

CC-Bio

Effets des Changements Climatiques sur la Biodiversité du Québec
Effects of Climate Change on Quebec Biodiversity



Vulnerability of Québec biodiversity to climate change

Yanick Gendreau, Dominique Berteaux, Patrick Nantel

The objectives of my project

- Providing knowledge and tools to support adaptation strategies in the field of conservation biology in a climate change context

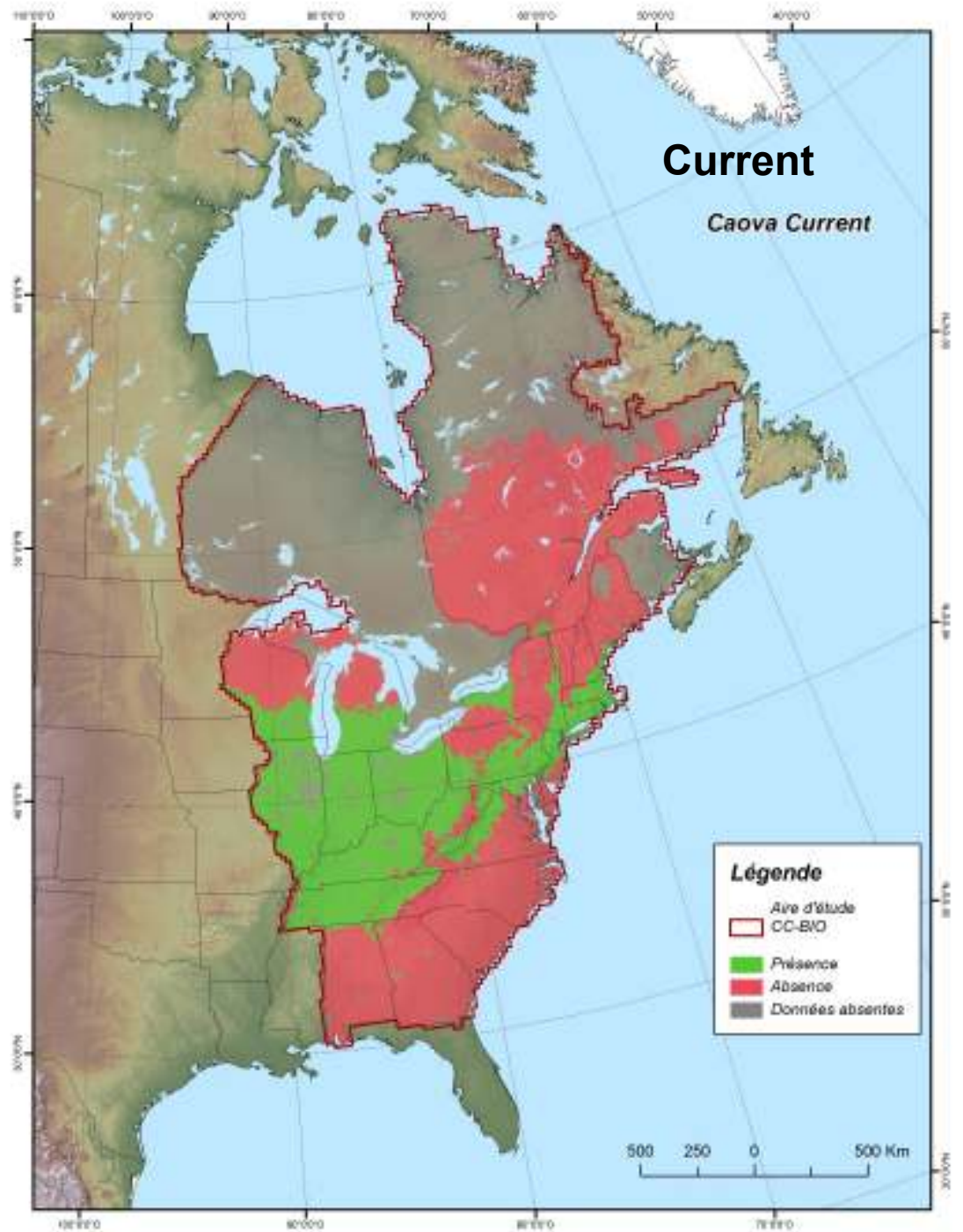
The objectives of my project

- **Providing knowledge and tools to support adaptation strategies in the field of conservation biology in a climate change context**
 - **Assessing the vulnerability of more than 300 species to climate change in Québec**

