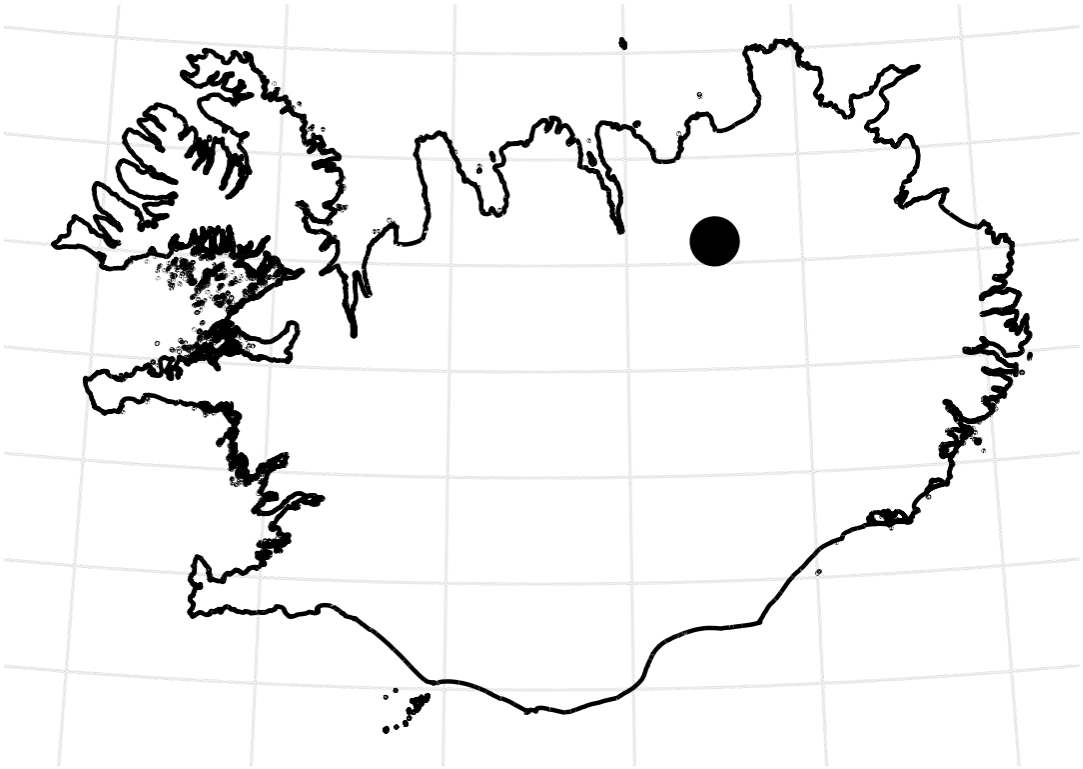


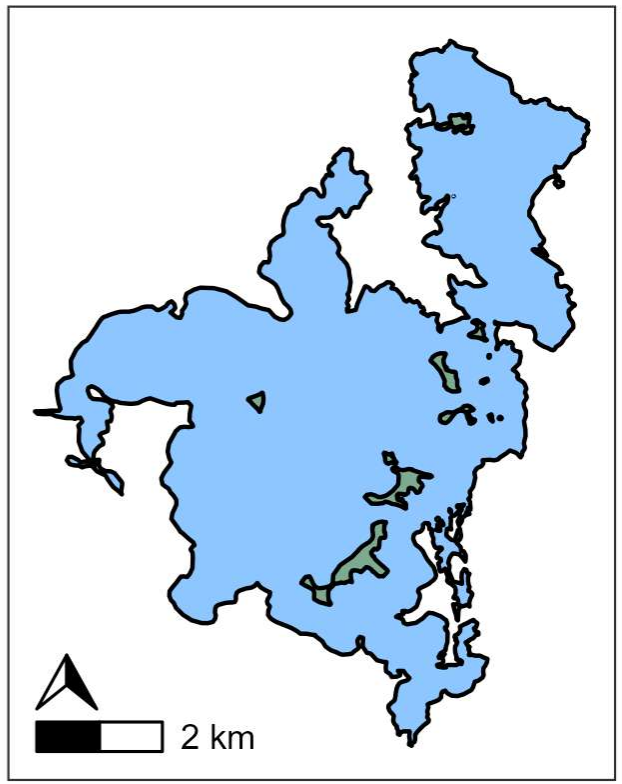
The landscape flies built

The story of a lake, billions of insects, and an ecosystem without boundaries


Mývatn

Mývatn






2016


2017


2018


2019



2020

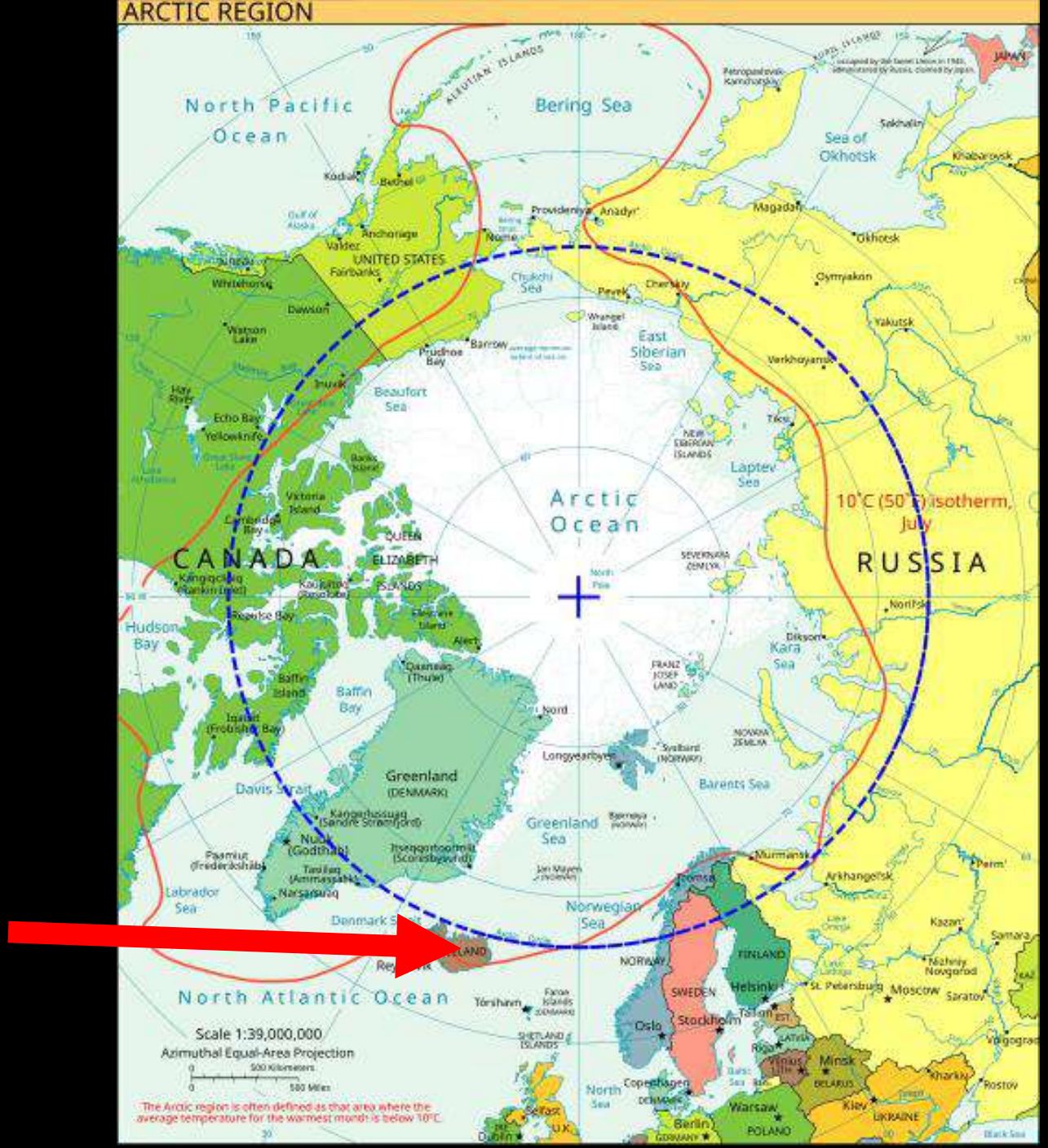

2021
ATHLETIC
1967
Authentic

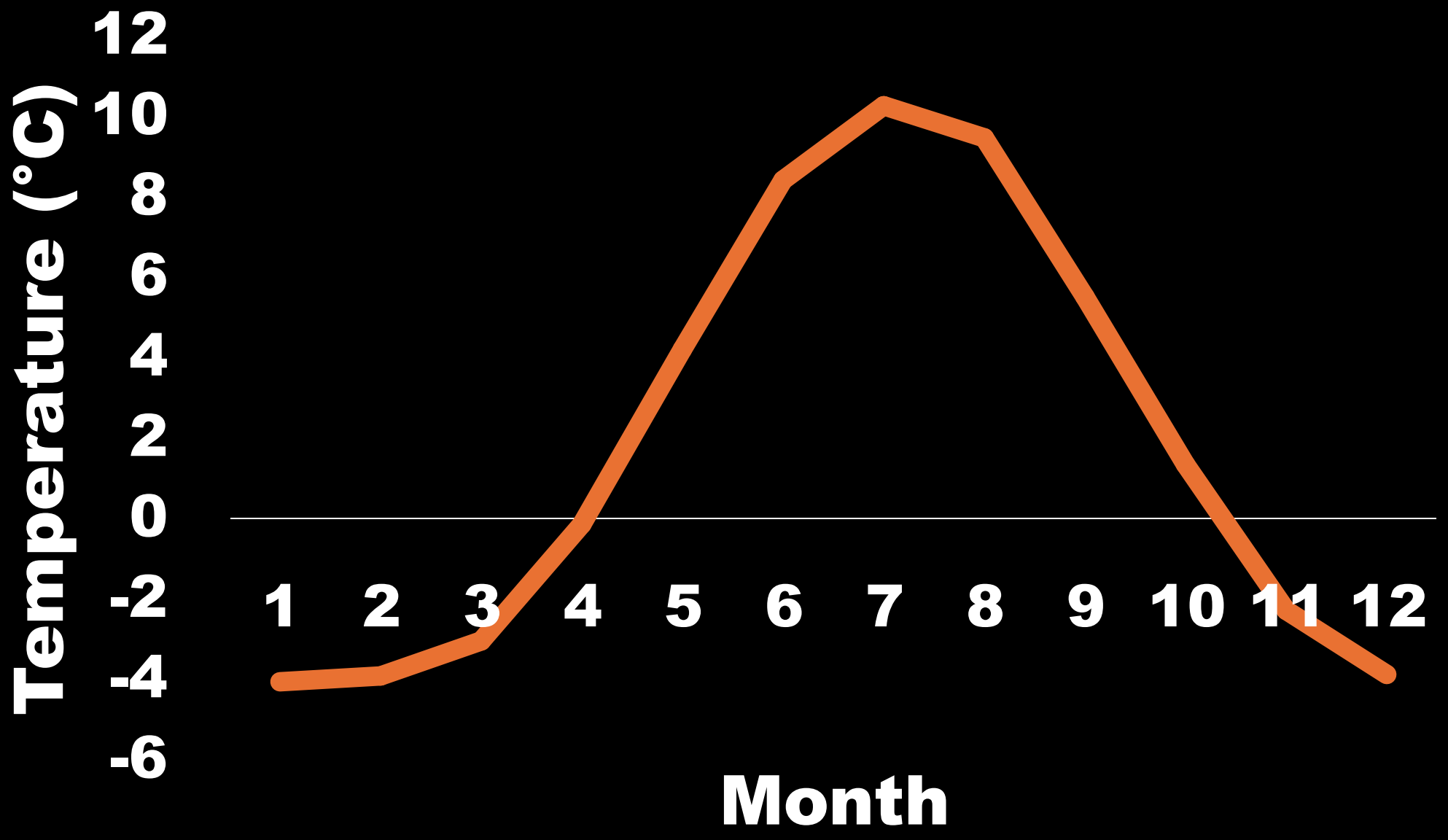

2022

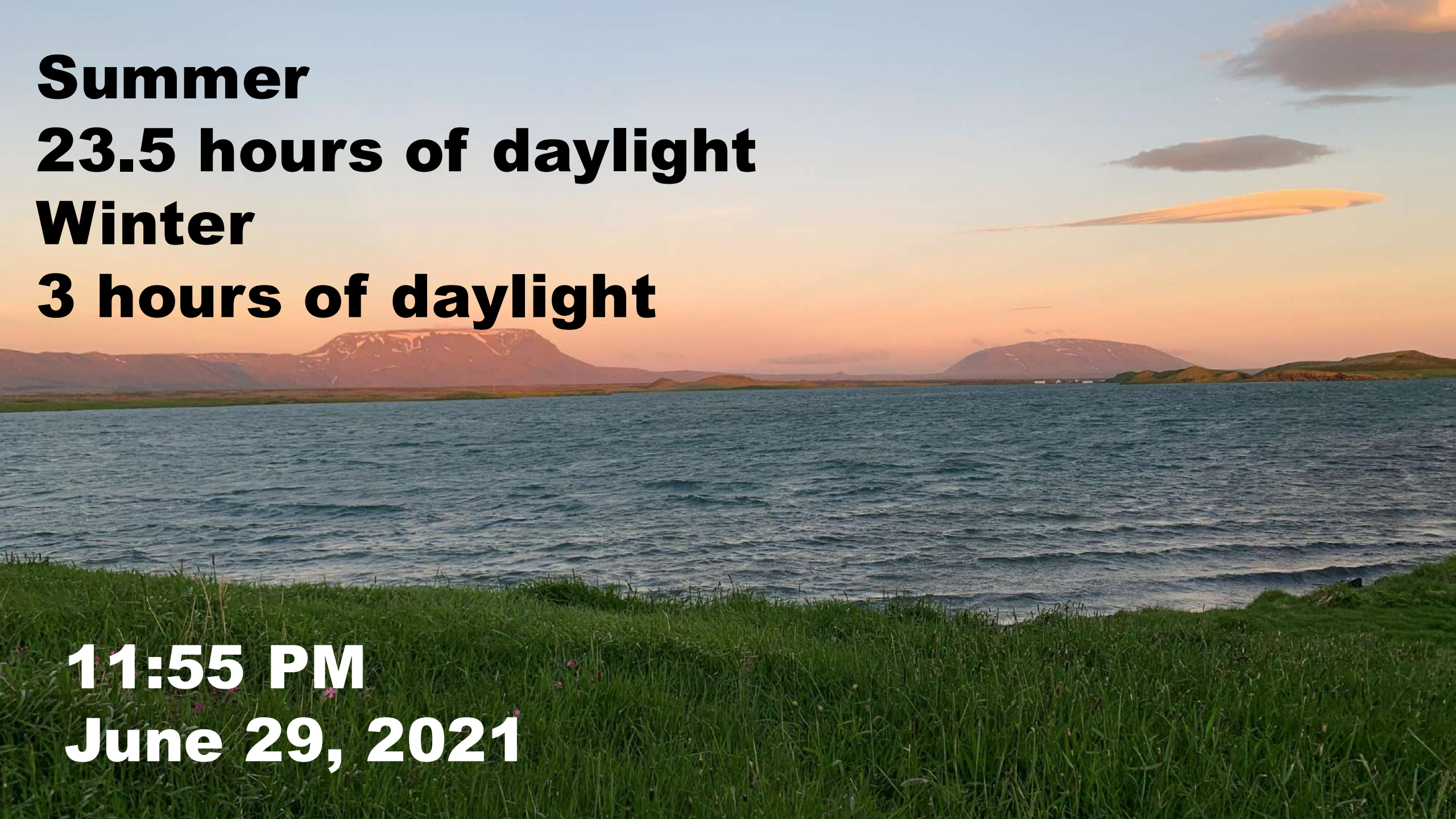
Mývatn is unusual, but the processes operating are common

Iceland

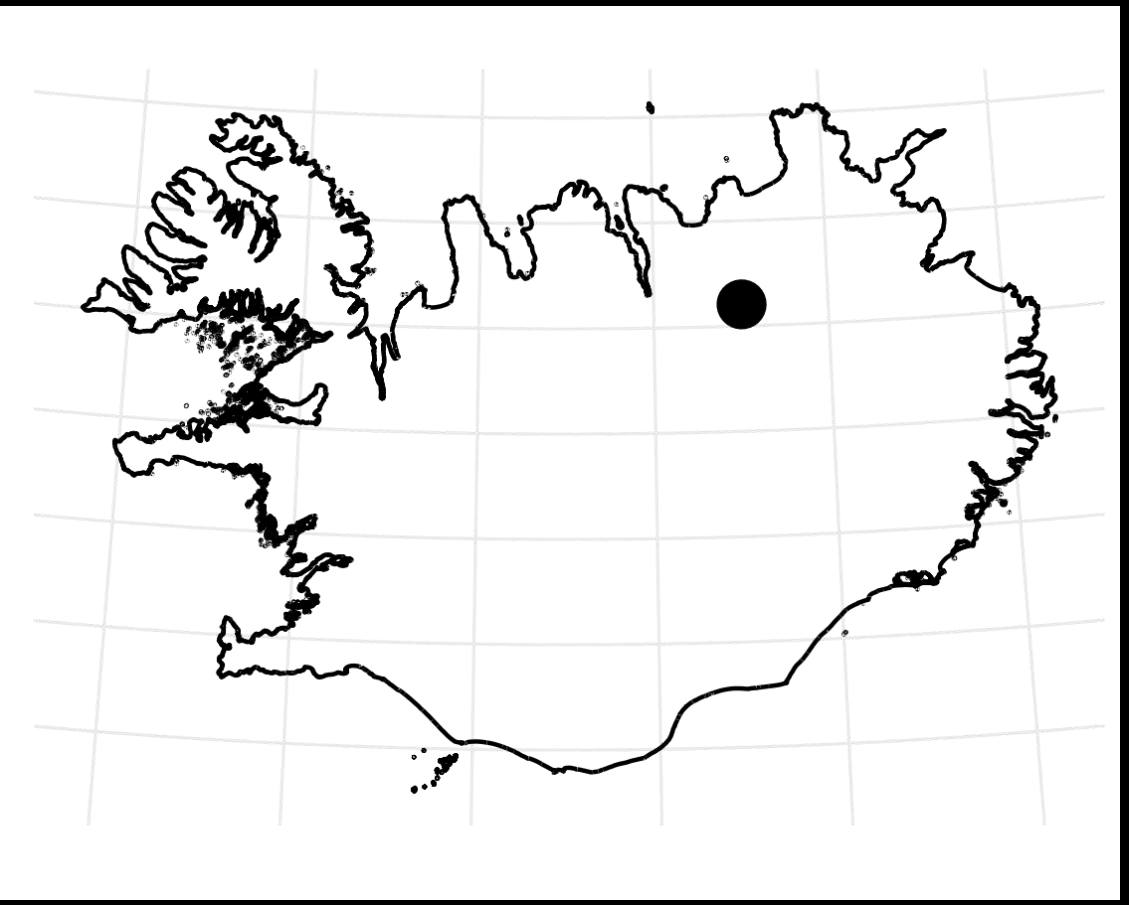



ARCTIC REGION
North Pacific Ocean
Bering Sea
Sea of Okhotsk
Chukchi Sea
East Siberian Sea
Laptev Sea
Kara Sea
Barents Sea
Beaufort Sea
Arctic Ocean
Hudson Bay
Baffin Bay
Davis Strait
Greenland Sea
Norwegian Sea
Labrador Sea
North Atlantic Ocean
CANADA
UNITED STATES
RUSSIA
Greenland (DENMARK)
NORWAY
SWEDEN
FINLAND
10°C (50°F) isotherm, July
Scale 1:39,000,000
Azimuthal Equal-Area Projection
The Arctic region is often defined as that area where the average temperature for the warmest month is below 10°C.


