<ul style="list-style-type: none"><li>• Population size</li><li>• Extent of occurrence</li><li>• Area of occupancy</li><li>• Area, extent and/or quality of habitat</li><li>• Number of locations</li><li>• Number of subpopulations</li></ul>

# Extreme Fluctuations

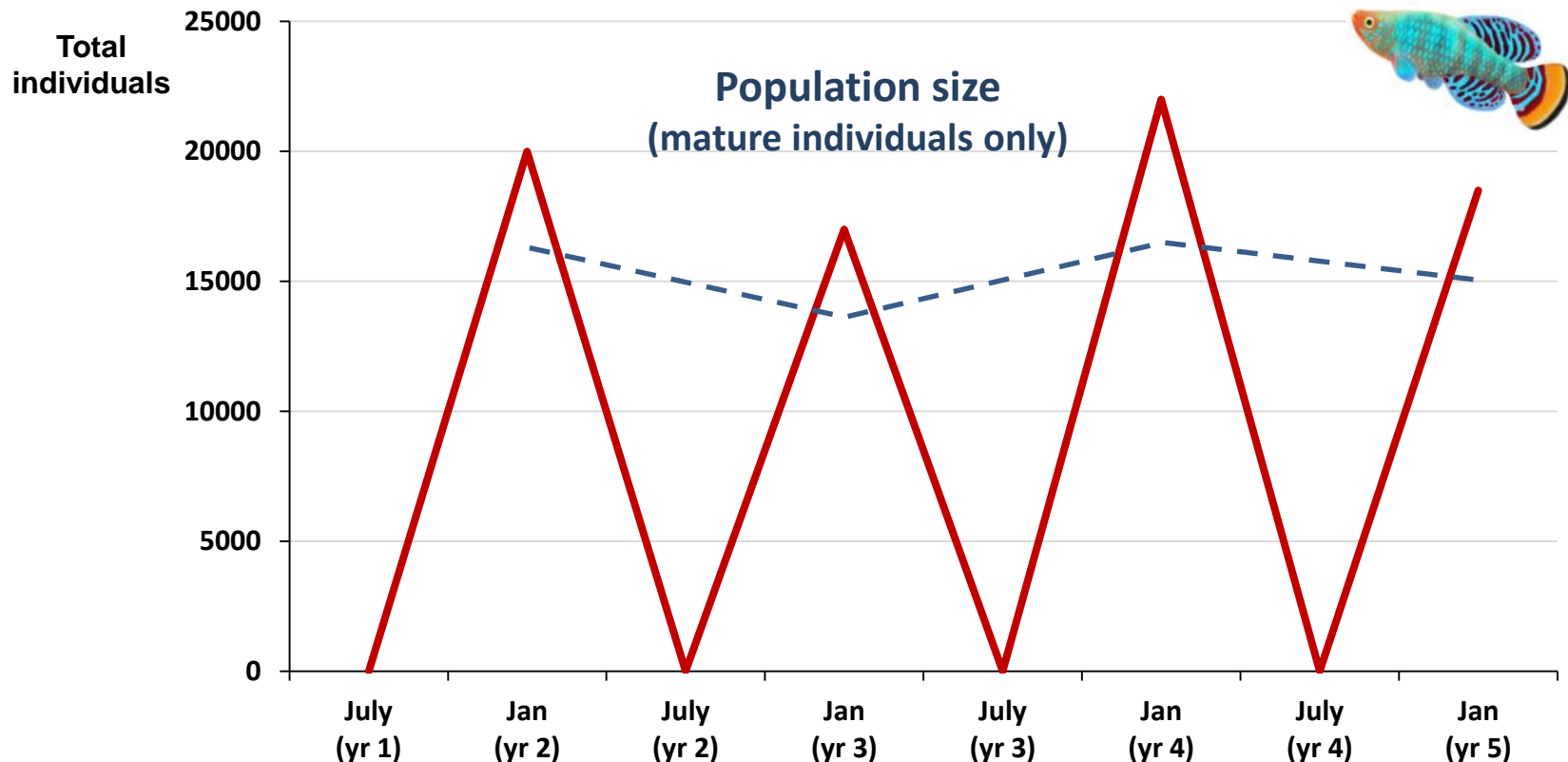
Wide, rapid and frequent variation in population size, or subpopulations, or locations, or distribution (typically tenfold increase or decrease)



Real changes in total population size; **extreme fluctuation**

# Extreme Fluctuations

Wide, rapid and frequent variation in population size, or subpopulations, or locations, or distribution (typically tenfold increase or decrease)



