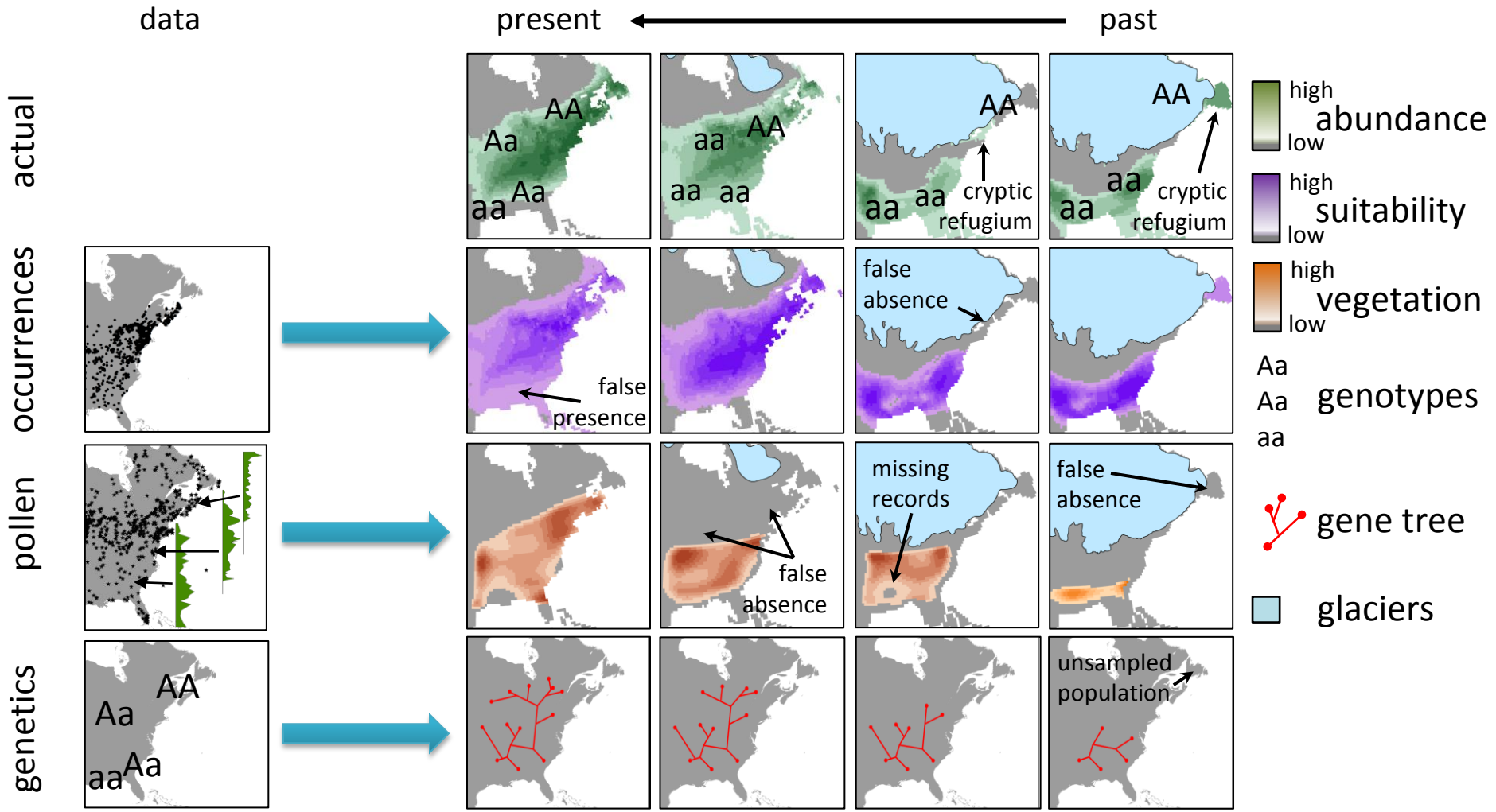
Rapid
Environmental
Change

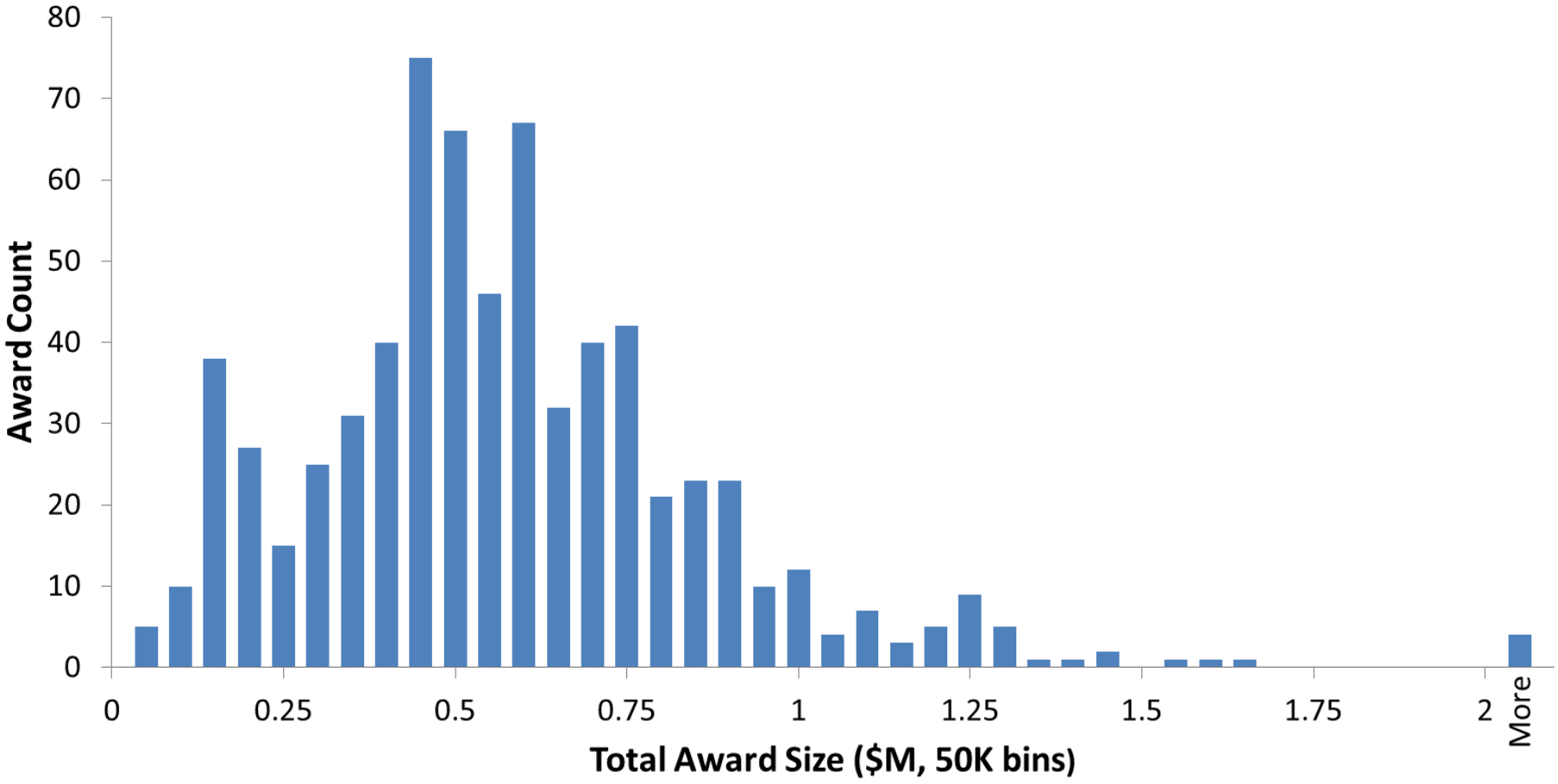
Nature of Species

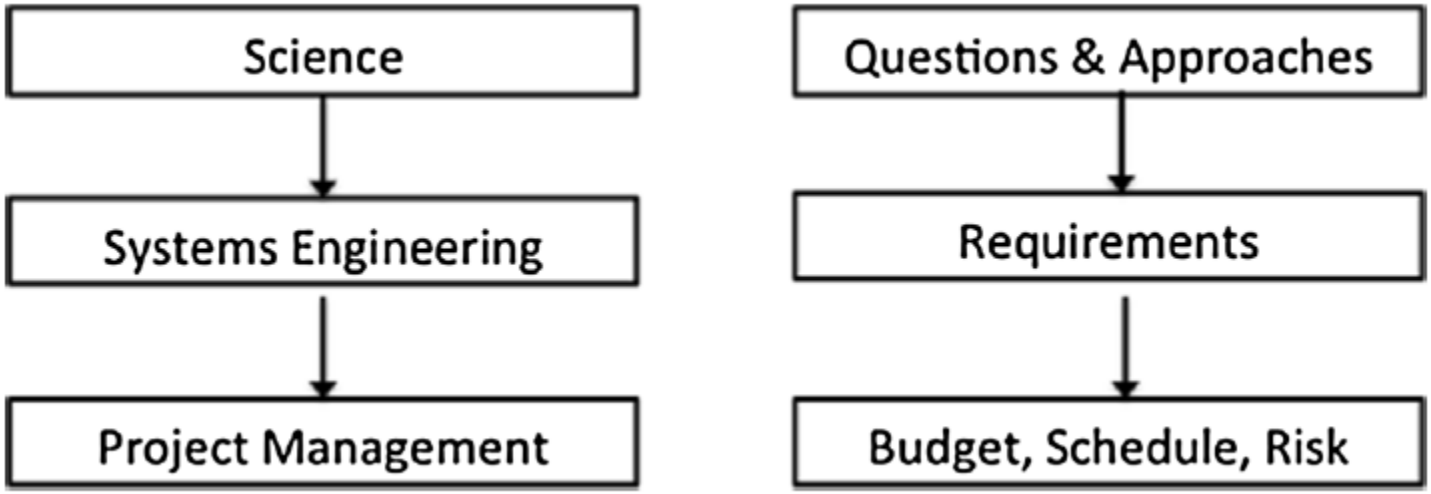