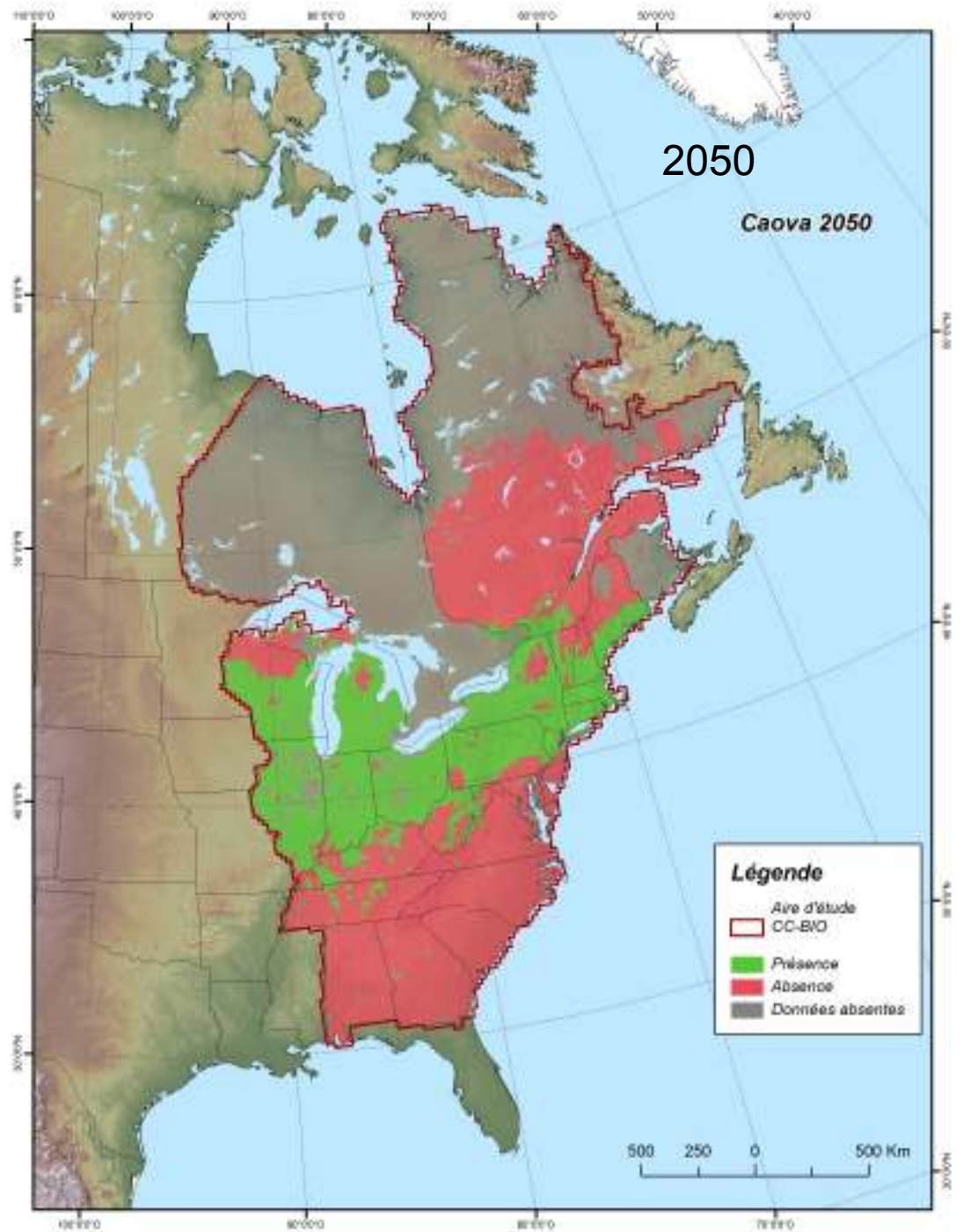
Risk management

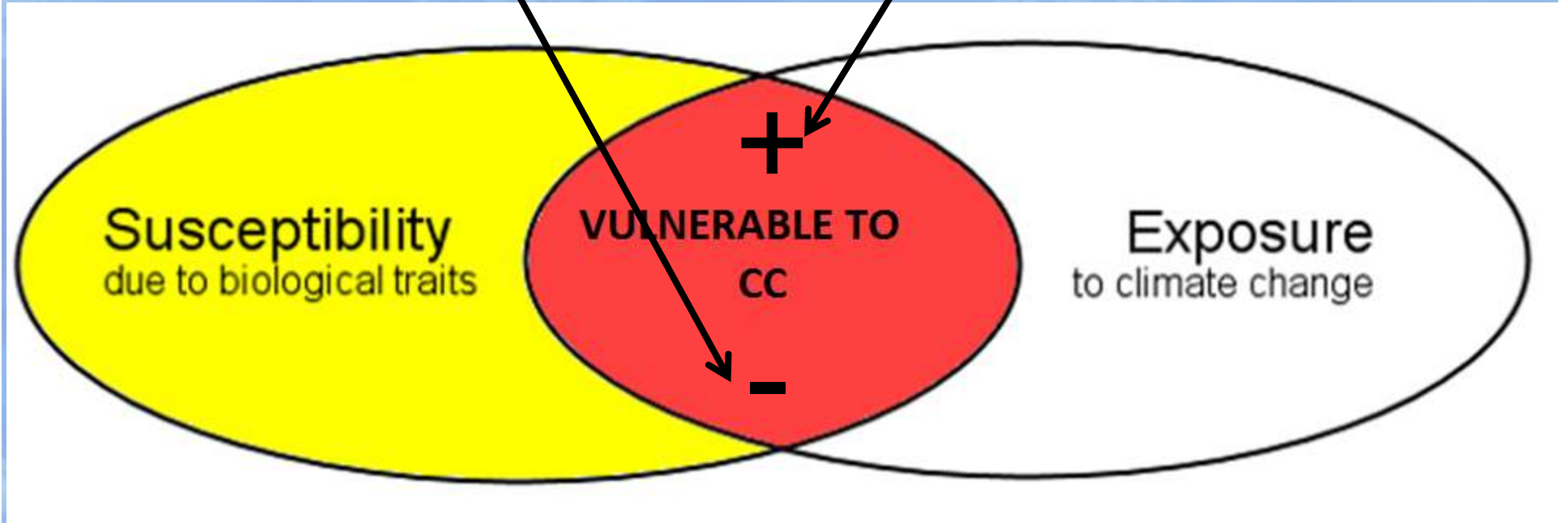


Carya ovata var. *ovata*
Caryer ovale
Shagbark Hickory
Statut : SDM



Carya ovata var. *ovata*
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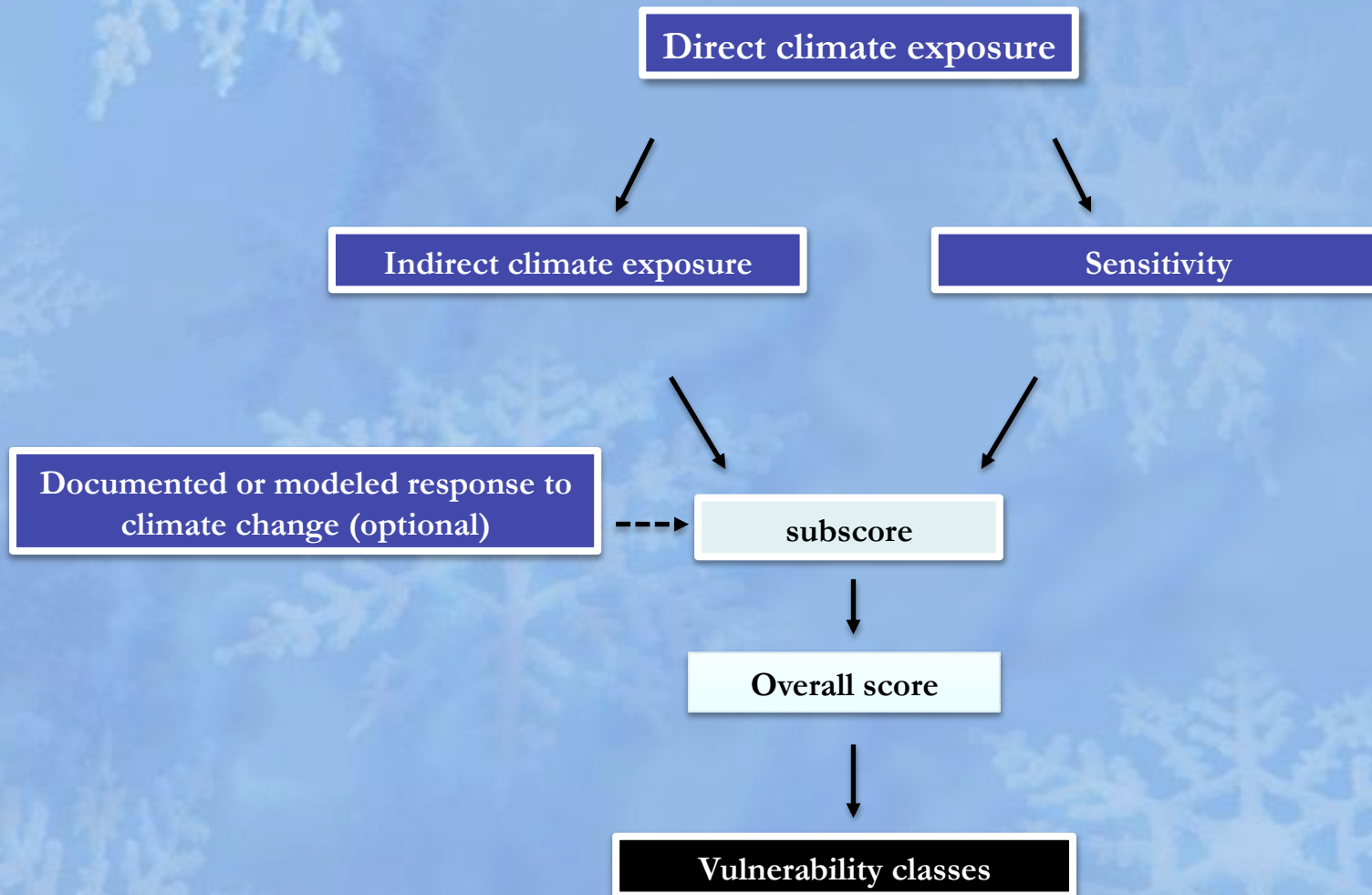






**Climate change vulnerability index
(CCVI)**

NatureServe Climate change vulnerability index (CCVI)



CCVI classes

1. Extremely vulnerable
2. Highly Vulnerable
3. Moderately Vulnerable
4. Not Vulnerable/Presumed Stable
5. Not Vulnerable/Increase Likely

CCVI Section sensitivity

Shagbark Hickory

Section C: Sensitivity

Mark an "X" in all boxes that apply.

Effect on Vulnerability						
Greatly increase	Increase	Somewhat increase	Neutral	Somewhat decrease	Decrease	Unknown
X	X					
						X
				X		
						X
			X			
			X			
			X			
			X			
						X
		X	X			
			X			
						X
						X
						X

Factors that influence vulnerability (* at least 10 required)

- 1) **Dispersal and movements**
- 2) Predicted **sensitivity to temperature and moisture changes**
 - a) Predicted **sensitivity to changes in temperature**
 - i) **historical thermal niche**
 - ii) **physiological thermal niche**
 - b) Predicted **sensitivity to changes in precipitation, hydrology, or moisture regime**
 - i) **historical hydrological niche**
 - ii) **physiological hydrological niche**
 - c) Dependence on a **specific disturbance regime** likely to be impacted by climate change
 - d) Dependence on **ice, ice-edge, or snow-cover habitats**
- 3) **Restriction to uncommon geological features or derivatives**
- 4) **Reliance on interspecific interactions**
 - a) Dependence on **other species to generate habitat**
 - b) **Dietary versatility** (animals only)
 - c) **Pollinator versatility** (plants only)
 - d) Dependence on **other species for propagule dispersal**
 - e) Forms part of an **interspecific interaction** not covered by 4a-d
- 5) **Genetic factors**
 - a) Measured **genetic variation**
 - b) Occurrence of **bottlenecks** in recent evolutionary history (*use only if 5a is "unknown"*)
- 6) **Phenological response to** changing seasonal temperature and precipitation dynamics