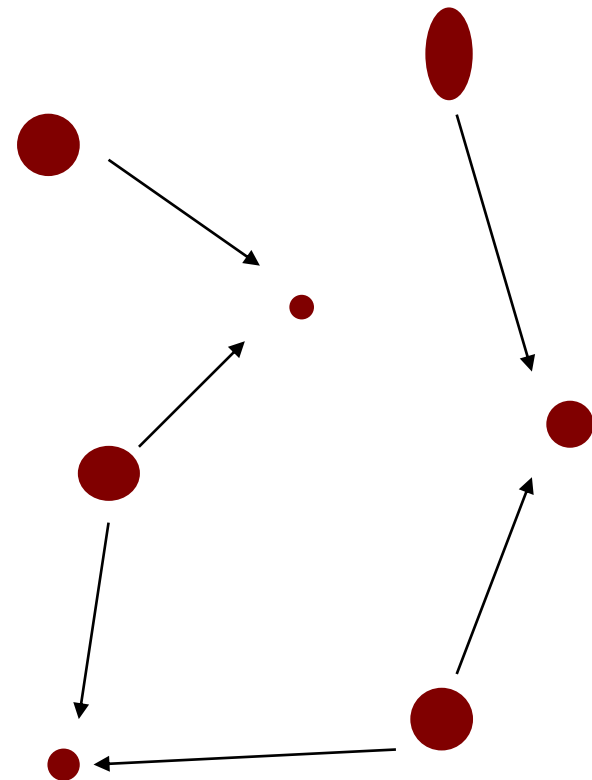
Natural seasonal fluctuations; **not extreme fluctuation**

## Severely Fragmented

Most individuals (>50%) found in **small, isolated subpopulations** between which there is **very little dispersal**. These subpopulations may be **too small to be viable**.

Taxa with highly mobile adult stages or producing large numbers of small, mobile diaspores can disperse more easily and are not so vulnerable to isolation through fragmented habitats.

Taxa producing small numbers of diaspores (or none at all), or only large ones are less able to disperse over wide areas and are more easily isolated.

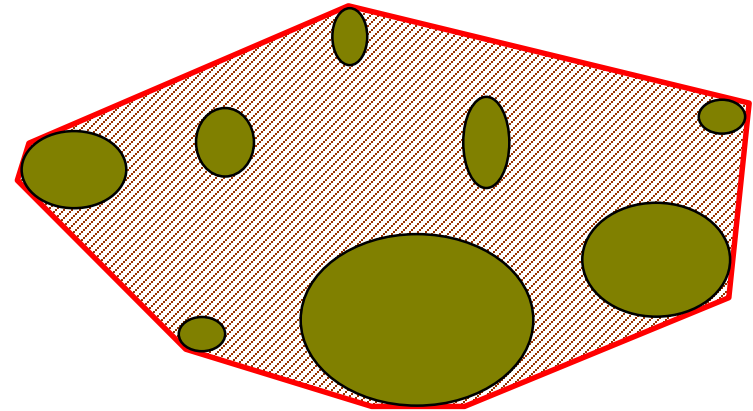


## Extent of Occurrence

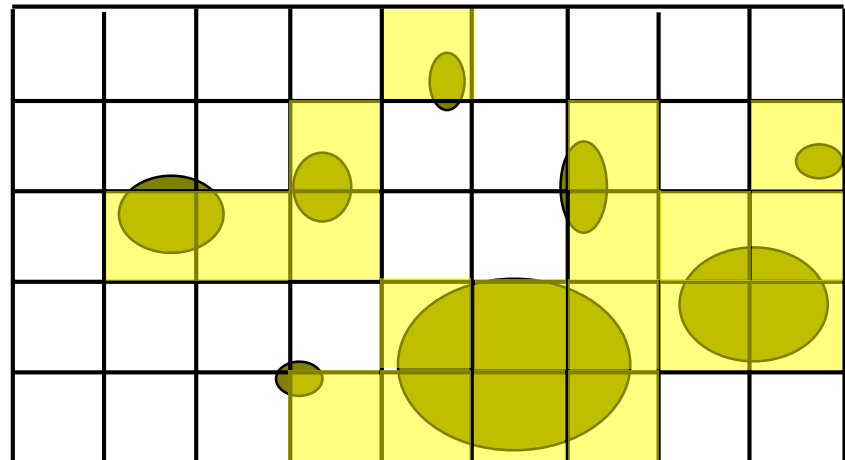
## Area of Occupancy

**Extent of Occurrence:** area within the shortest continuous imaginary boundary drawn around all known, inferred, or projected sites presently occupied by the taxon.