Temperature (°C)
12
10
8
6
4
2
0
-2
-4
-6
1
2
3
4
5
6
7
8
9
10
11
12
Month

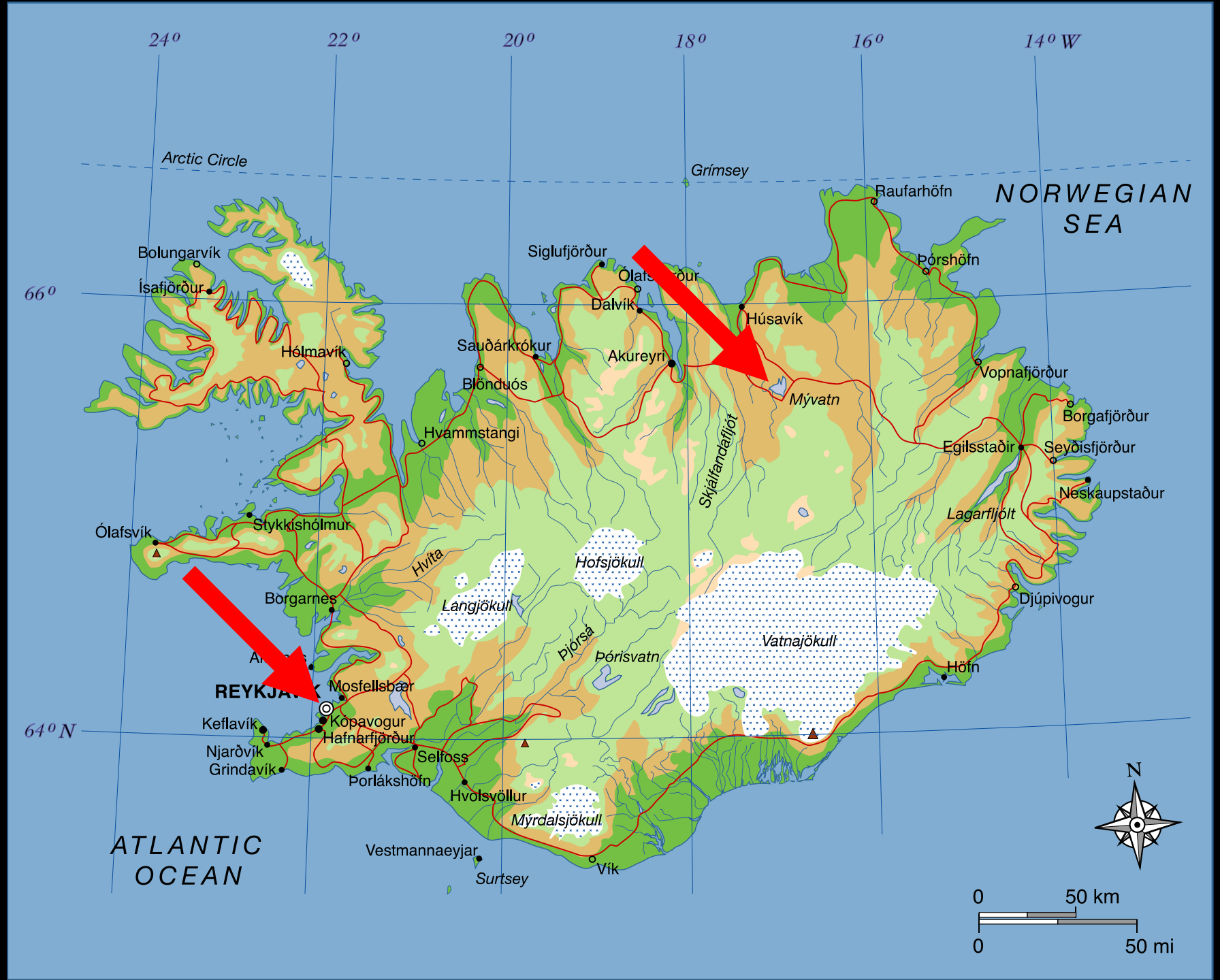

Summer
23.5 hours of daylight
Winter
3 hours of daylight
11:55 PM
June 29, 2021

103,125 km²



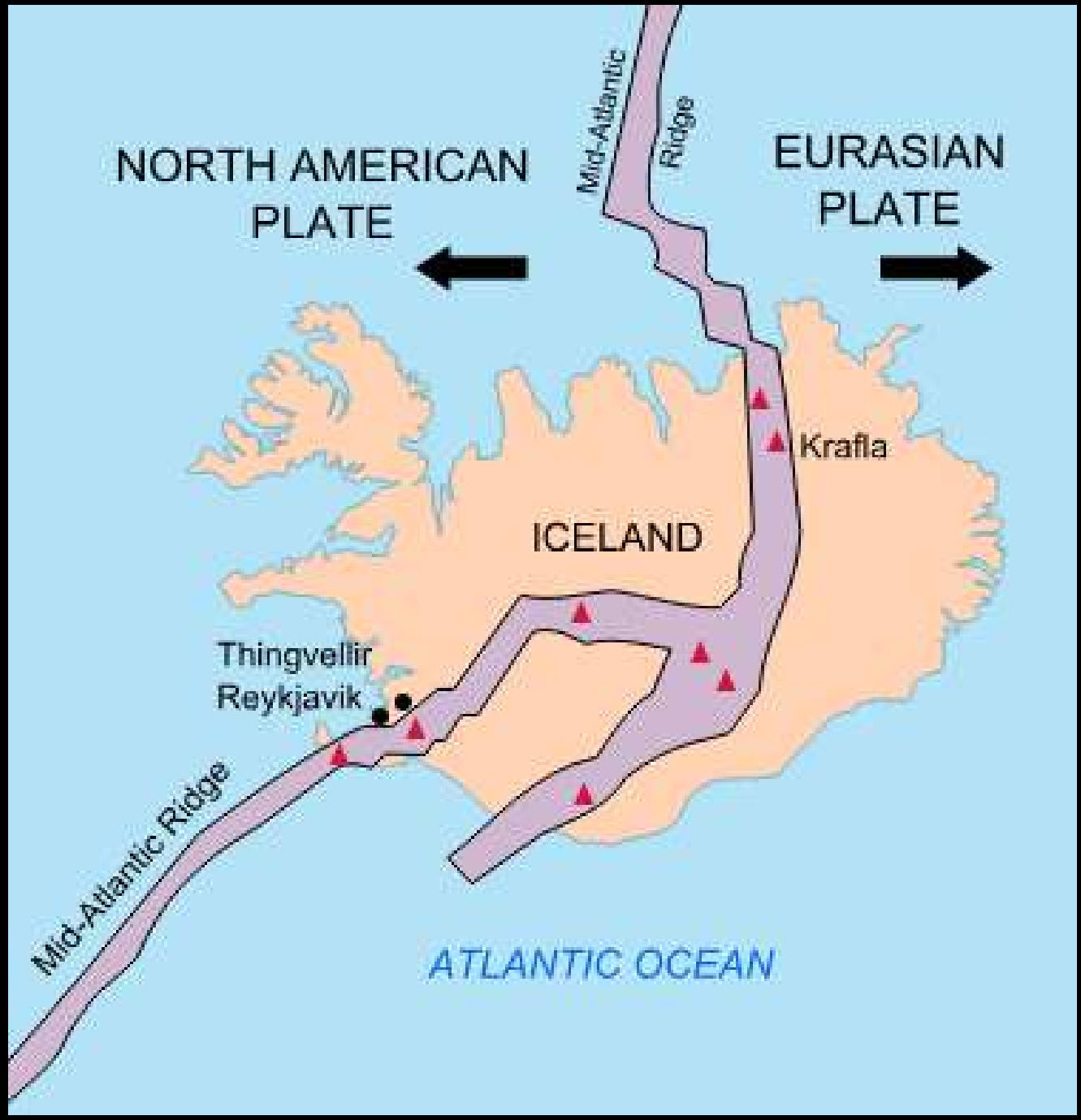
104,656 km²





Iceland population: 394,324

Clarksville Metro area population: 328,304


NORTH AMERICAN PLATE
Mid-Atlantic Ridge
EURASIAN PLATE
Krafla
ICELAND
Thingvellir
Reykjavik
Mid-Atlantic Ridge
ATLANTIC OCEAN