Questions

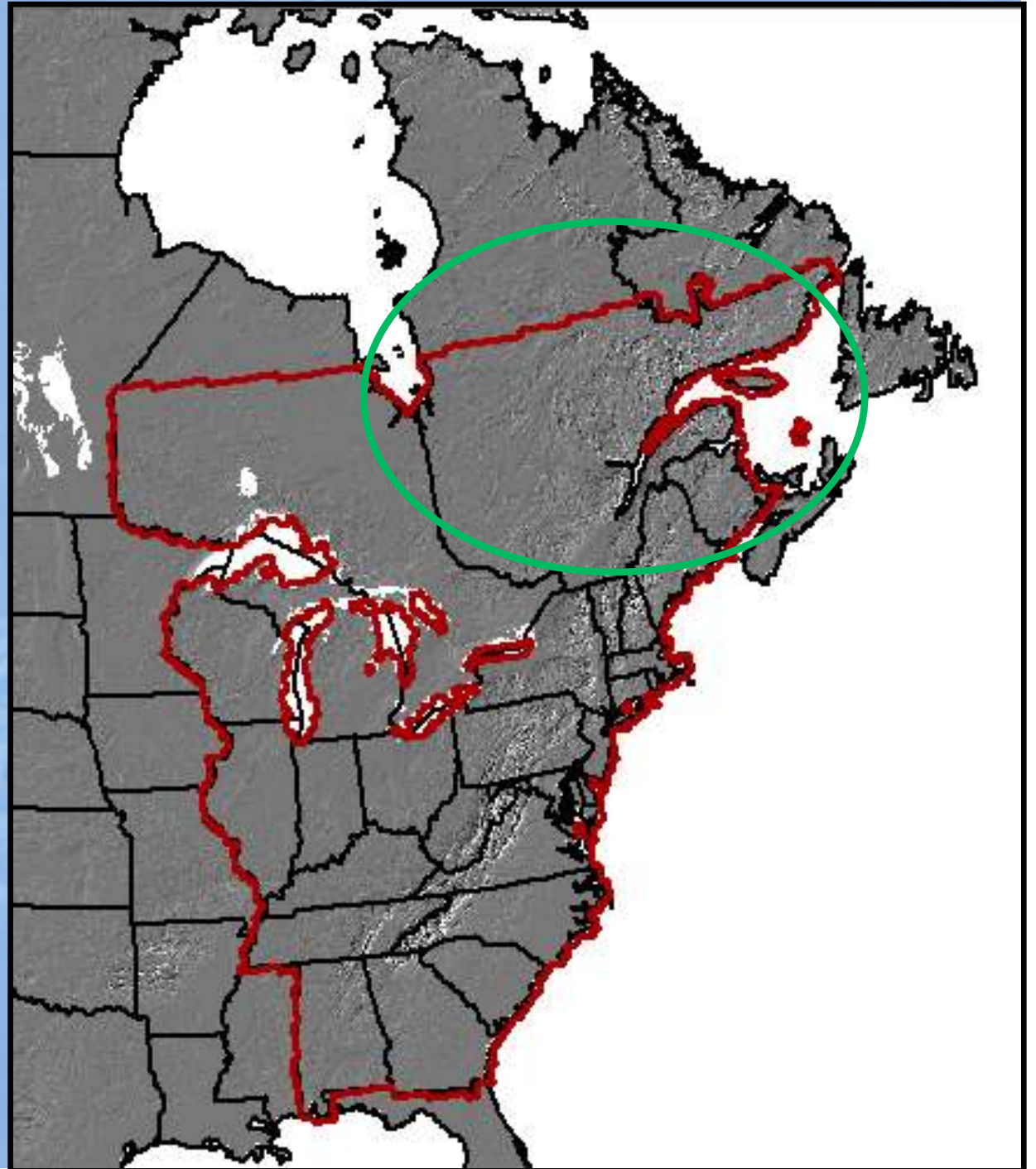
- Which species and taxonomic groups appear to be more or less vulnerable to climate change
- Which factors are making species more or less vulnerable
- Difference in CCVI classification depending on SDM methods (no SDM, SDM/full migration, SDM/ no migration)

Study area

— CC-Bio
(SDM)

○ CCVI

Projection horizon
2050





n=189



n=18



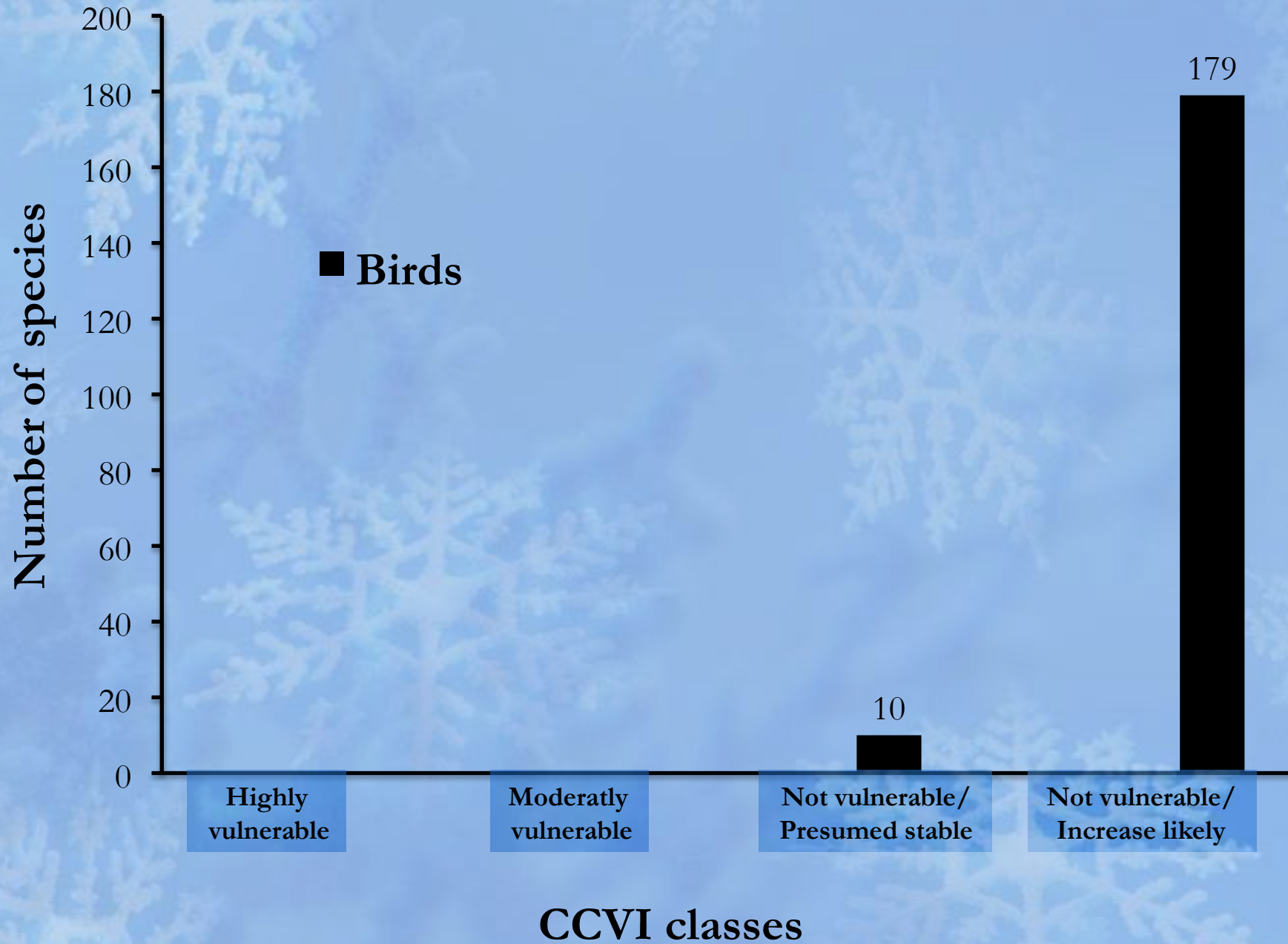
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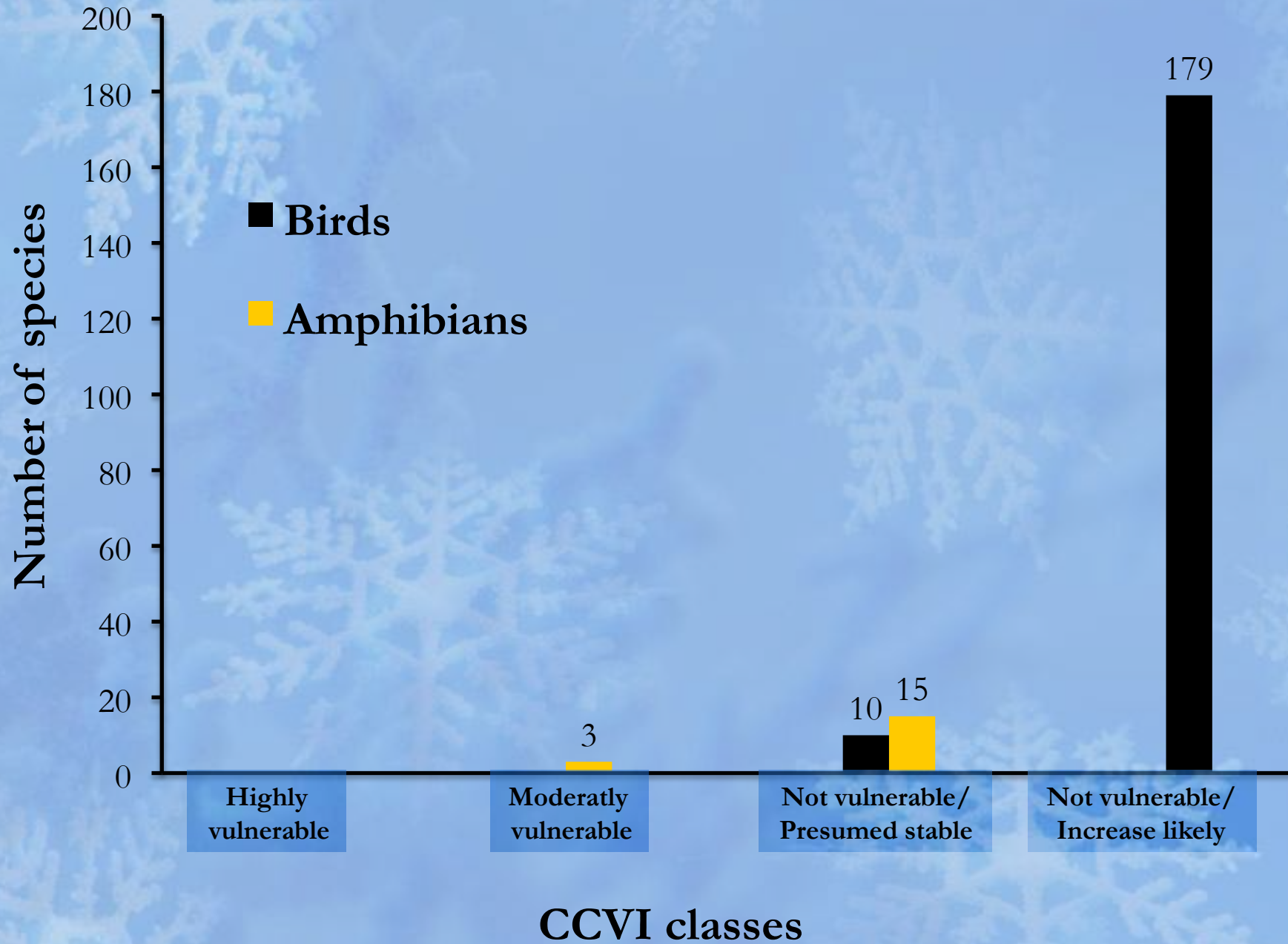
n=52