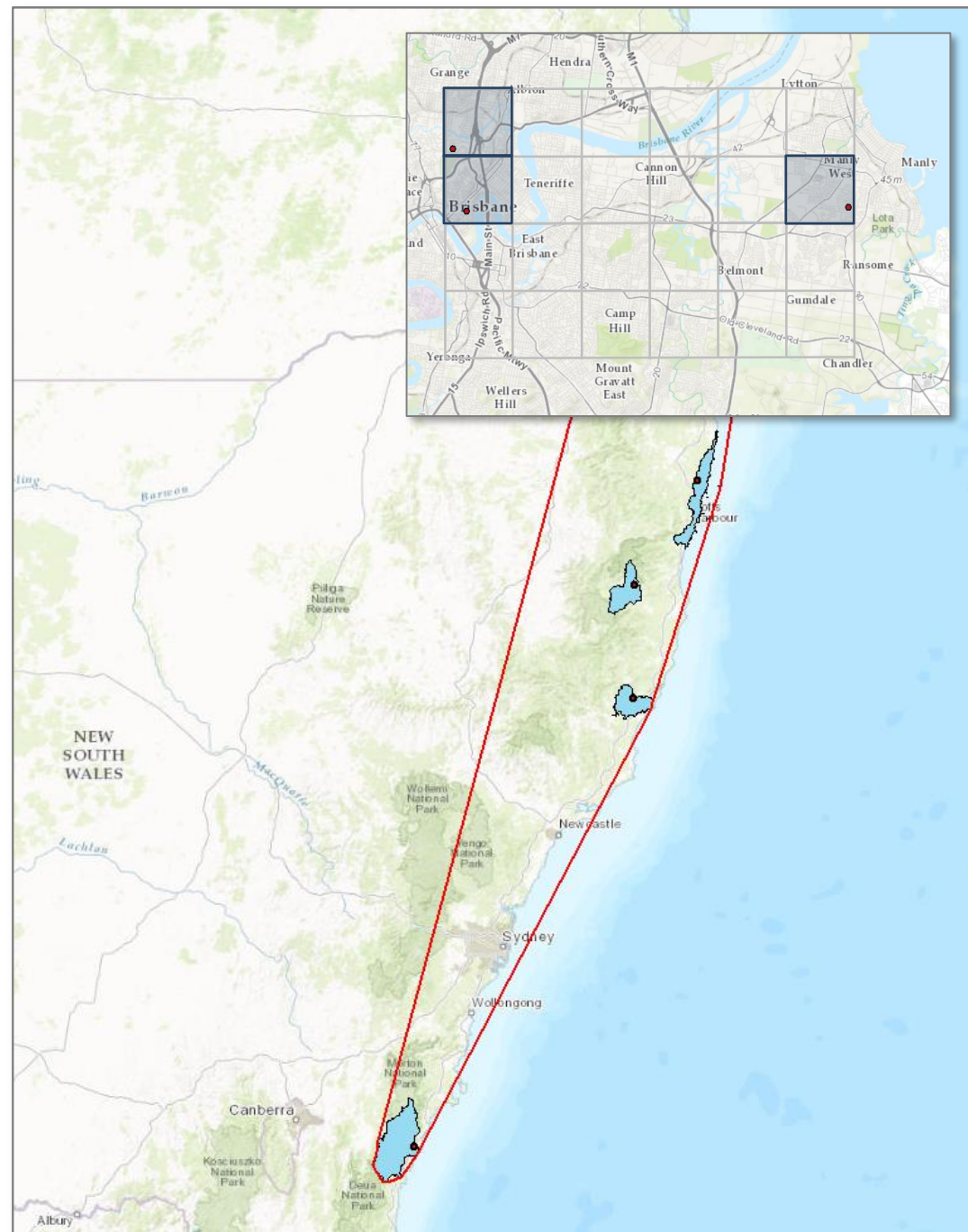
*...**EOO** ≠ the species' range.*



**Area of Occupancy:** area within the extent of occurrence which is actually occupied by the taxon (measured by **overlaying a 2x2 km grid and counting number of occupied cells**).