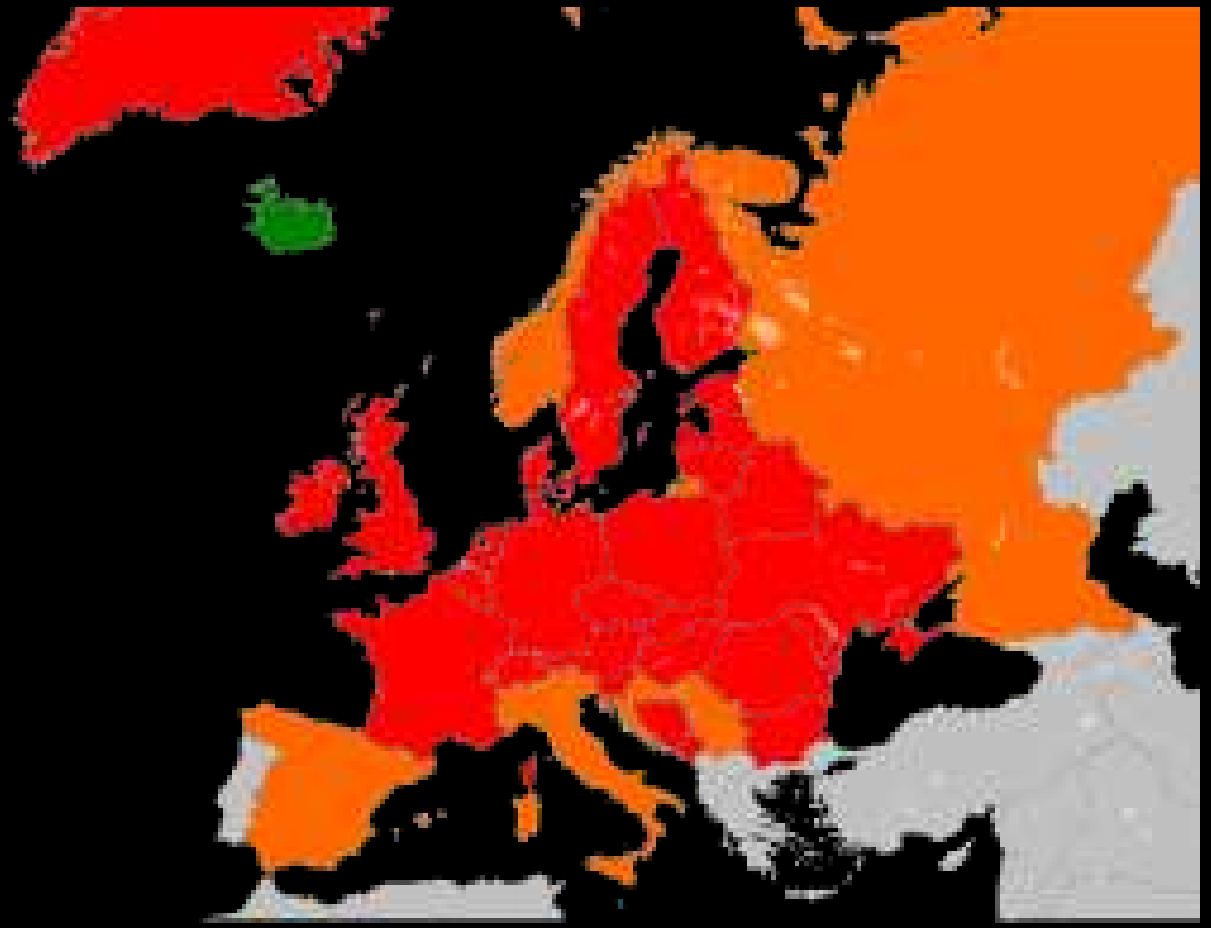

Fagradalsfjall
August 21, 2021

Eyjafjallajökull 2010

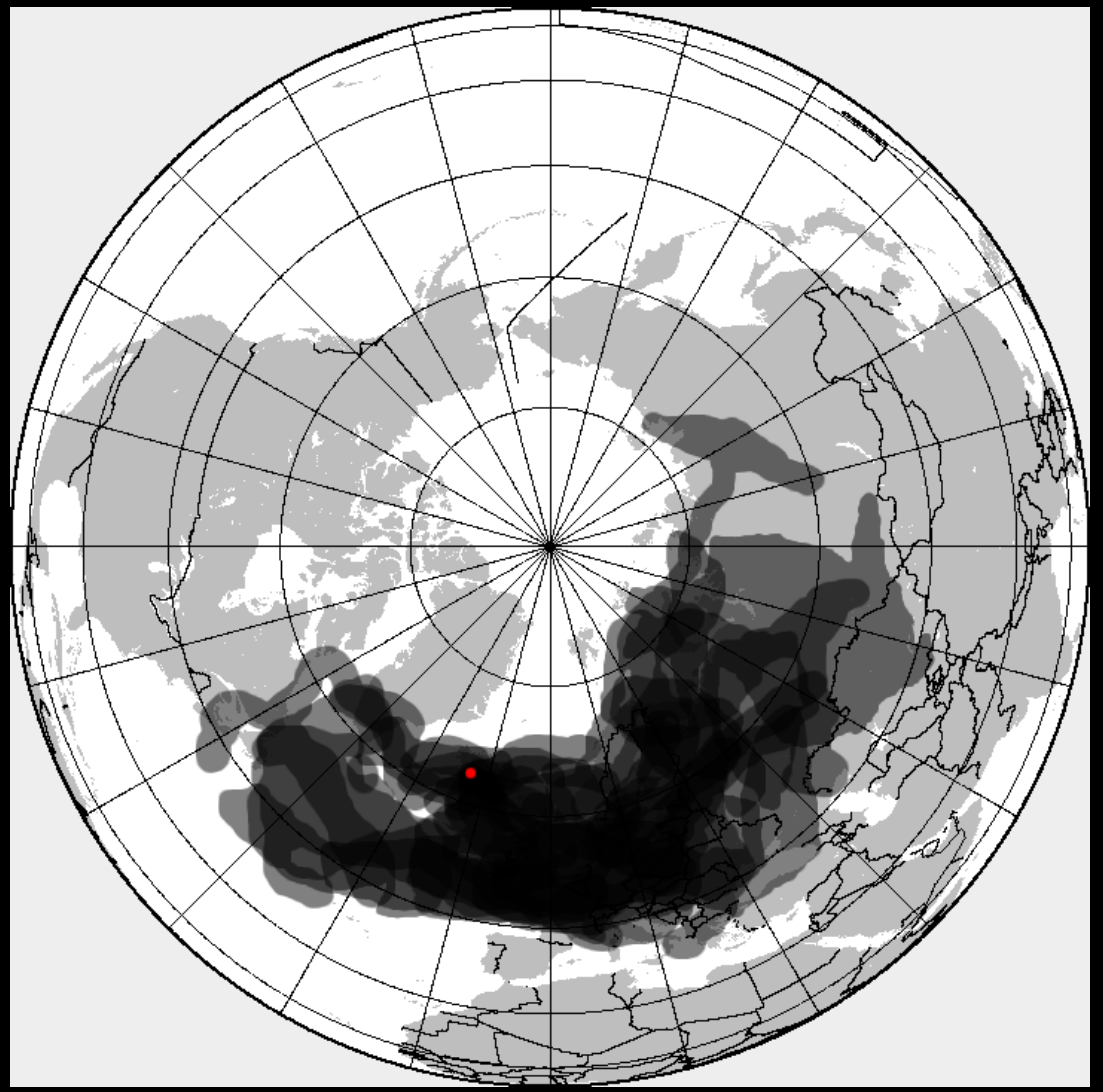


Oddur Sigurðsson

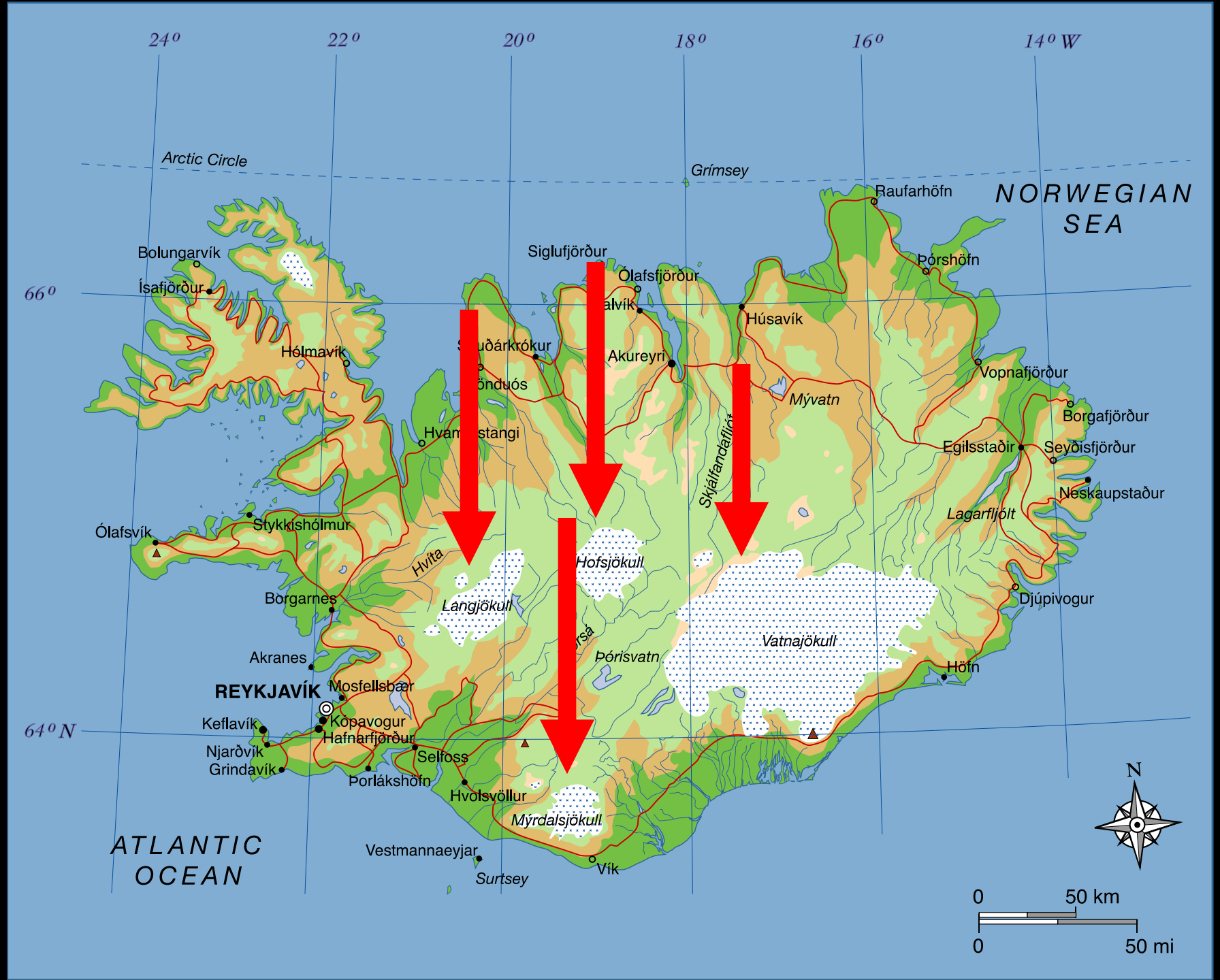
Eyjafjallajökull 2010



Travel disruptions

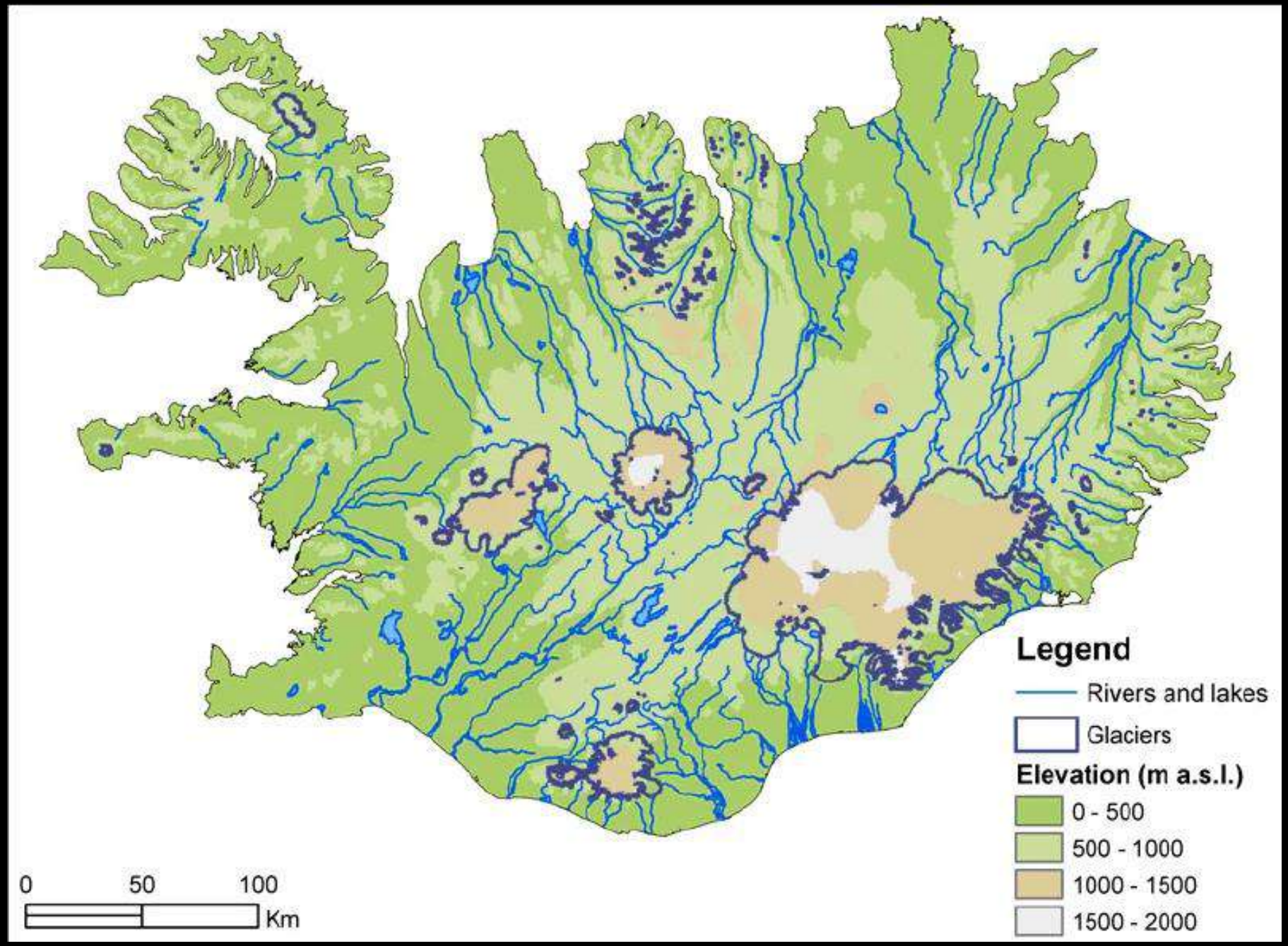