Cyhoäide rövät
Sakari Faisleri, Iac sine Joroca
10 juulit 2007

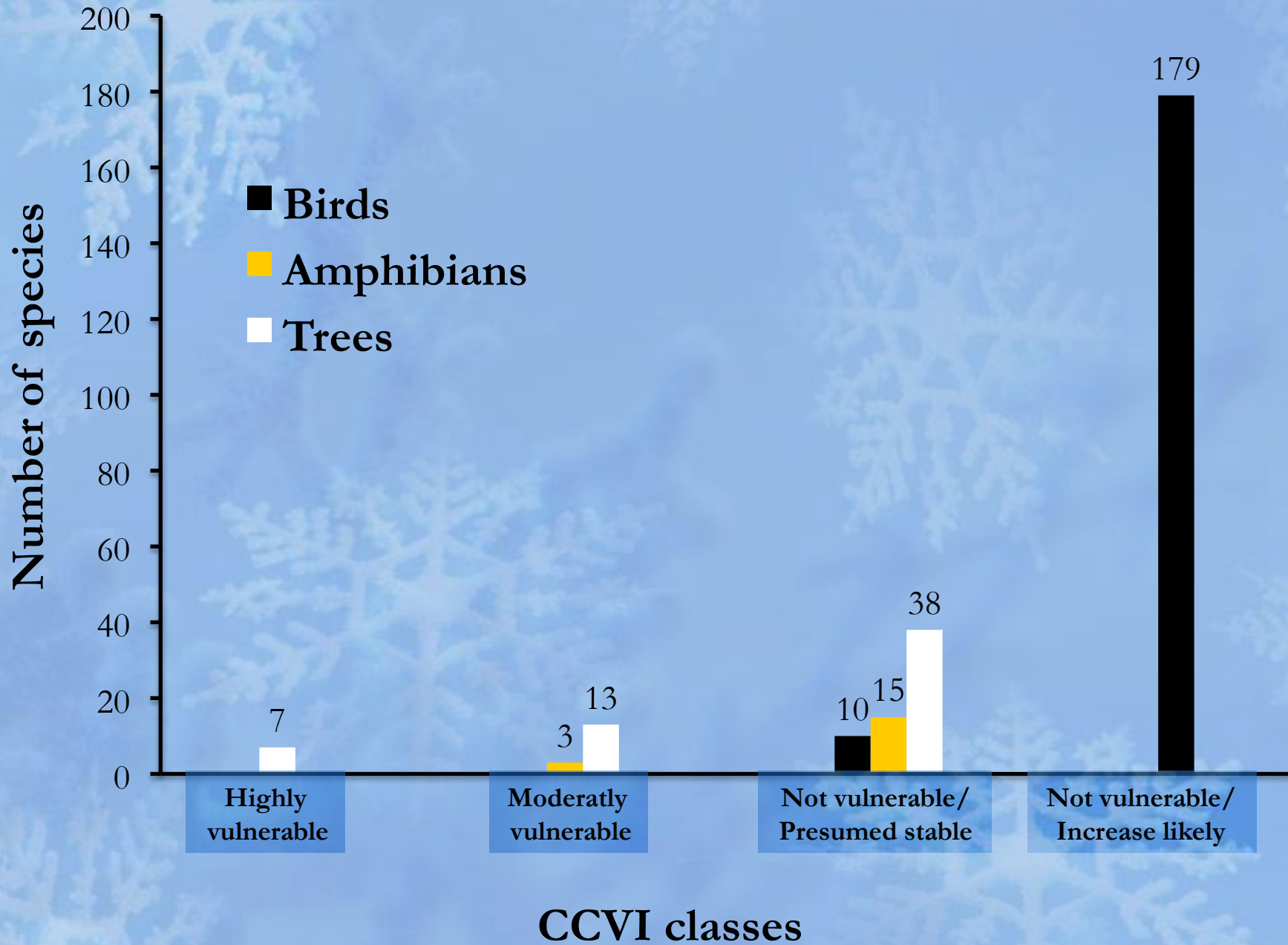
CCVI classification per taxonomic groups (no SDM)



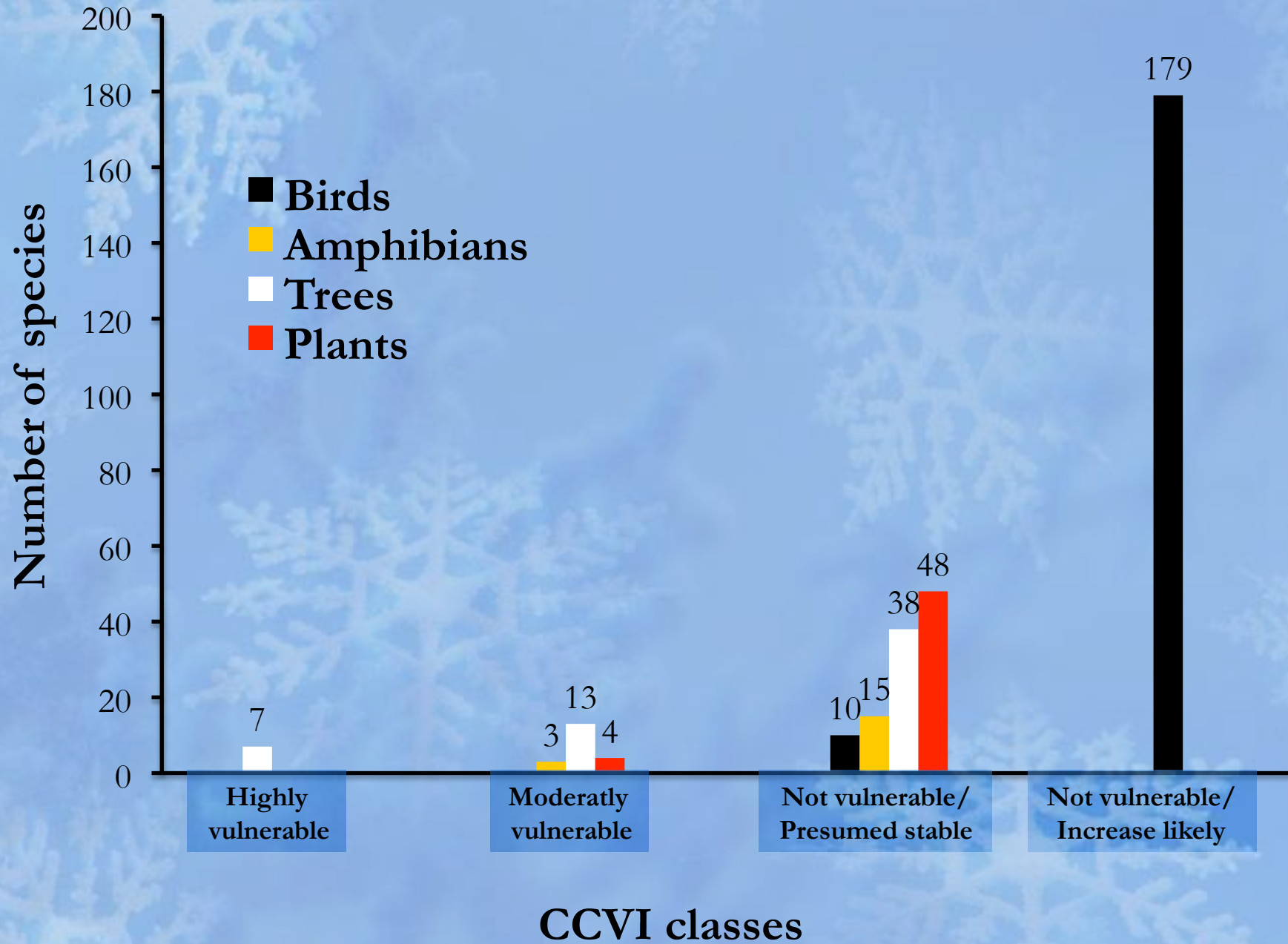
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Section C: Sensitivity