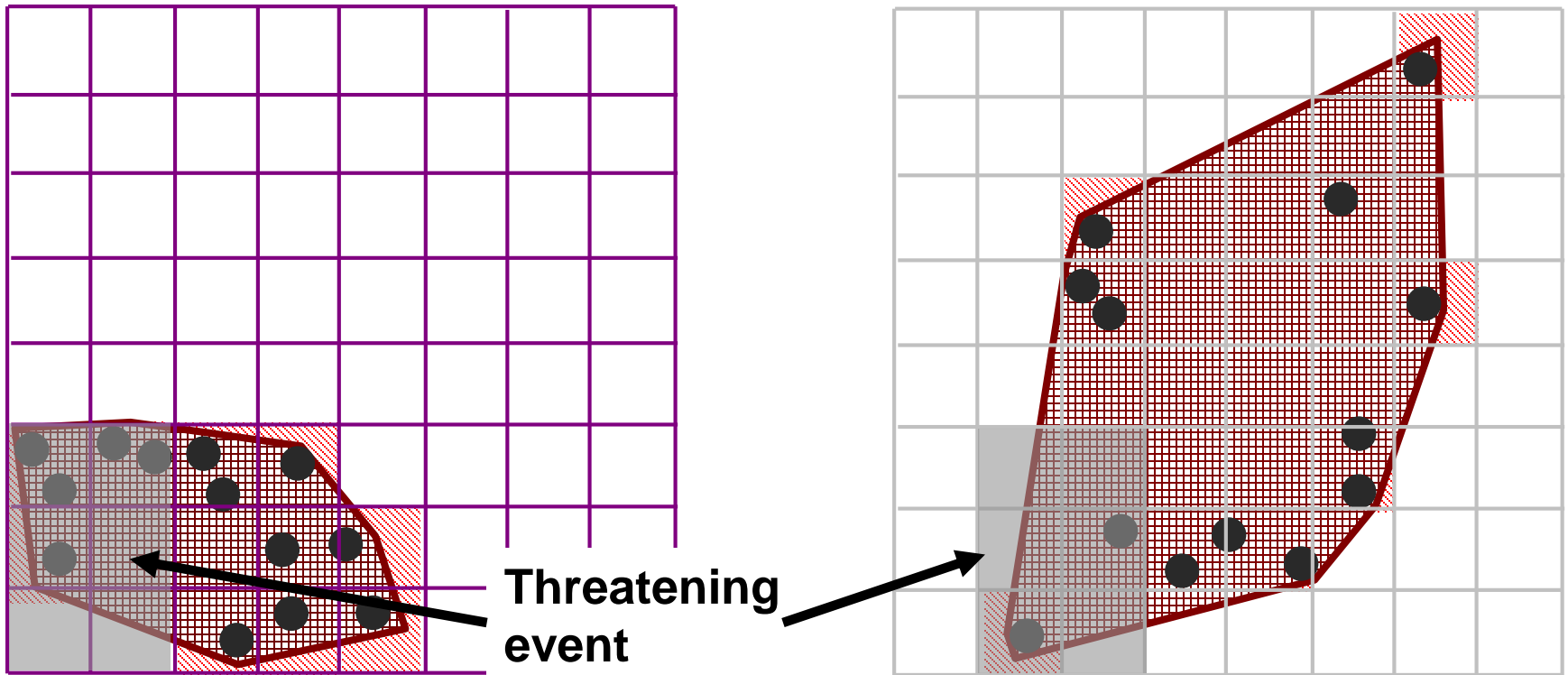
- **Distribution map**
  - Data points (red dots)
  - Limits to distribution (blue polygons)
- **Extent of occurrence (EOO)**
  - Entire area within the minimum convex polygon (e.g., 121,536 km<sup>2</sup>)
- **Area of occupancy (AOO)**
  - Total occupied 2x2 km grid cells (e.g., 40 km<sup>2</sup>)





# Extent of Occurrence

Comparison of taxa with same AOO but different EOO – a single threatening event is more likely to impact the taxon with the smaller EOO:

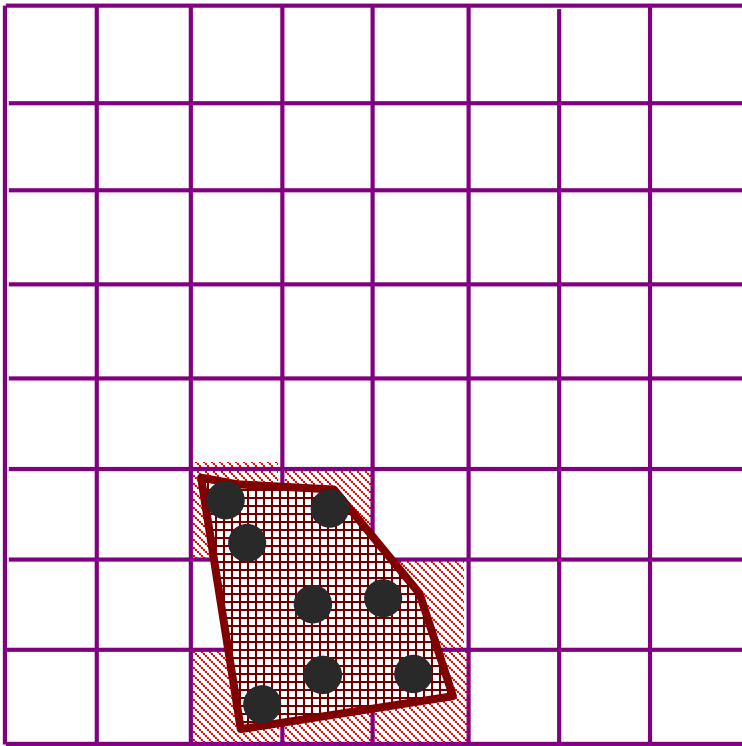


$AOO = 10 \times 4 = 40 \text{ km}^2$   
 $EOO = 44 \text{ km}^2$

$AOO = 10 \times 4 = 40 \text{ km}^2$   
 $EOO = 105 \text{ km}^2$

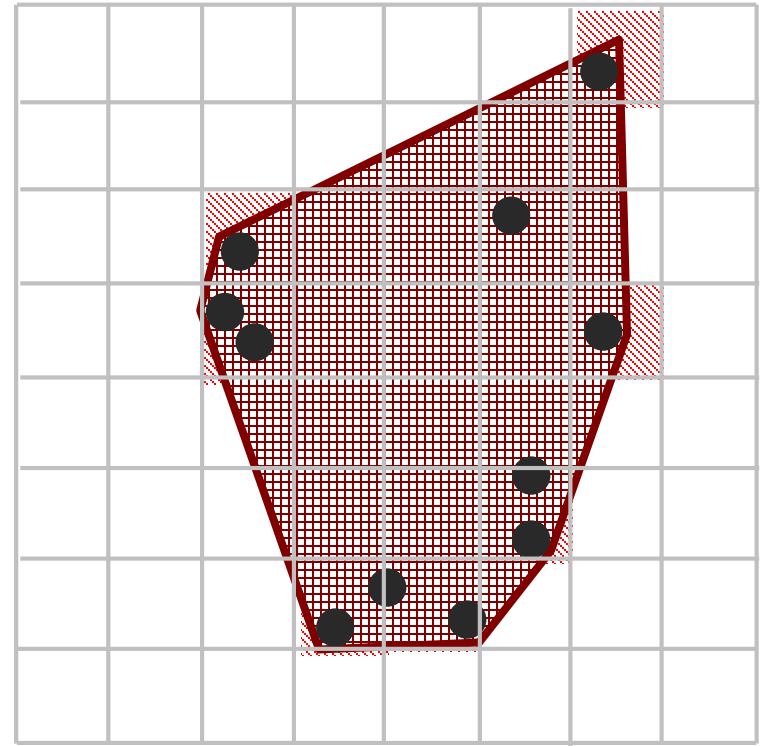
## Extent of Occurrence

Comparison of taxa with same AOO but different EOO – a single threatening event is more likely to impact the taxon with the smaller EOO:



$$\text{AOO} = 7 \times 4 = 28 \text{ km}^2$$

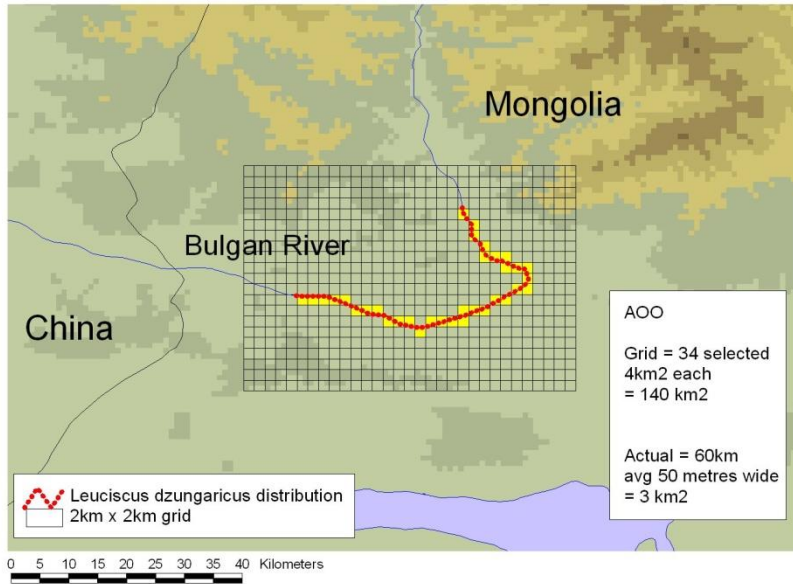
$$\text{EOO} = 28 \text{ km}^2$$



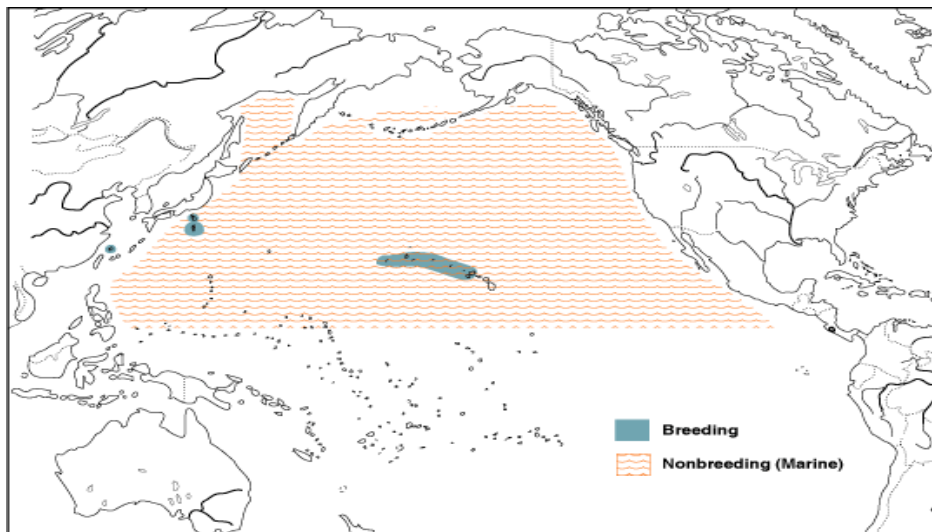
$$\text{AOO} = 8 \times 4 = 32 \text{ km}^2$$

$$\text{EOO} = 82 \text{ km}^2$$

# Area of Occupancy



- Linear habitats: AOO measurement must be **consistent with threshold values** – use a 2x2 km grid for AOO estimates.