Resilience

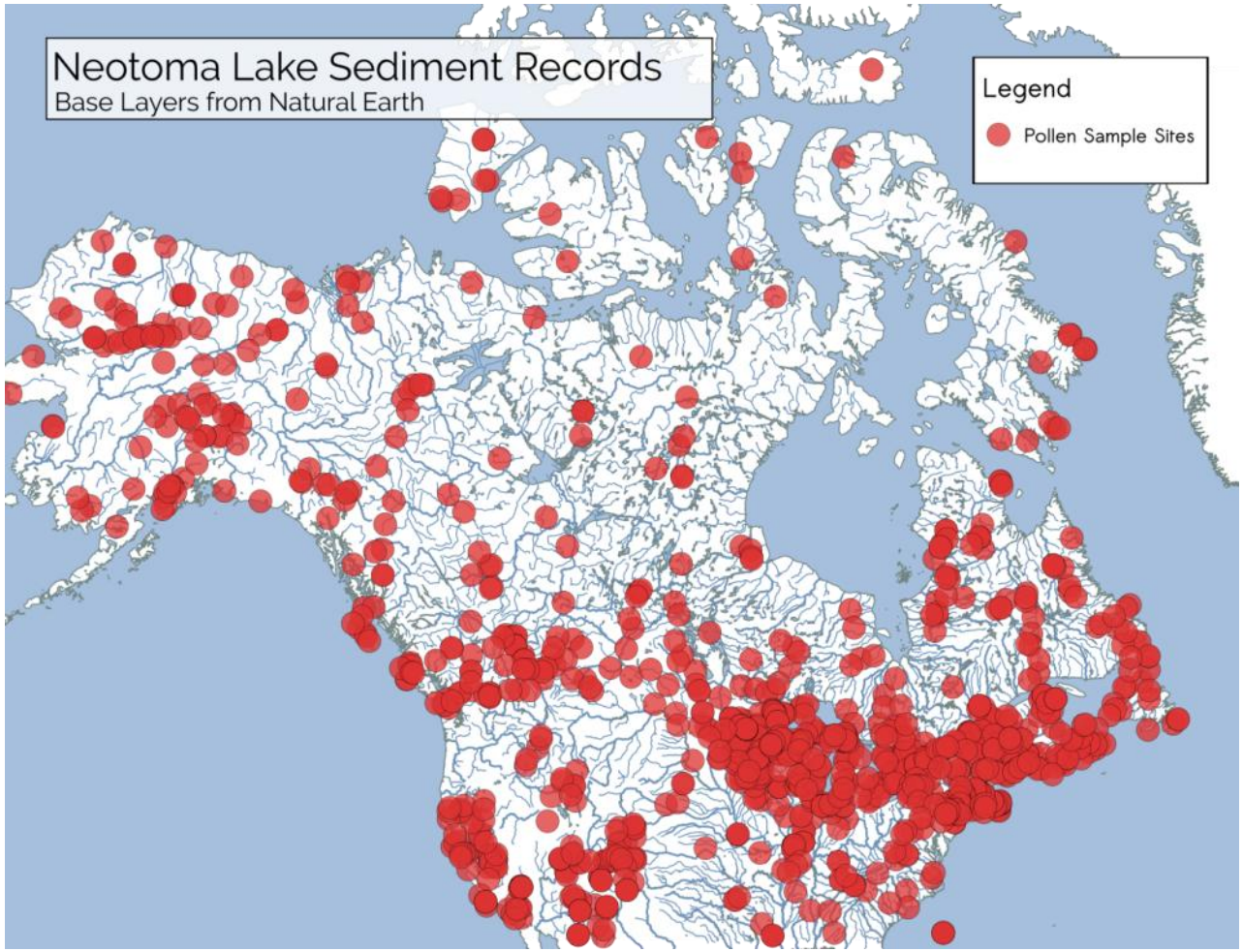
Adaptation

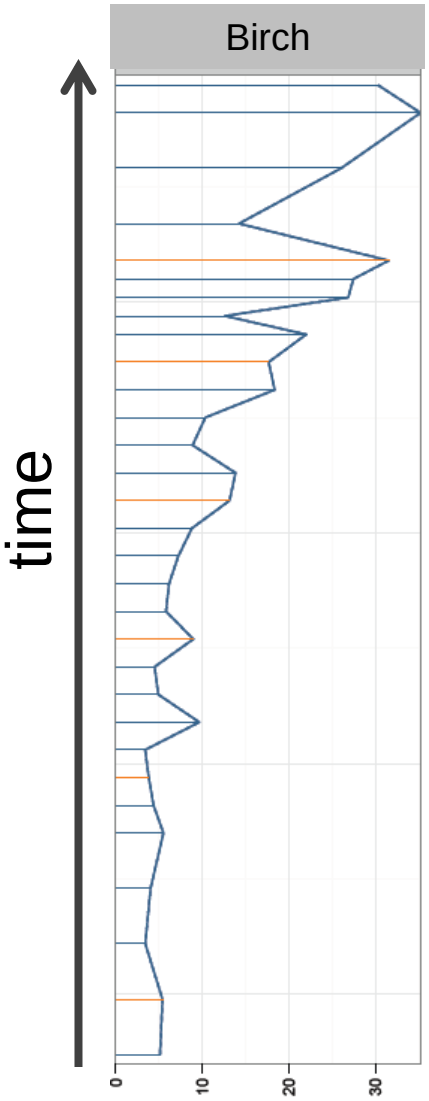
Extinction


data
present
past
actual
occurrences
pollen
genetics
AA
Aa
aa
Aa
aa
AA
aa
aa
AA
aa
aa
cryptic
refugium
AA
aa
aa
cryptic
refugium
false
presence
false
absence
missing
records
false
absence
false
absence
unsampled
population
high
abundance
low
high
suitability
low
high
vegetation
low
Aa
Aa
aa
genotypes
gene tree
glaciers