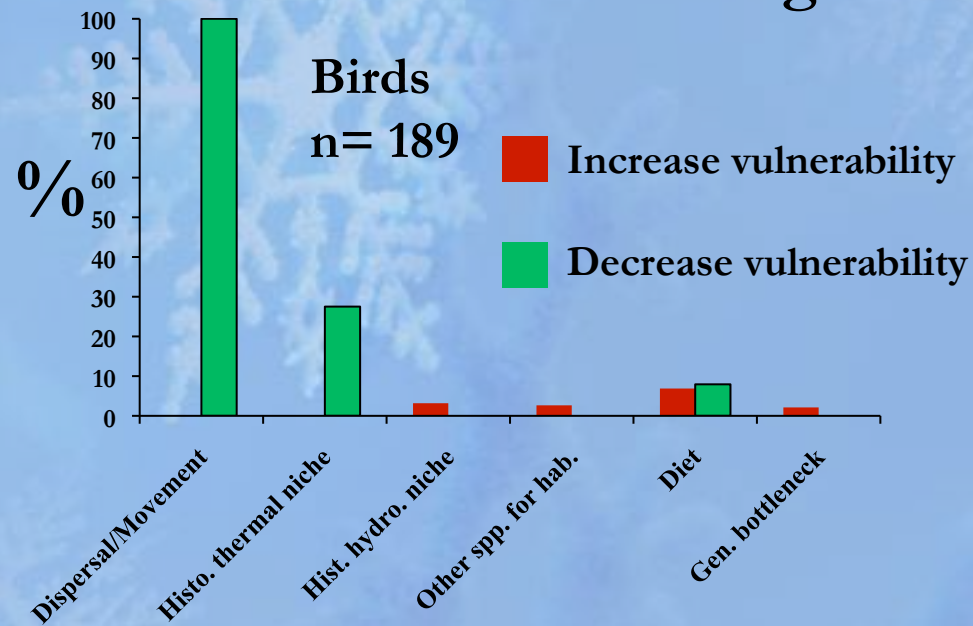
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X	X					
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						X
			X			
			X			
			X			
			X			
						X
			X			
		X				
			X			
						X
						X
						X

Factors that influence vulnerability (* at least 1)

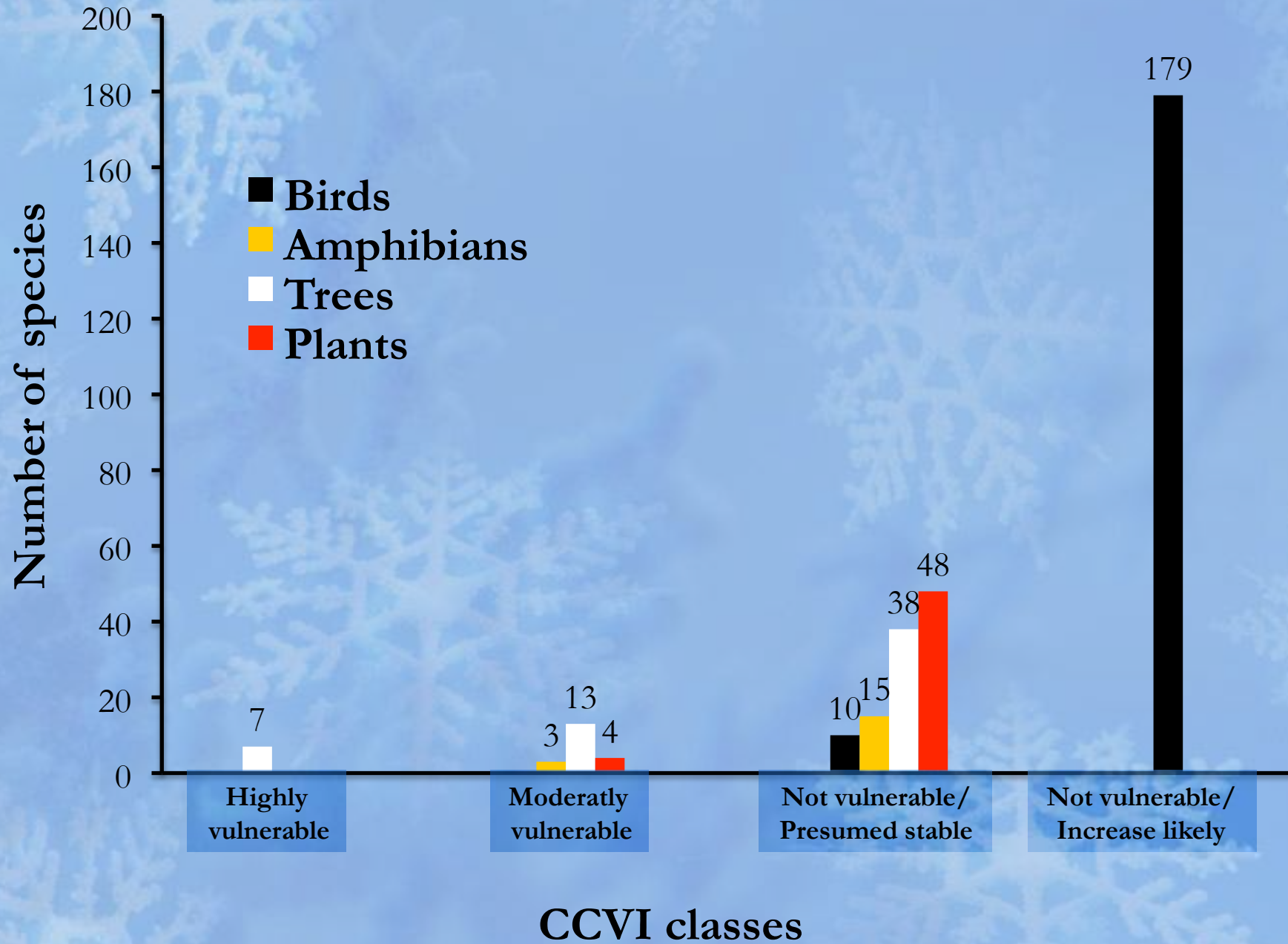
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CCVI factors contributing to increase or decrease vulnerability

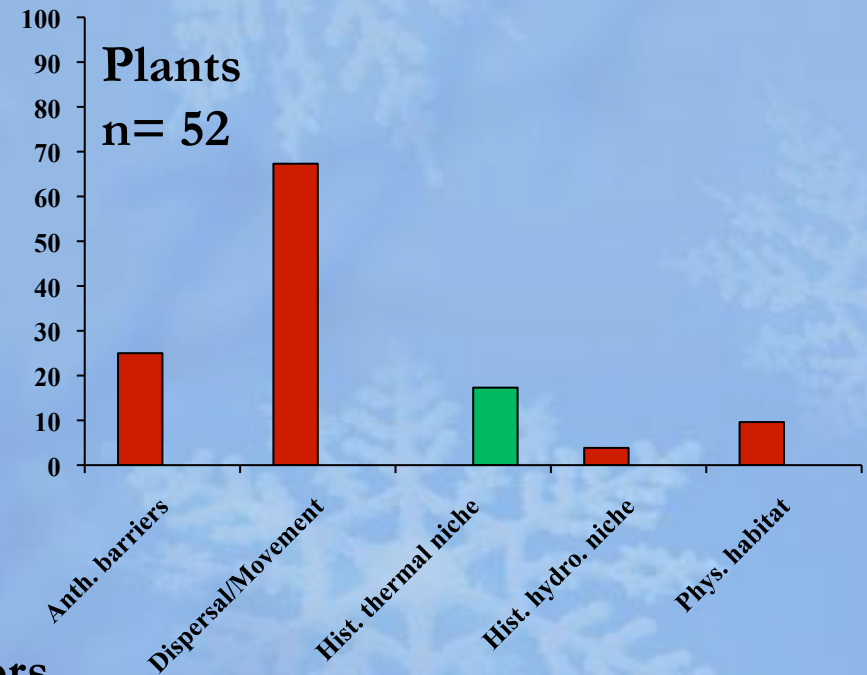
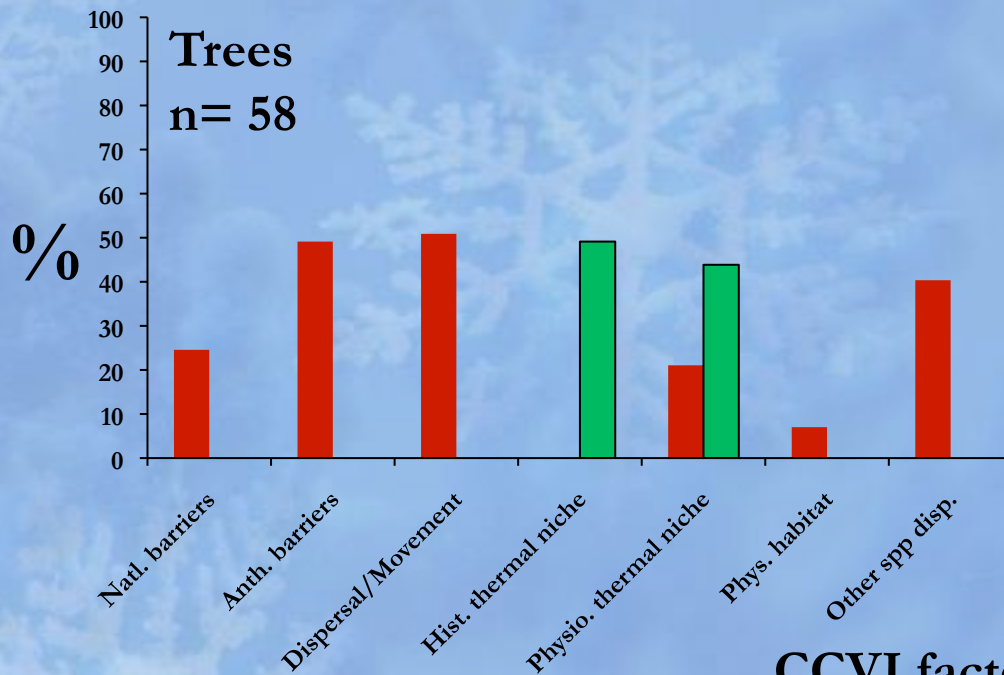
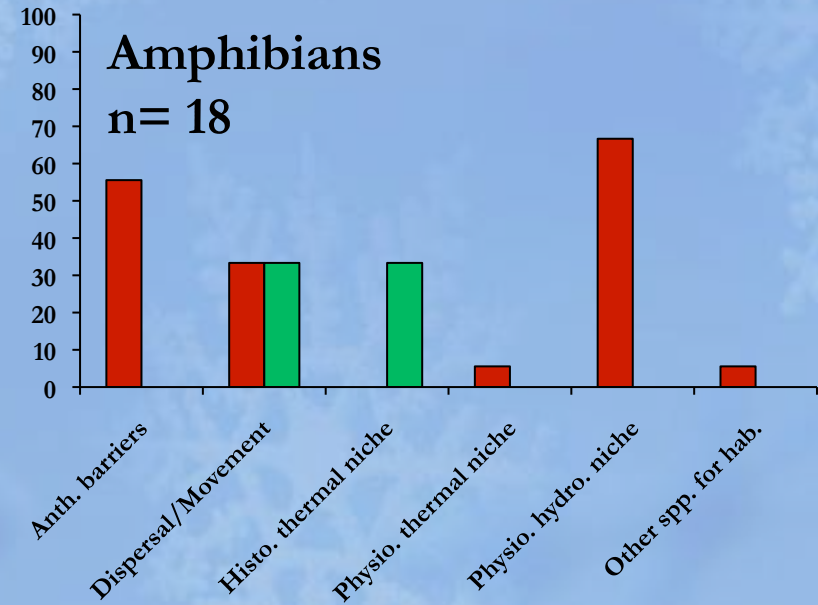
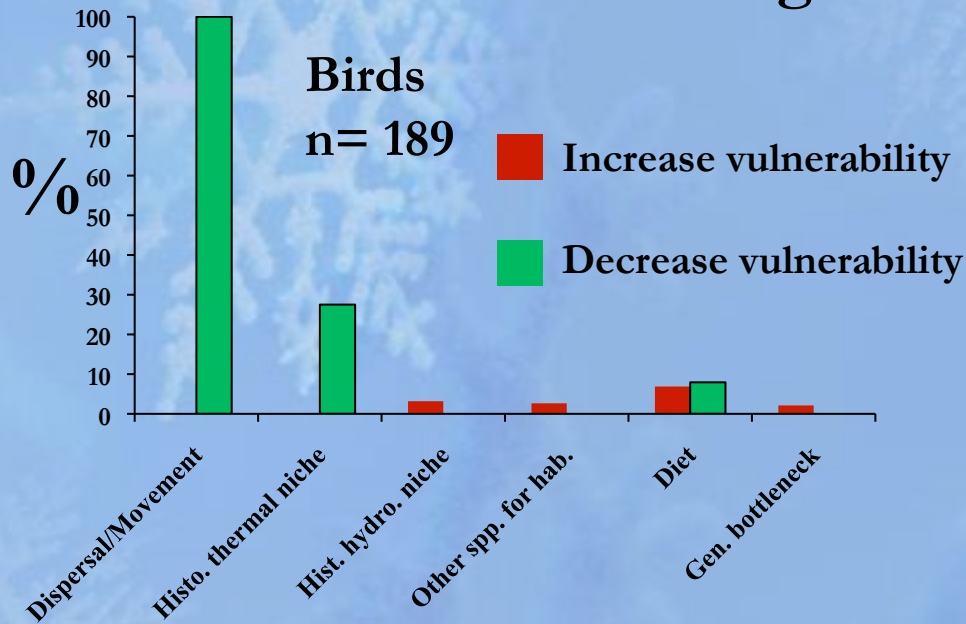