- AOO can also be measured as the **smallest area essential at any stage to the survival**

## Location

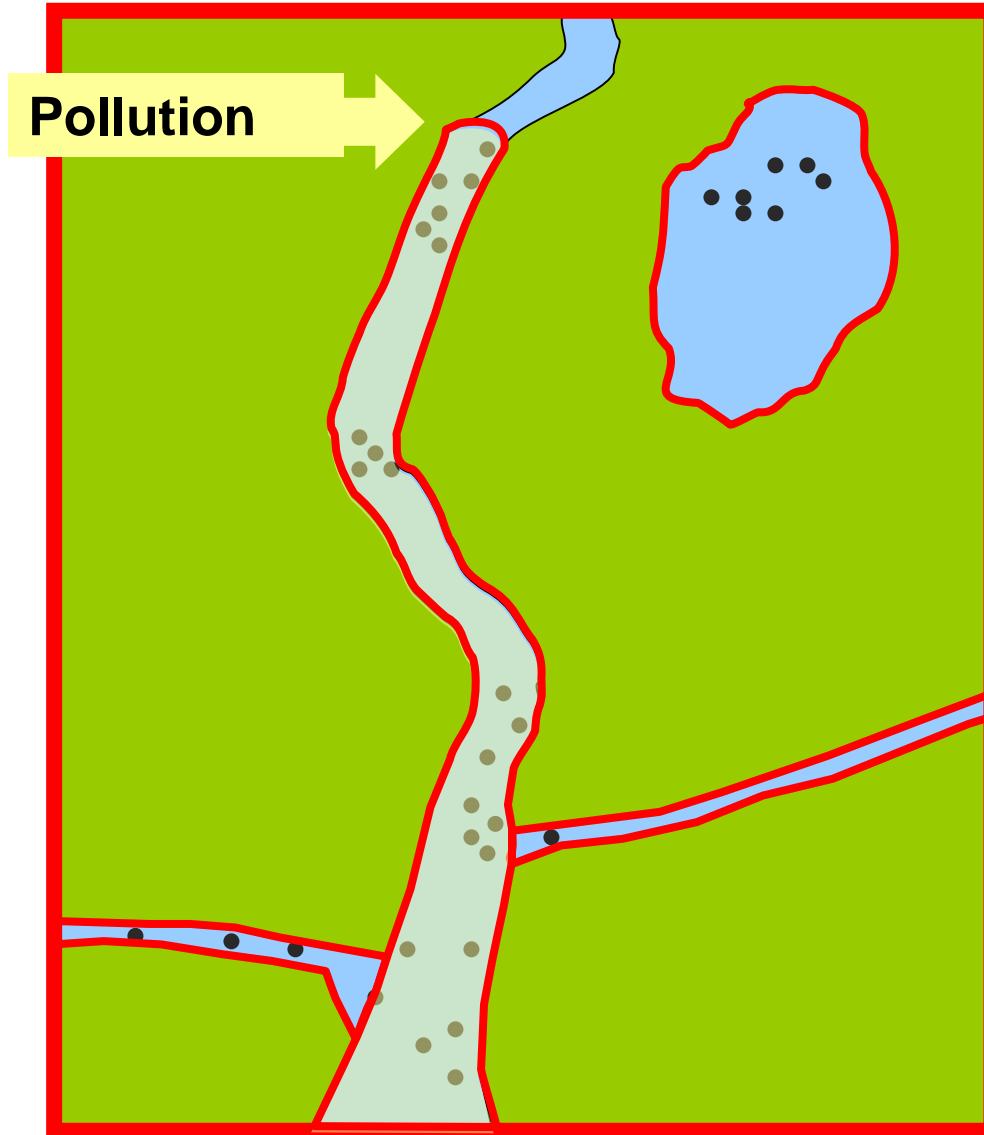
**Location** is a geographically or ecologically distinct area in which a **single threatening event can rapidly affect all individuals of the taxon.**