Ash Cloud 13-25 April 2010



Glaciers

cover 11% of country and hold around 951 trillion gallons of water



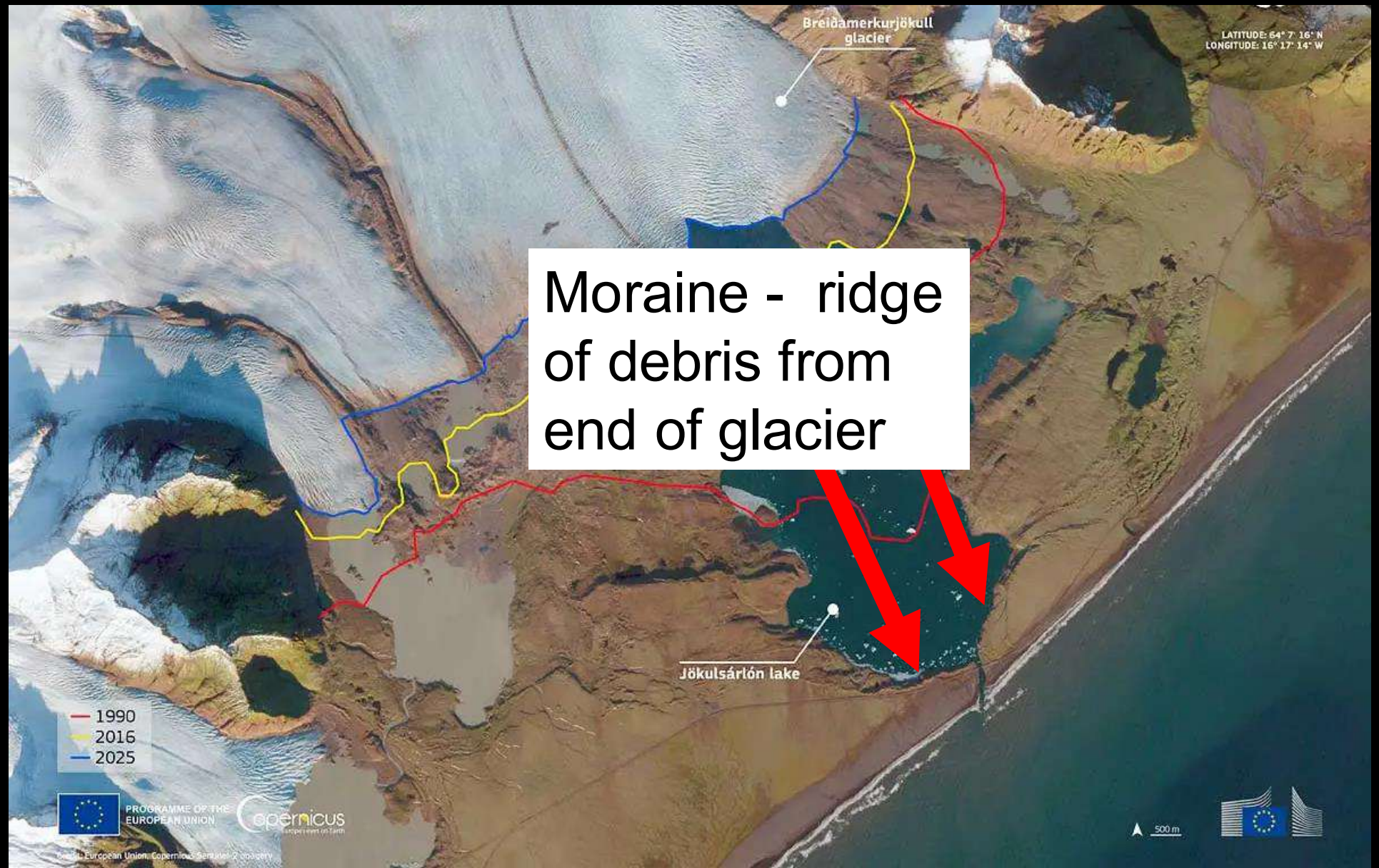
1,840 lakes
with an area
>0.1 km^2

1 natural lake
in Tennessee

Jökulsárlón Glacier Lake



Jökulsárlón Glacier Lake

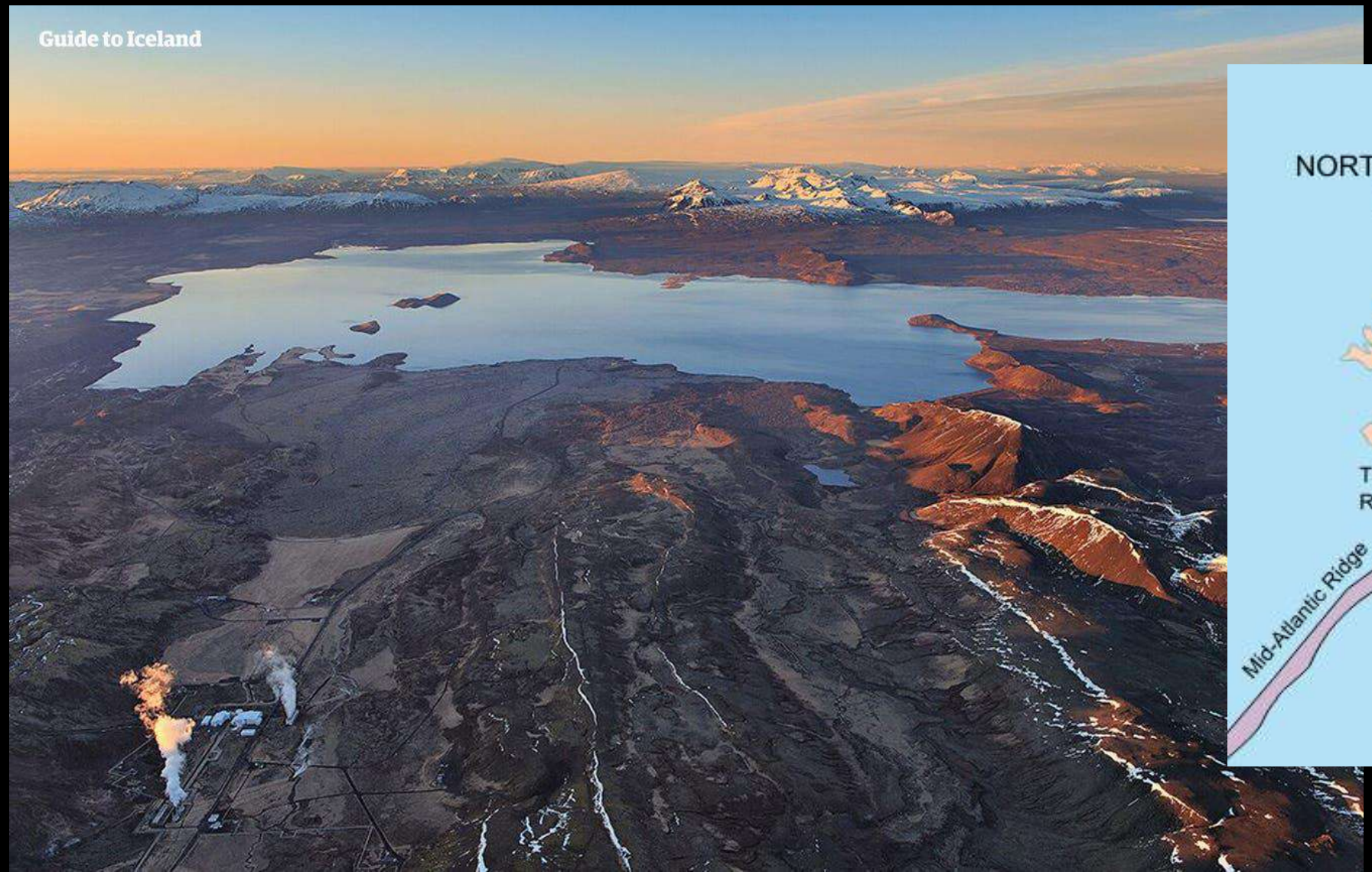