CCVI factors

CCVI classification per taxonomic groups (no SDM)

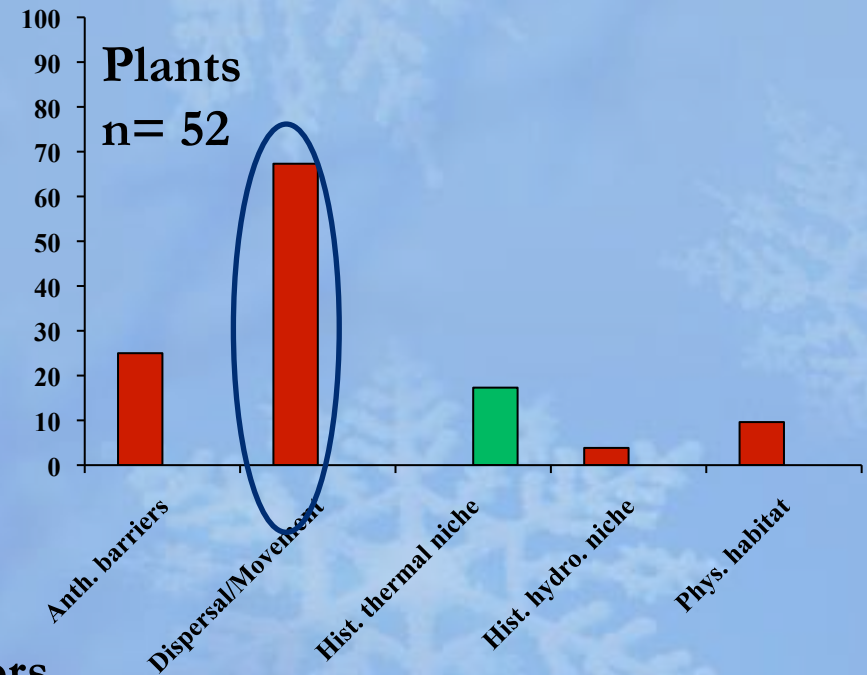
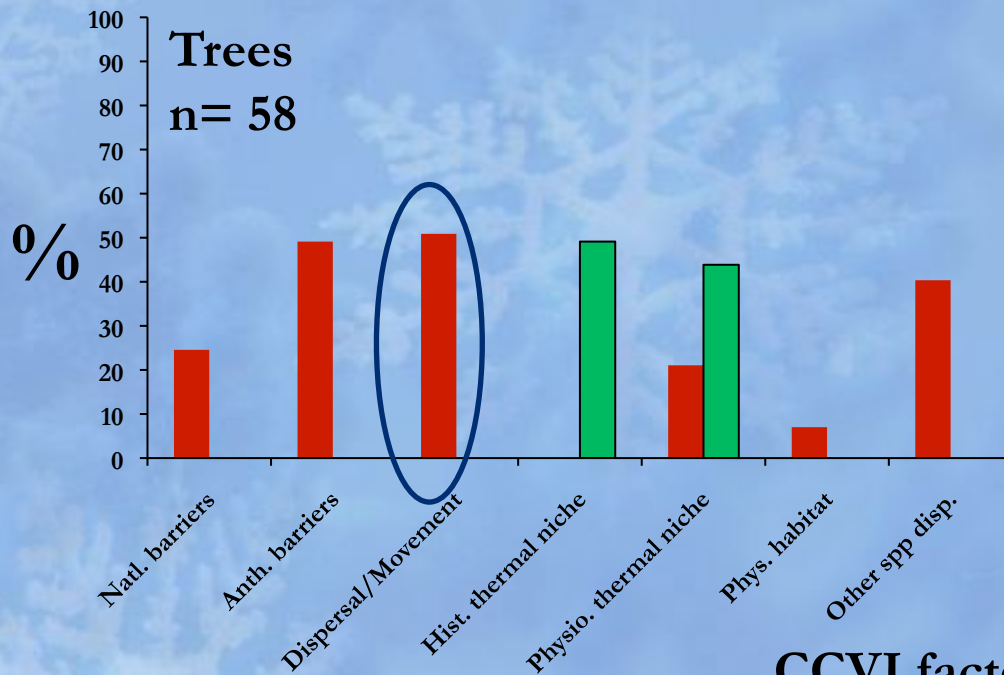
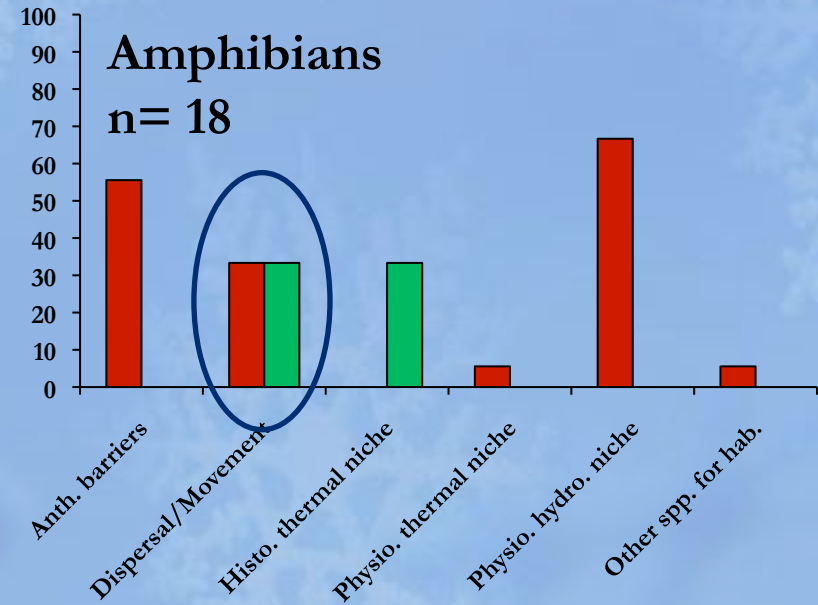
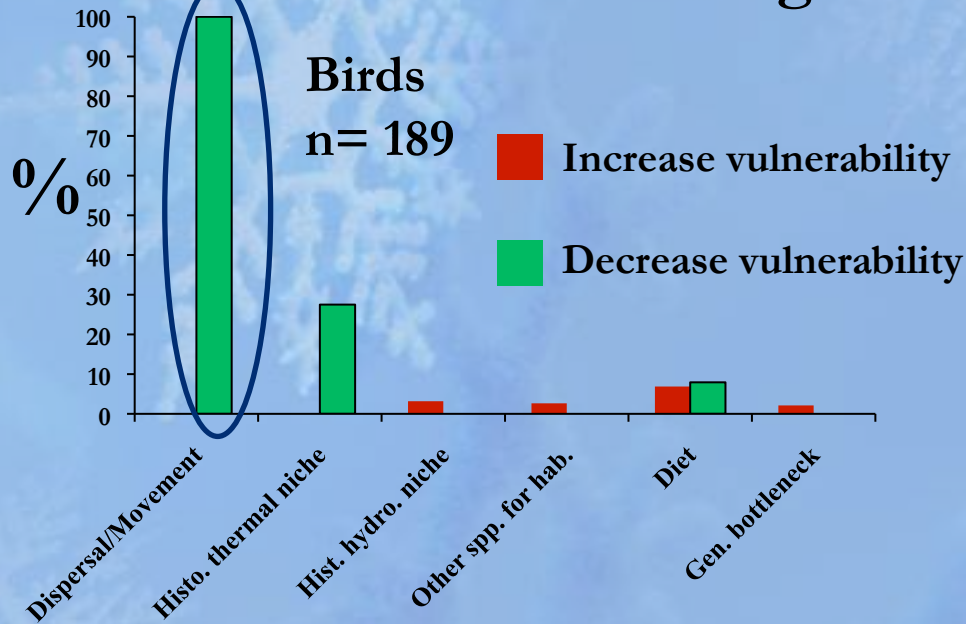