# Location



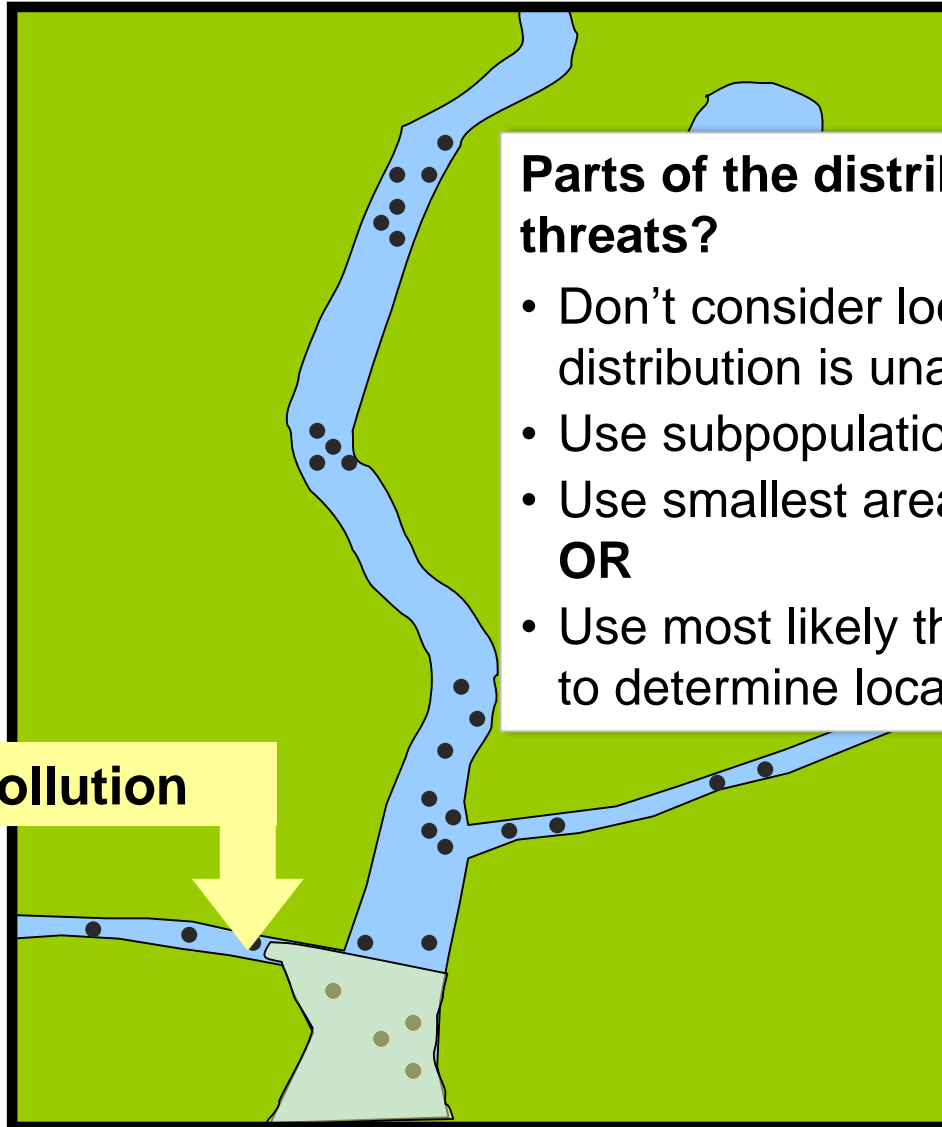
**2 locations**

# Location



**4 locations**

# Location



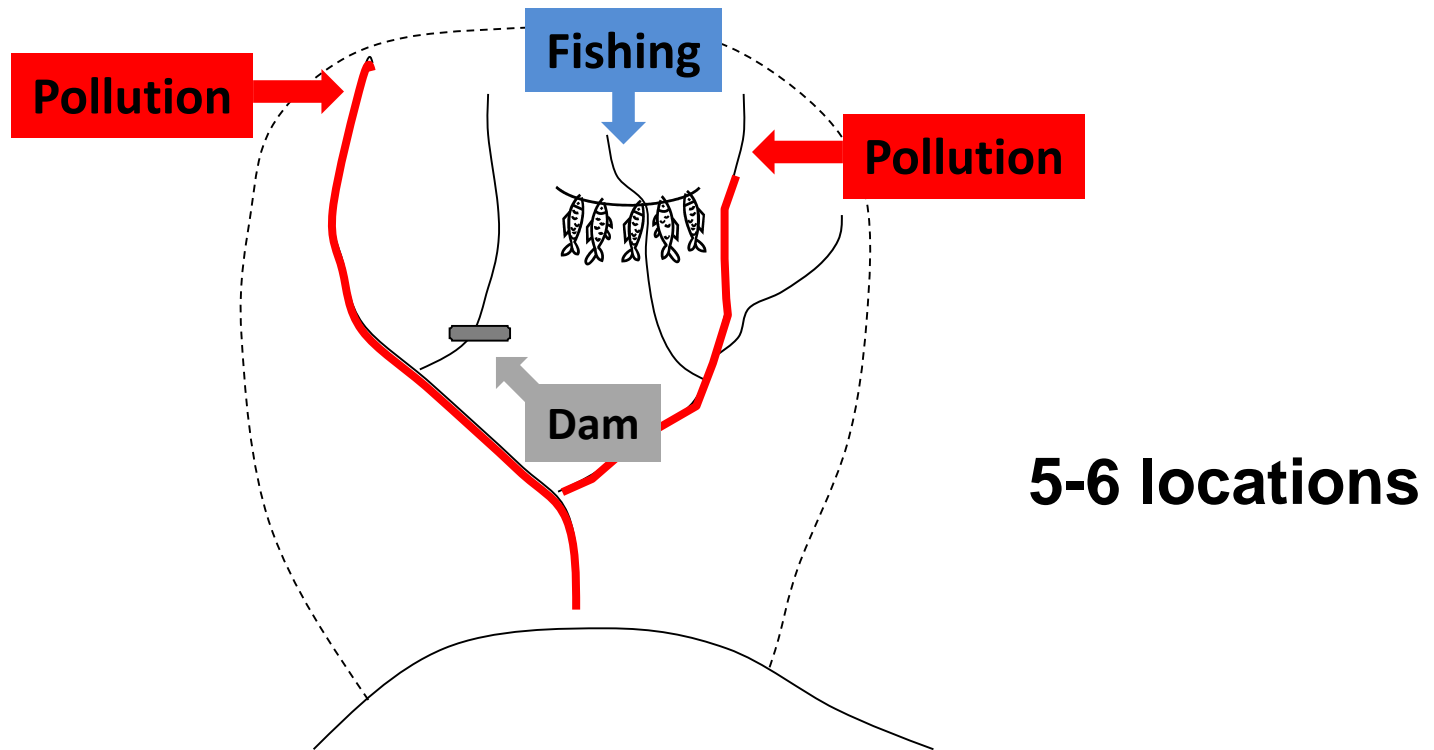
**Parts of the distribution not affected by any threats?**