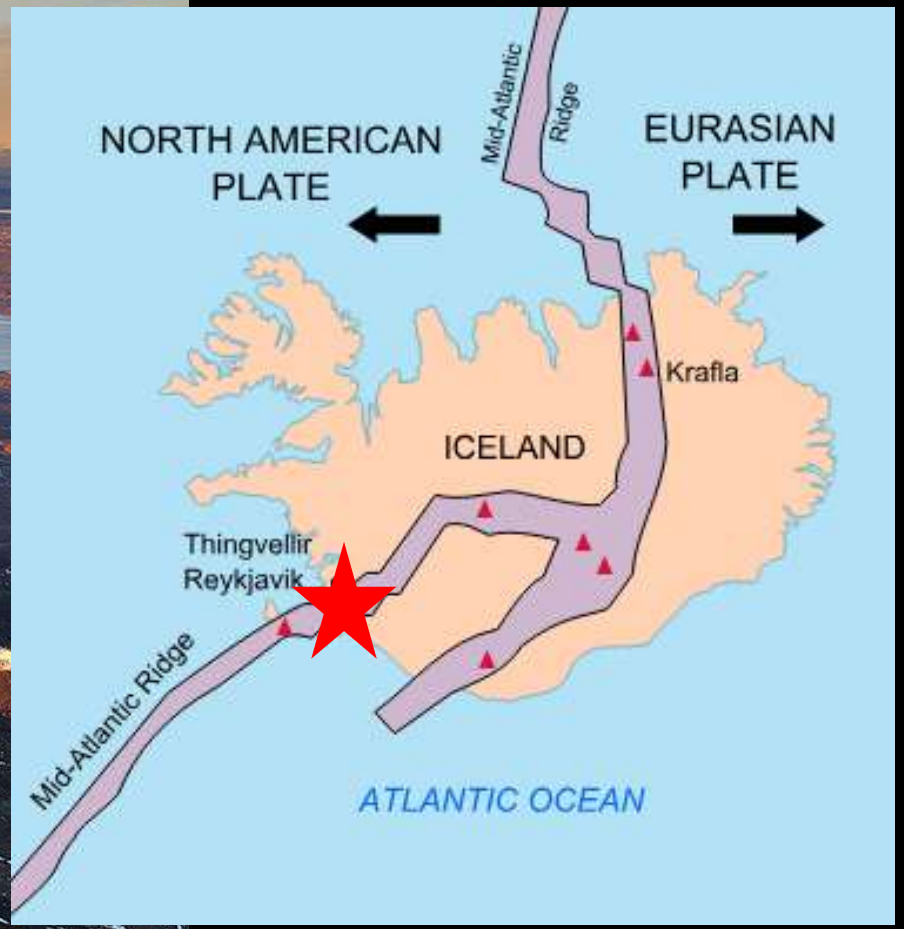
Öskjuvatn Crater Lake



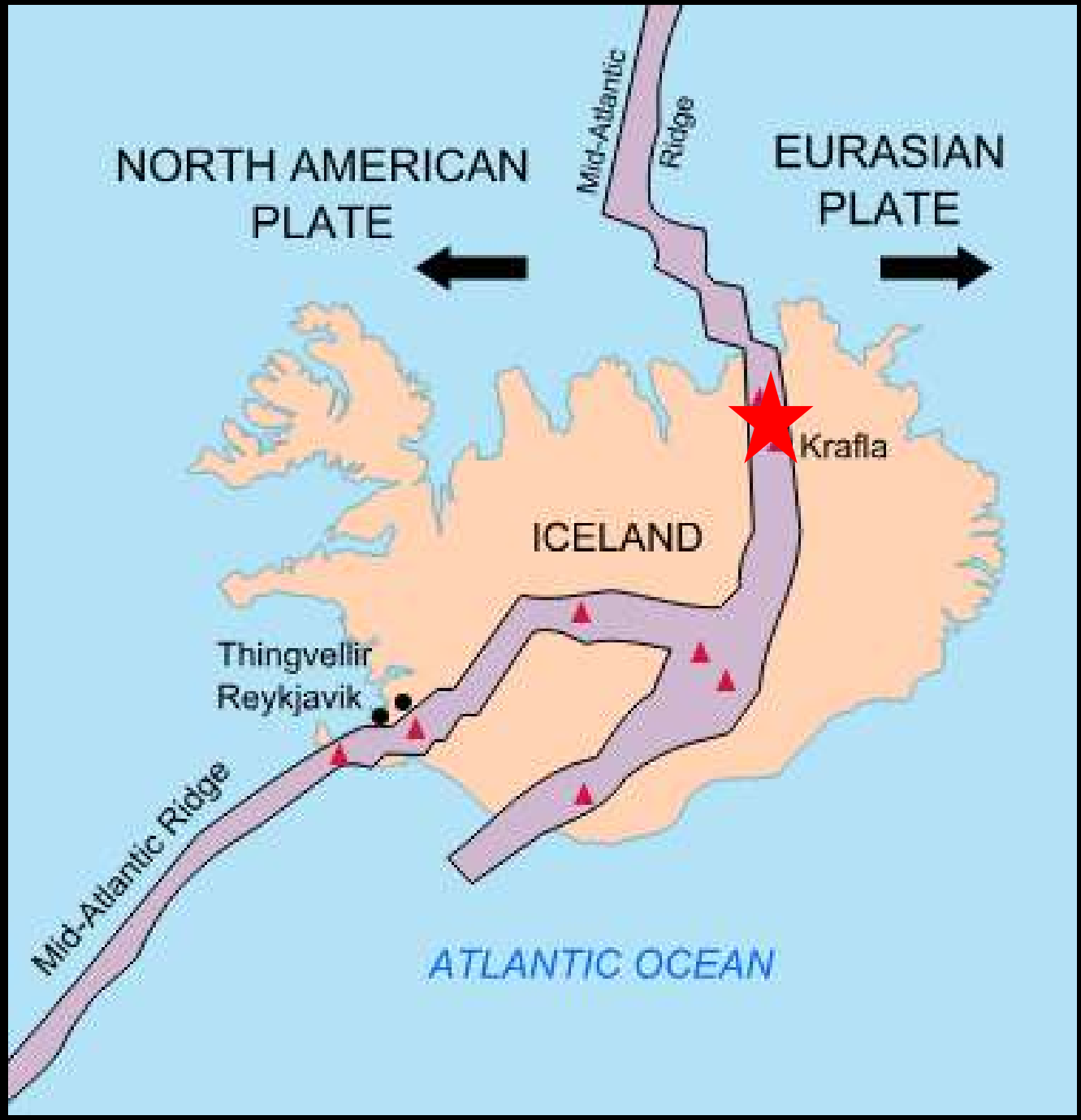


Þingvallavatn rift valley lake






Mývatn


NORTH AMERICAN PLATE
Mid-Atlantic Ridge
EURASIAN PLATE
Krafla
ICELAND
Thingvellir
Reykjavik
Mid-Atlantic Ridge
ATLANTIC OCEAN