CCVI factors contributing to increase or decrease vulnerability



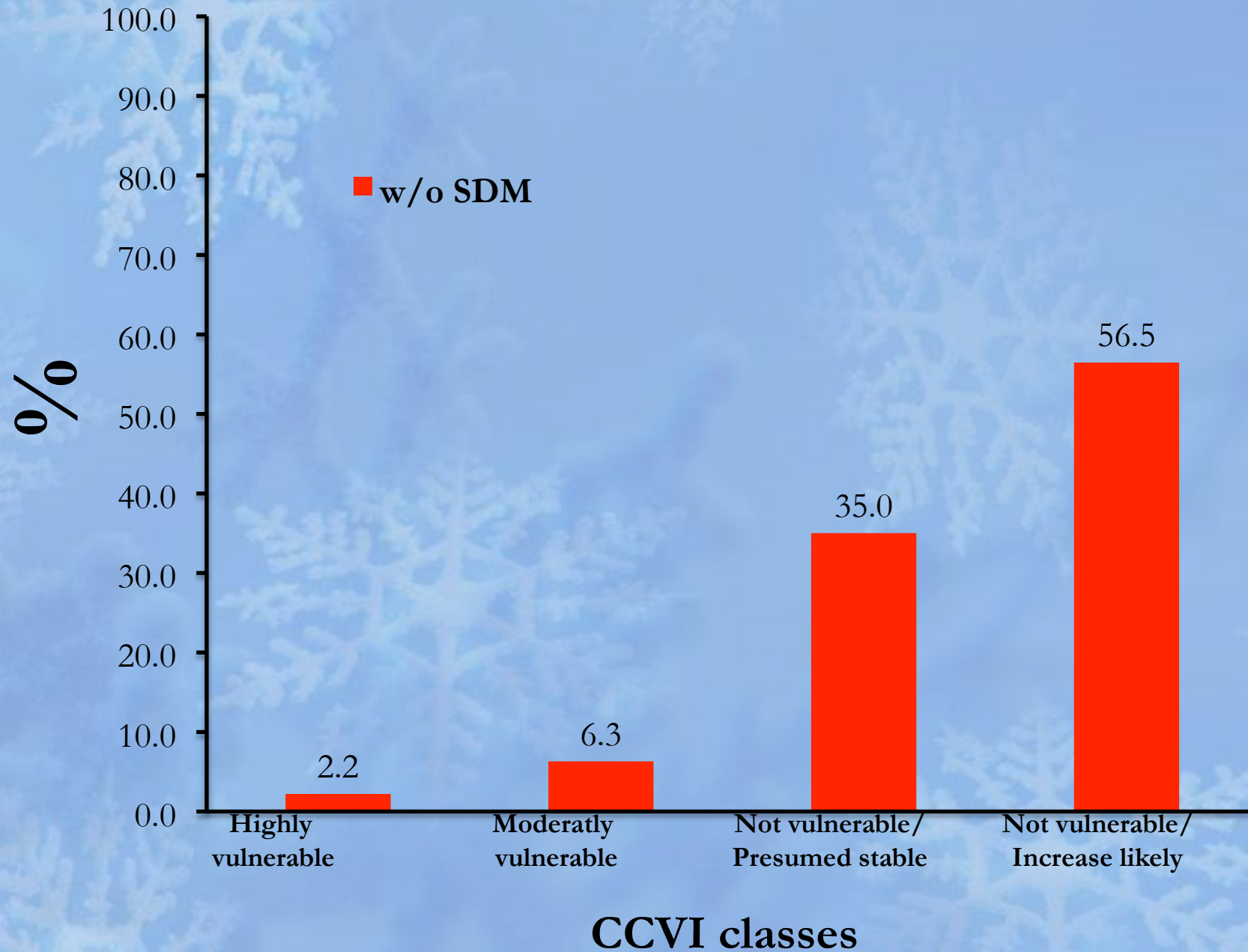
CCVI factors

CCVI factors contributing to increase or decrease vulnerability

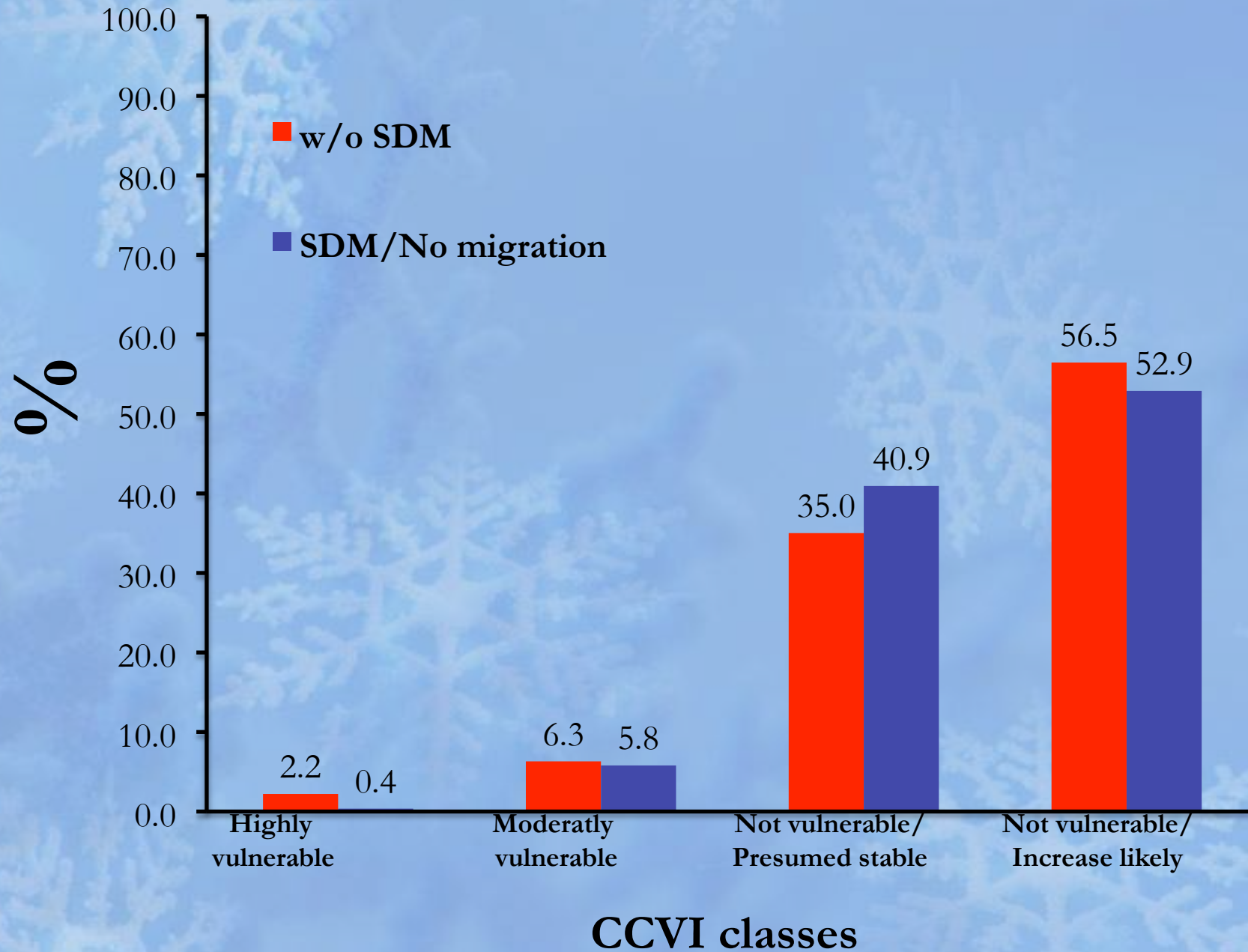


CCVI factors

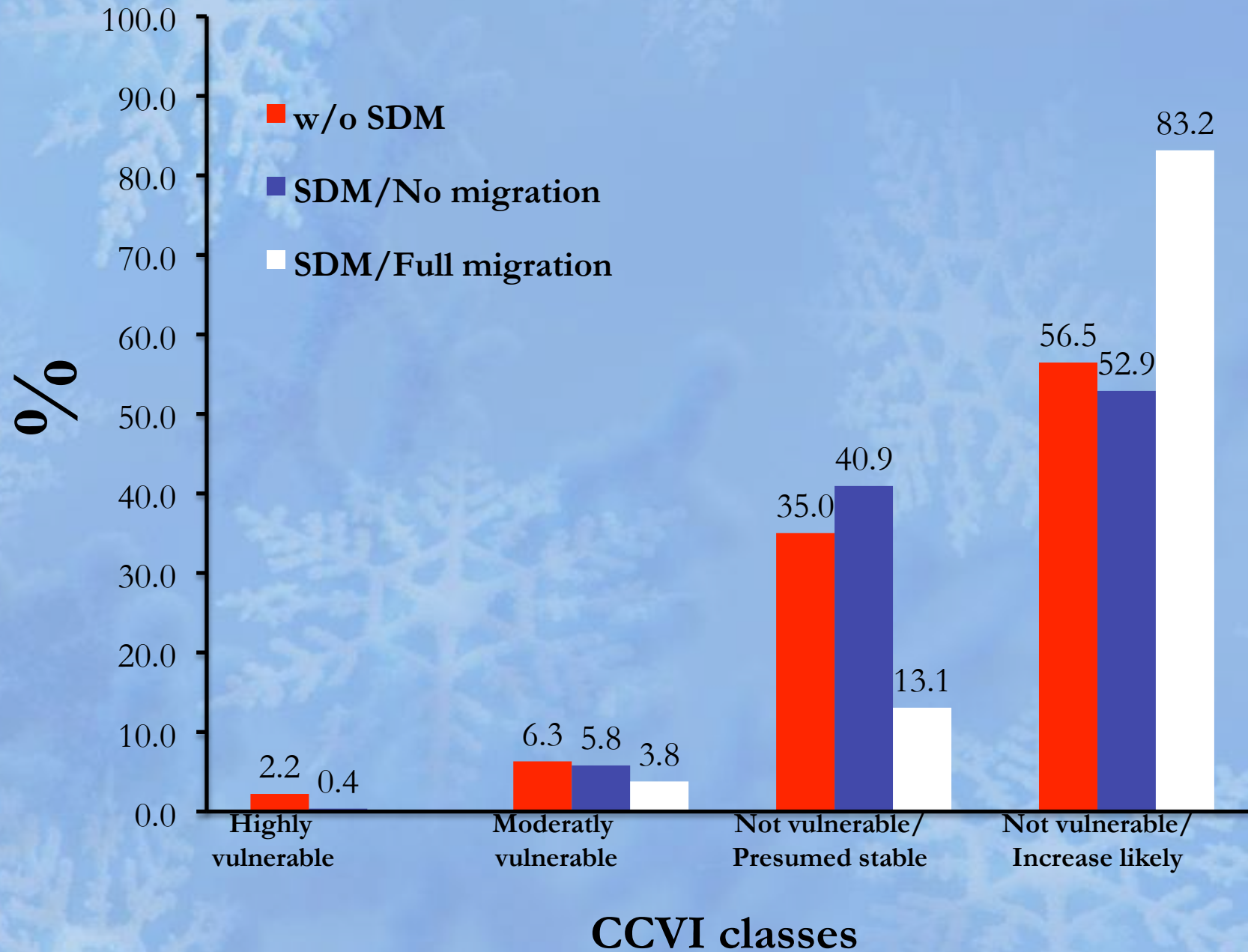
CCVI classification based on different SDM scenarios



CCVI classification based on different SDM scenarios



CCVI classification based on different SDM scenarios



Shagbark Hickory

w/o SDM
Highly vulnerable



SDM/no migration
Moderately vulnerable



SDM/full migration
Not vulnerable/
Presumed stable



Conclusion

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- Most of the species we analysed appear to be not vulnerable to climate change
- Factors such as dispersal capabilities and anthropogenic barriers make species more sensitive to climate change
- Be critics when including SDM in the CCVI
- Vulnerability assessment is not an endpoint but an intermediate step.

Special thanks to