- Don't consider locations at all (if >50% of distribution is unaffected); **OR**
- Use subpopulations as surrogate for locations; **OR**
- Use smallest area affected to determine locations; **OR**
- Use most likely threat to occur in unaffected areas to determine locations there.

**4-5 or >5 locations...?**

## Location

If most serious threat does not affect entire distribution: can use other threats to count locations in areas not affected by most serious threat.

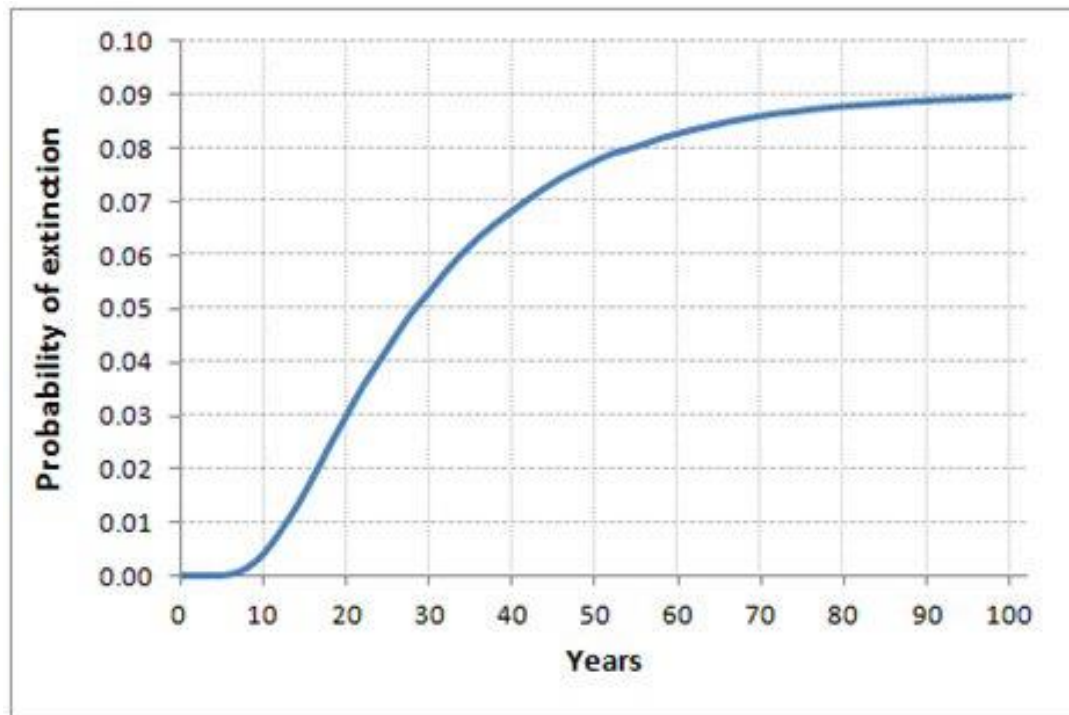


*If there are no plausible threats, do not consider locations at all.*



## Quantitative Analysis

**Quantitative Analysis** is any form of analysis which estimates the extinction probability of a taxon based on known life history, habitat requirements, threats and any specified management options (e.g., Population Viability Analysis (PVA)).





<https://www.iucnredlist.org/resources/redlistguidelines>



## Guidelines for Using the IUCN Red List Categories and Criteria

Version 3.1  
(January 2017)

Prepared by the Standards and Petitions Committee of the IUCN Species Survival Commission

Citation: IUCN Standards and Petitions Committee. 2017. IUCN Red List Categories and Criteria, Version 3.1. Downloadable from <https://www.iucnredlist.org/documents/>

THE IUCN RED LIST OF THREATENED SPECIES™

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# Key terms and Concepts exercise (20 minutes)

1. Work in groups of 2-3 people.
2. You will be given a card with a Red List term on it.
3. You have 20 minutes to:
  - Discuss the meaning of the term within your group.
  - Give **one example** (real or fictional) that demonstrates the term, explaining what it means in your own words
4. After 20 minutes, each group will present their example.

Location
<i>Example:</i>