Award Count
80
70
60
50
40
30
20
10
0
0
0.25
0.5
0.75
1
1.25
1.5
1.75
2
More
Total Award Size ($M, 50K bins)


Science
Systems Engineering
Project Management
Questions & Approaches
Requirements
Budget, Schedule, Risk


Neotoma Lake Sediment Records
Base Layers from Natural Earth
Legend
Pollen Sample Sites

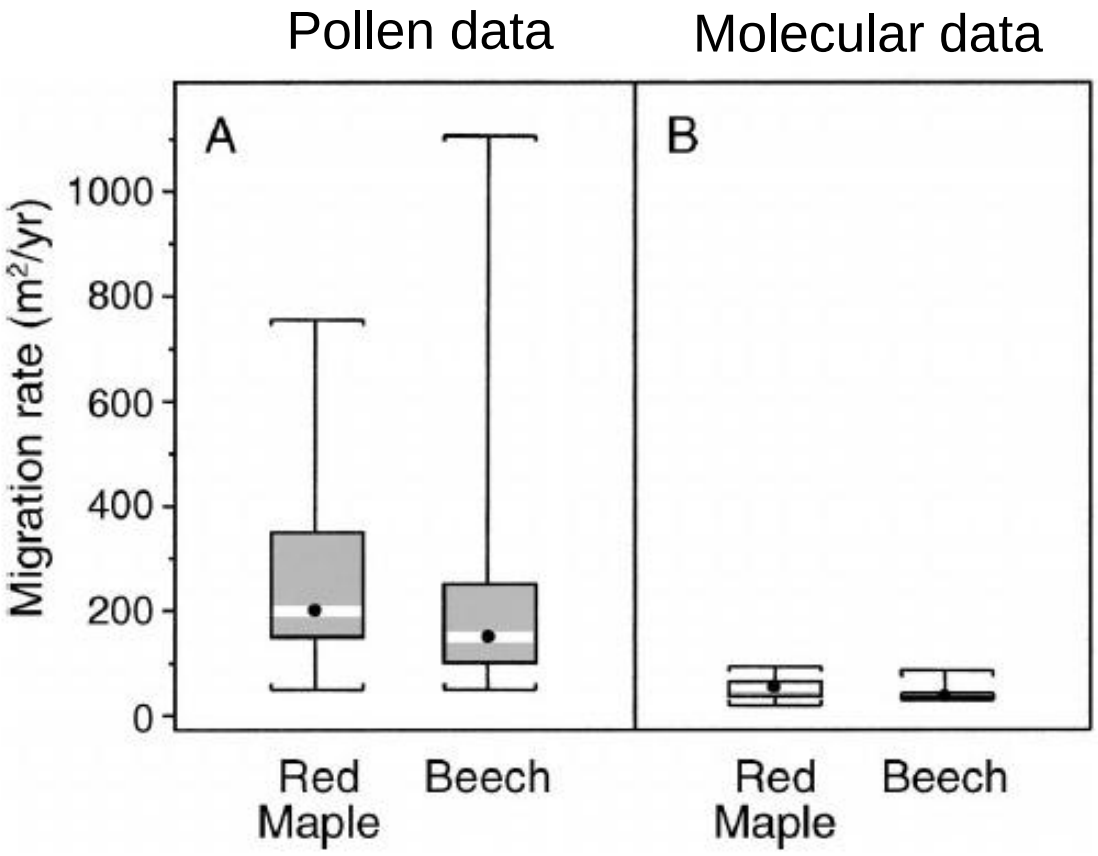

Birch
time
0
10
20
30

$P(\text{data}|\text{model})$

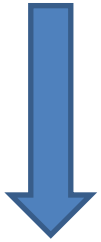
Ronald Fisher

$P(\text{model}|\text{data})$

Thomas Bayes

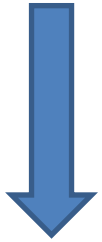

Pollen data
Molecular data
A
B
Migration rate (m²/yr)
1000
800
600
400
200
0
Red Maple
Beech
Red Maple
Beech

SCIENCE



DISRUPTION

SCIENCE



DEVELOPMENT