Nicolas Casajus and Lab colleagues

CC-Bio joint venture partners

UQAR

Université du Québec
à Rimouski



Gouvernement
du Canada

Government
of Canada

Canada



**CRSNG
NSERC**



Canards Illimités Canada
la conservation des oiseaux en français

Ressources naturelles
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BIOGROUPEMENT
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Atlas des Amphibiens
et des Reptiles du Québec

Développement durable,
Environnement
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Québec



Fonds de recherche
sur la nature
et les technologies

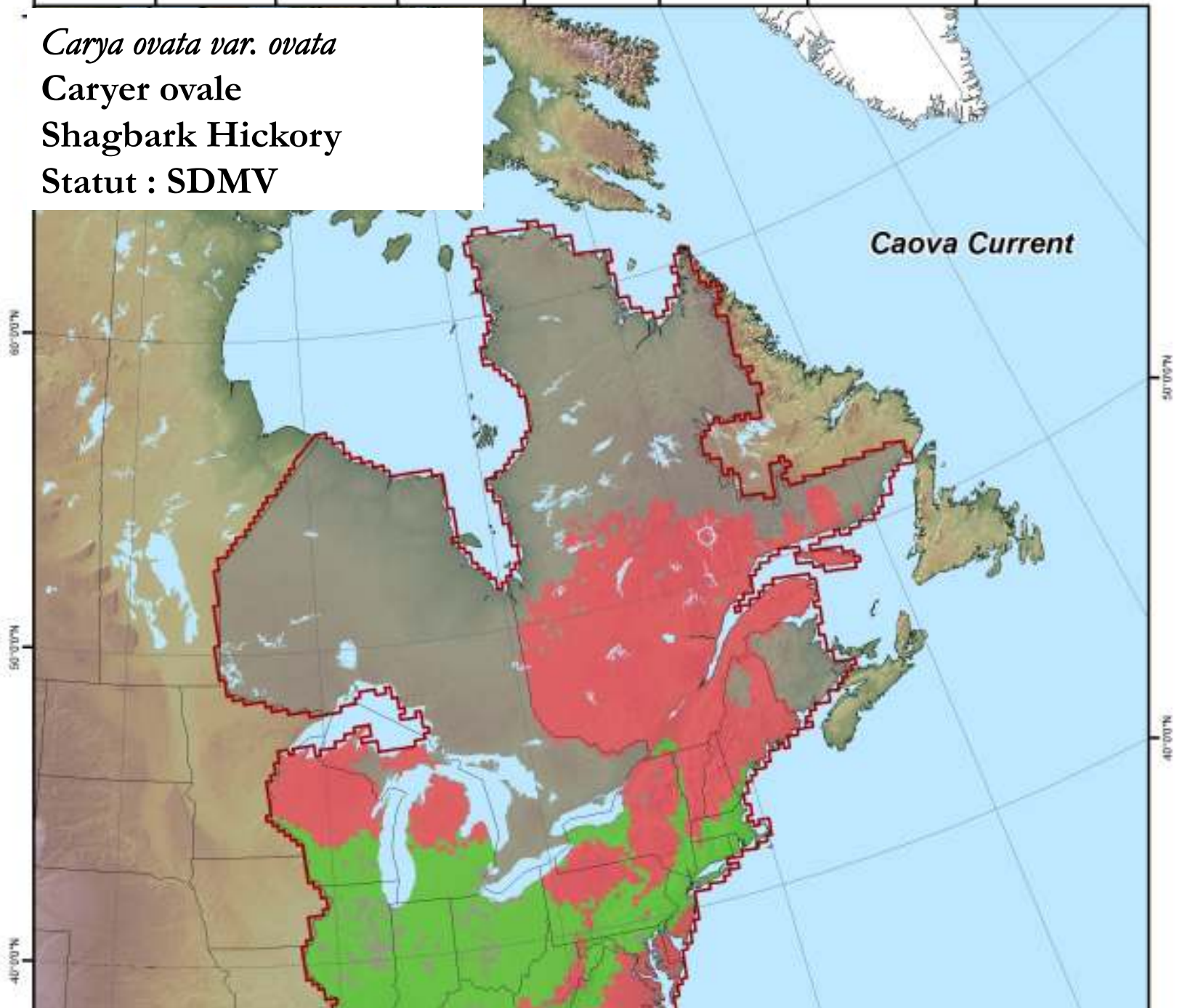
Québec



Yanick Gendreau, scholarship

Carya ovata var. *ovata*
Caryer ovale
Shagbark Hickory
Statut : SDM V

110°00'0" 100°00'0" 90°00'0" 80°00'0" 70°00'0" 60°00'0" 50°00'0" 40°00'0"



Caova Current

Légende

Carya ovata var. *ovata*
Caryer ovale
Shagbark Hickory
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Caova 2050



Légende