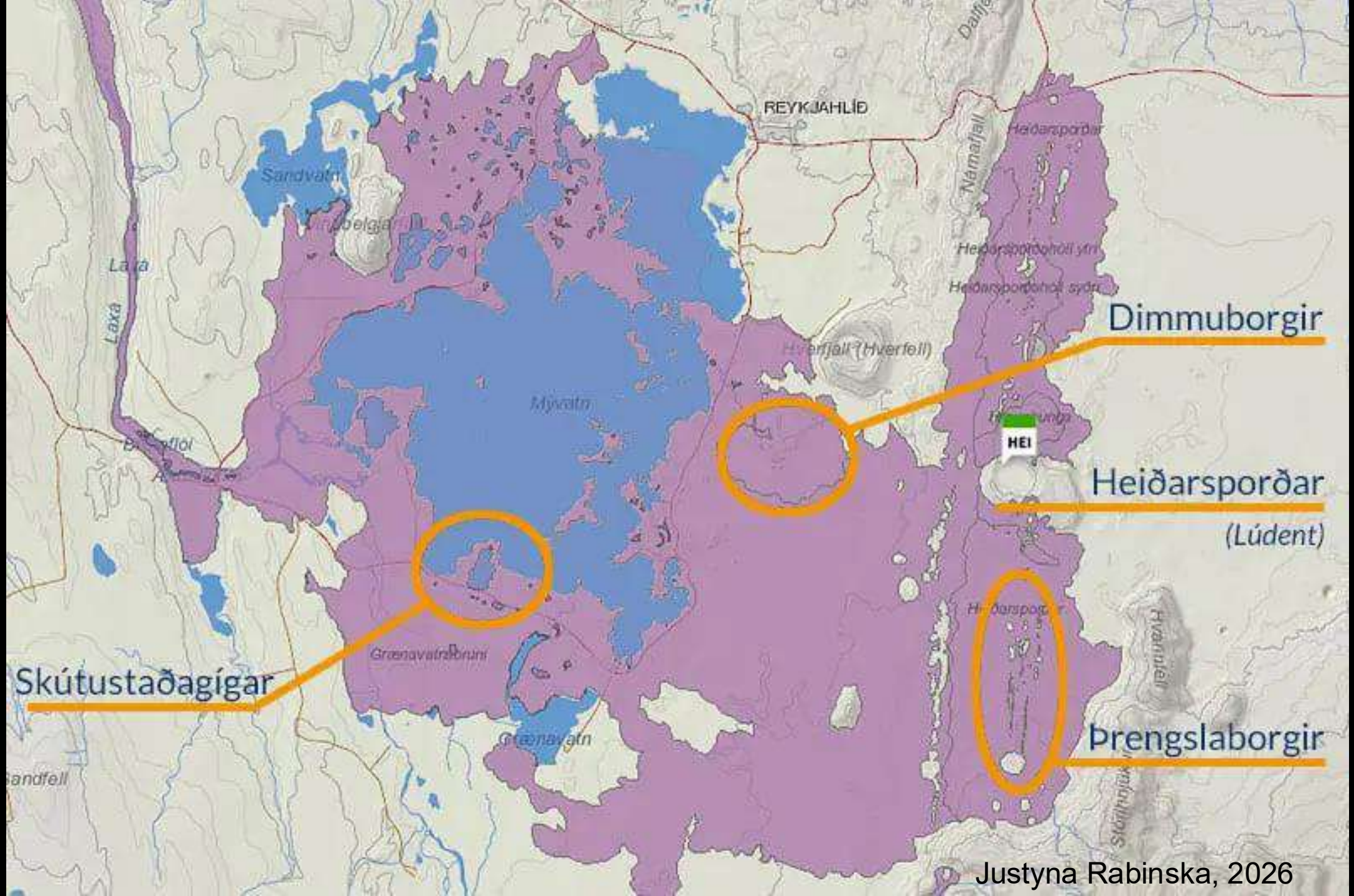

Hverir, ~ 5km NW


Hverfjall, 2.5 km W



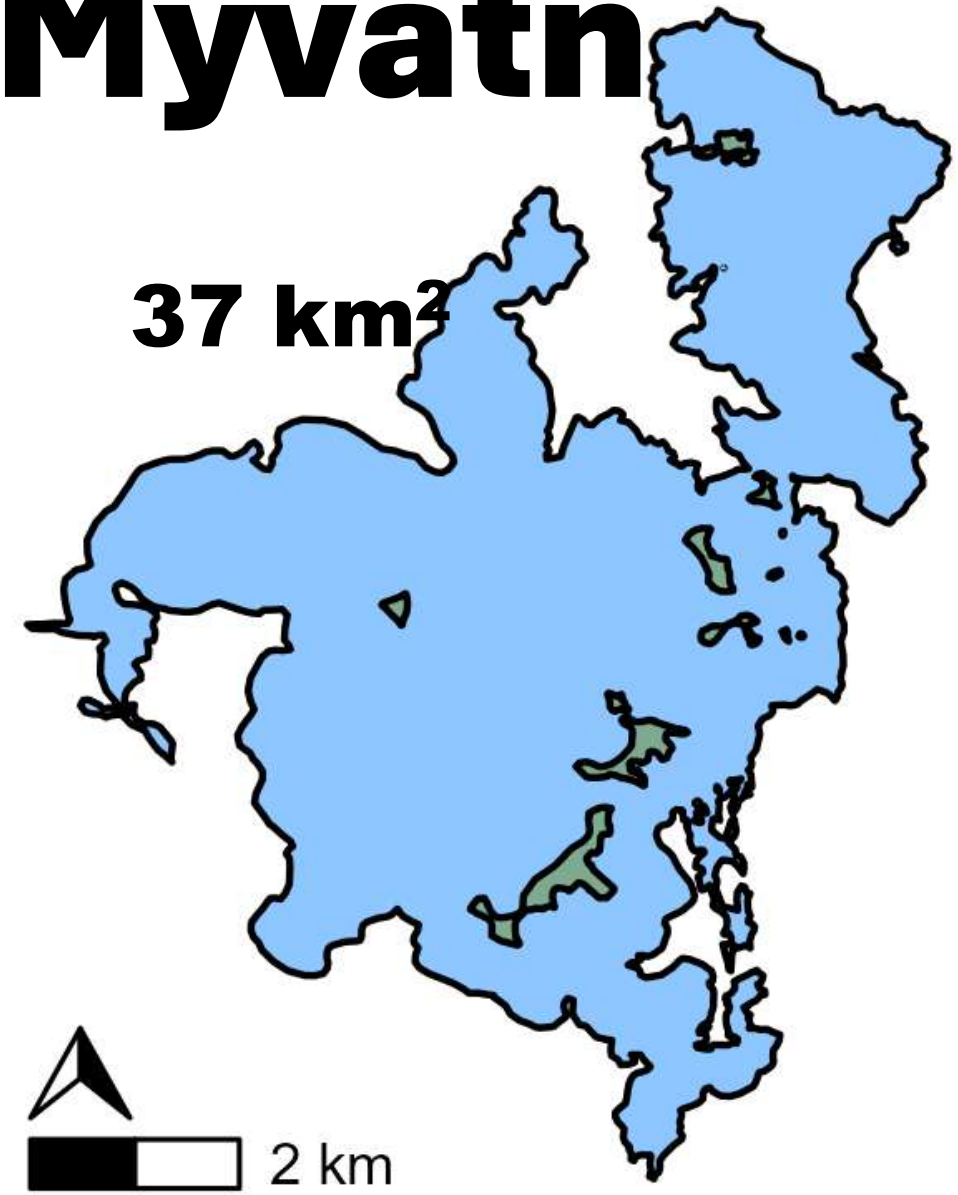
https://www.dronestagr.am/pseudocraters-in-myvatn-lake-iceland/



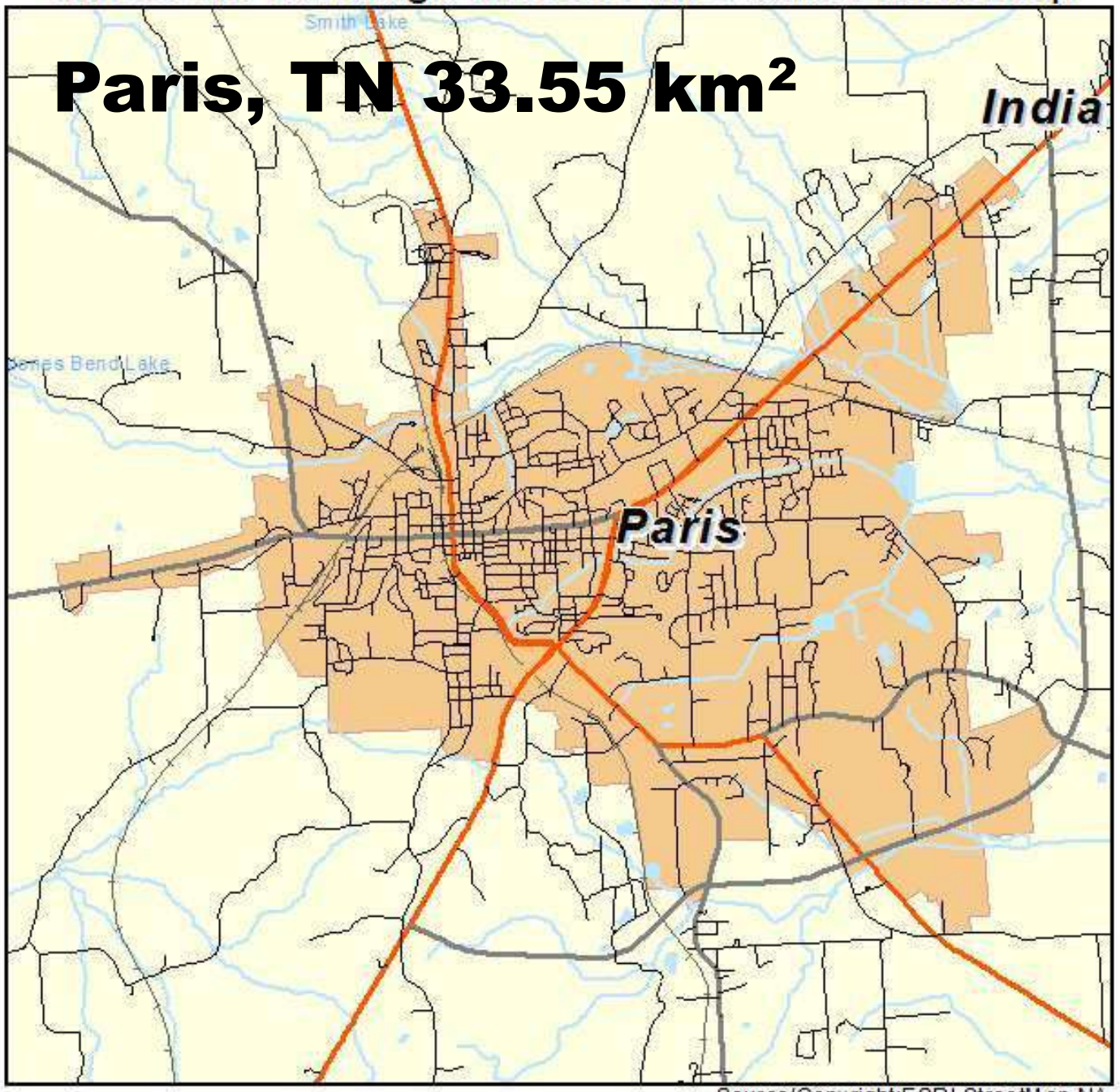

REYKJAHLÍÐ
Sandvatn
Laxá
Mývatn
Grænavatnsbruni
Grænavatn
Hverfjall (Hverfell)
Námafjall
Heiðarsporðar
HEI
Dimmuborgir
Heiðarsporðar
(Lúdent)
Skútustaðagígar
Þrengslaborgir
Justyna Rabinska, 2026

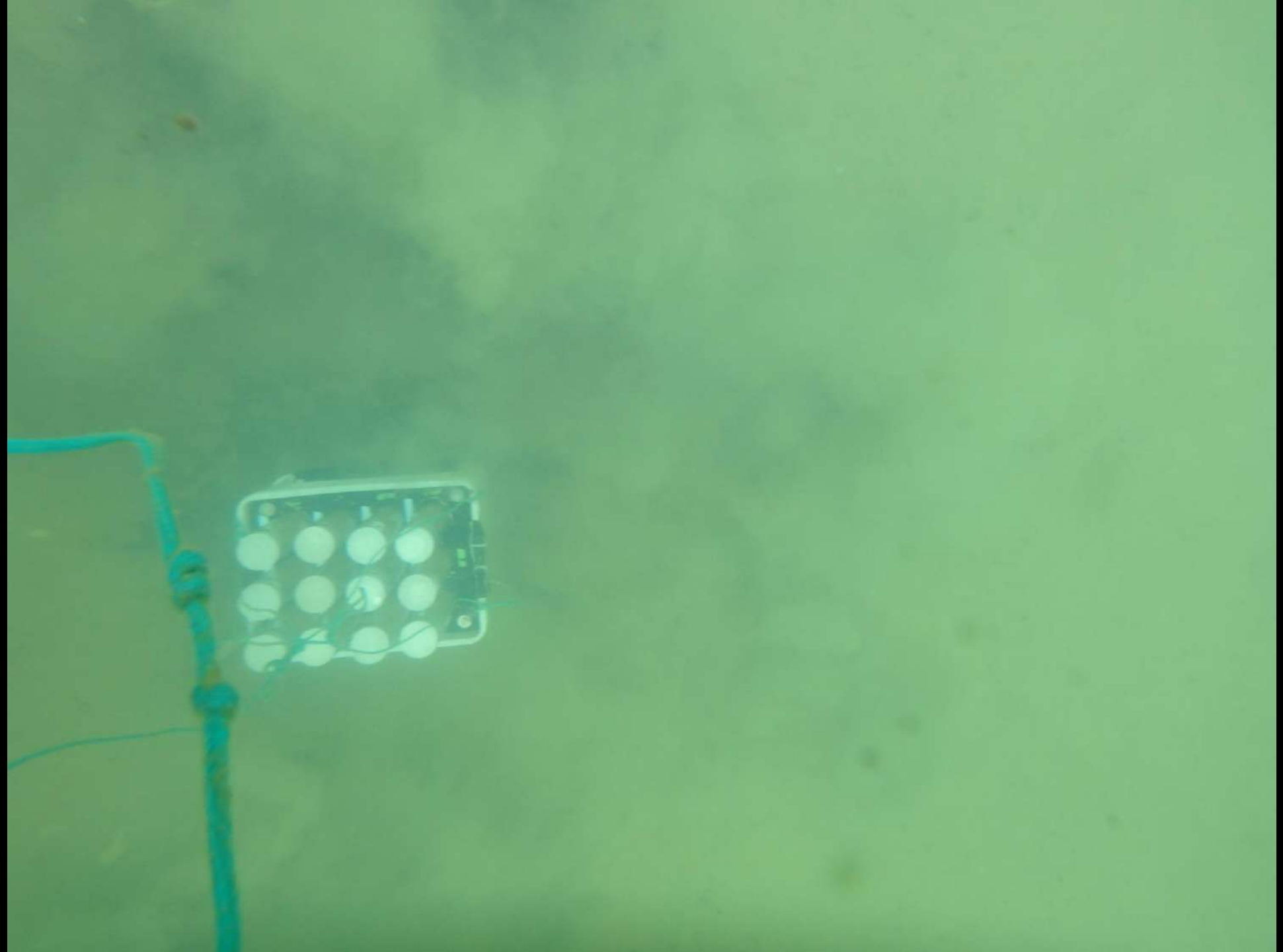
Mývatn

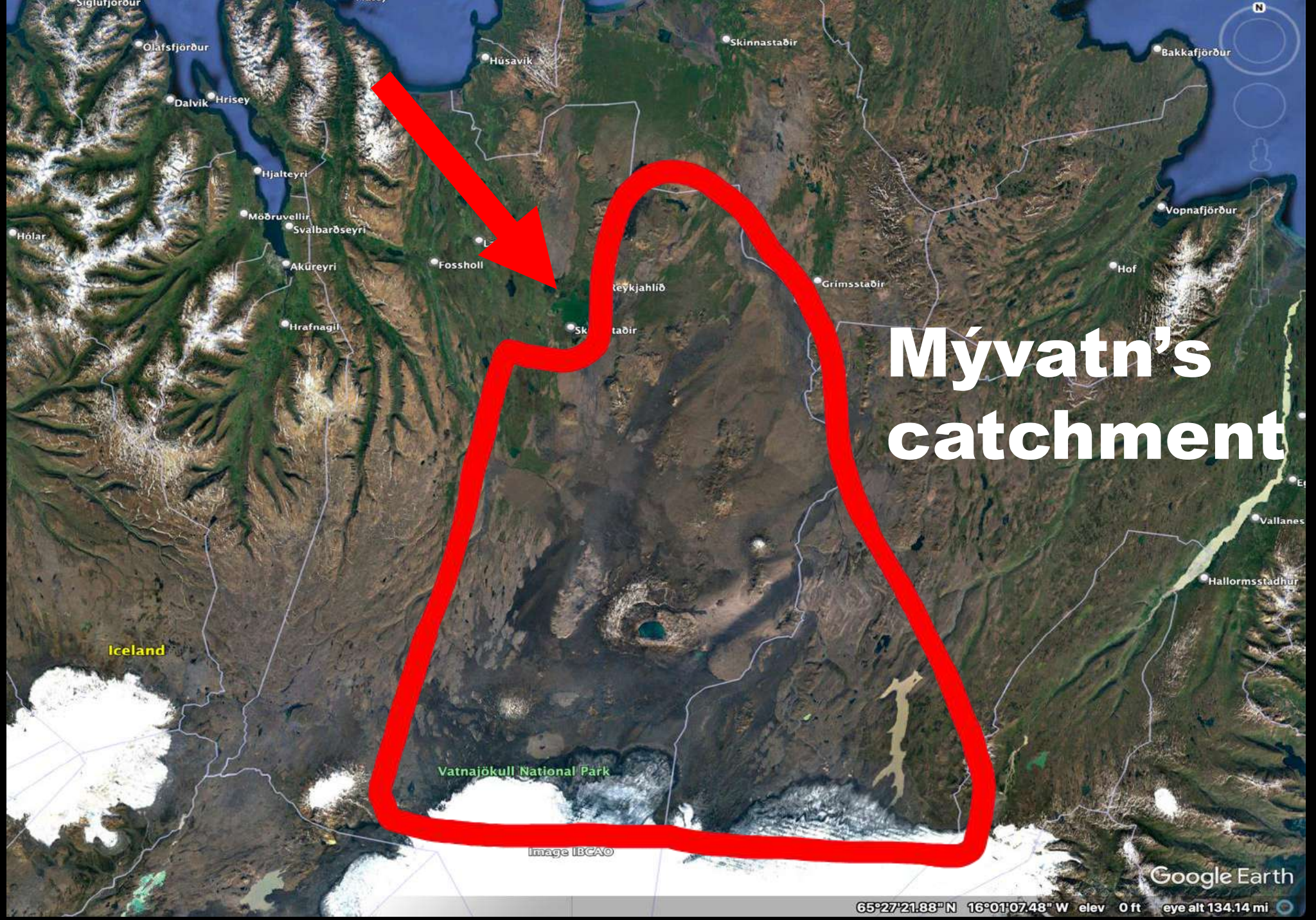
37 km²

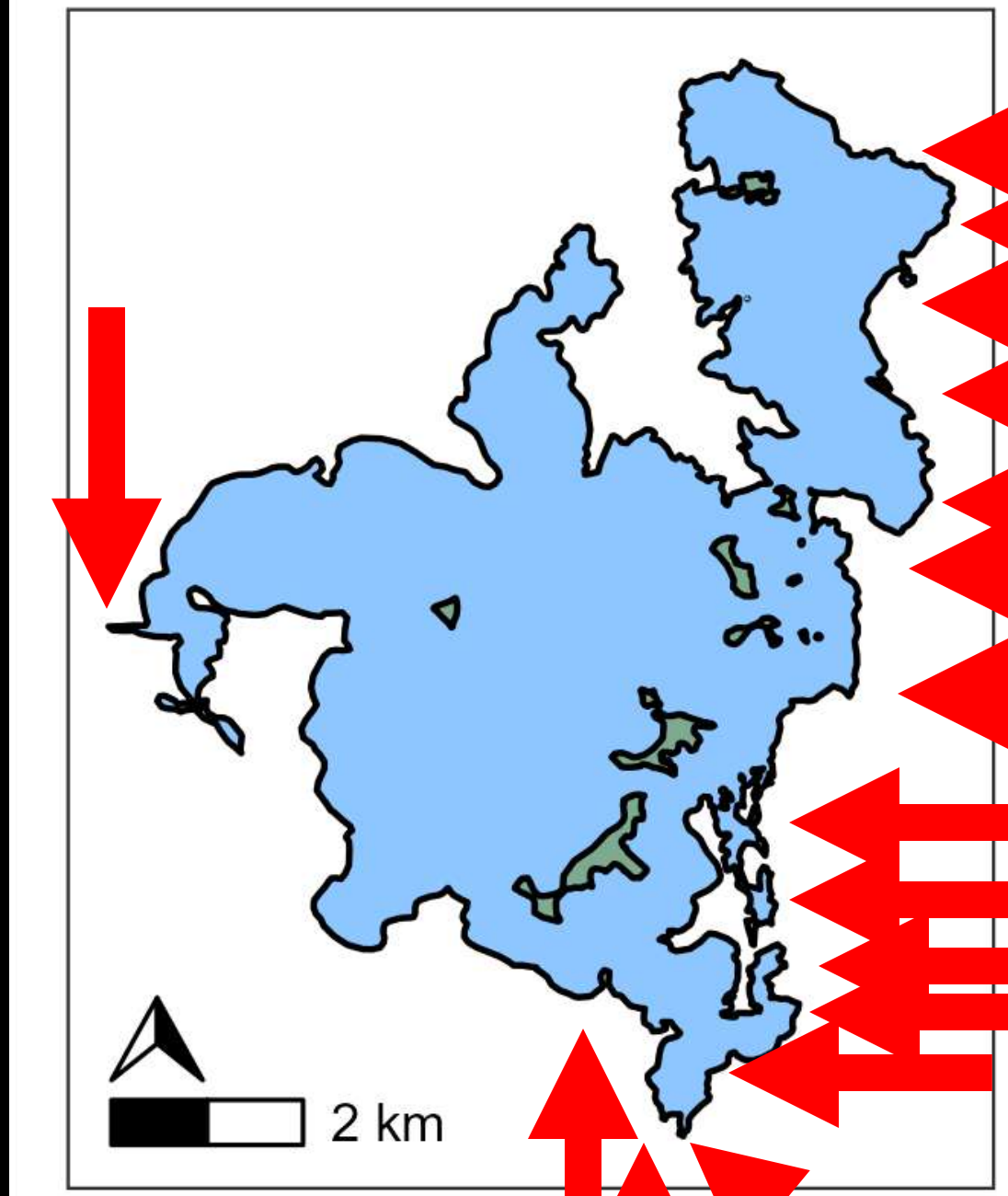


This is the coverage area for the Aerial Photo Map






Siglufjörður
Ólafsfjörður
Húsavík
Skinnastaðir
Bakkafjörður
Dalvík
Hrísey
Hjalteyri
Möðruvellir
Svalbarðseyri
Hólar
Akureyri
Fossholl
Grímsstaðir
Hof
Vopnafjörður
Hrafnagil
Vallanes
Hallormsstaðhur
Iceland
Vatnajökull National Park
Image IBCAO
Google Earth
65°27'21.88" N 16°01'07.48" W elev 0 ft eye alt 134.14 mi
Mývatn's catchment



Nutrient-rich

Residence time = 28 days


Laxá
Salmon River
Arni Einarsson



https://icelandoutfitters.com/laxa-in-myvatnssveit/

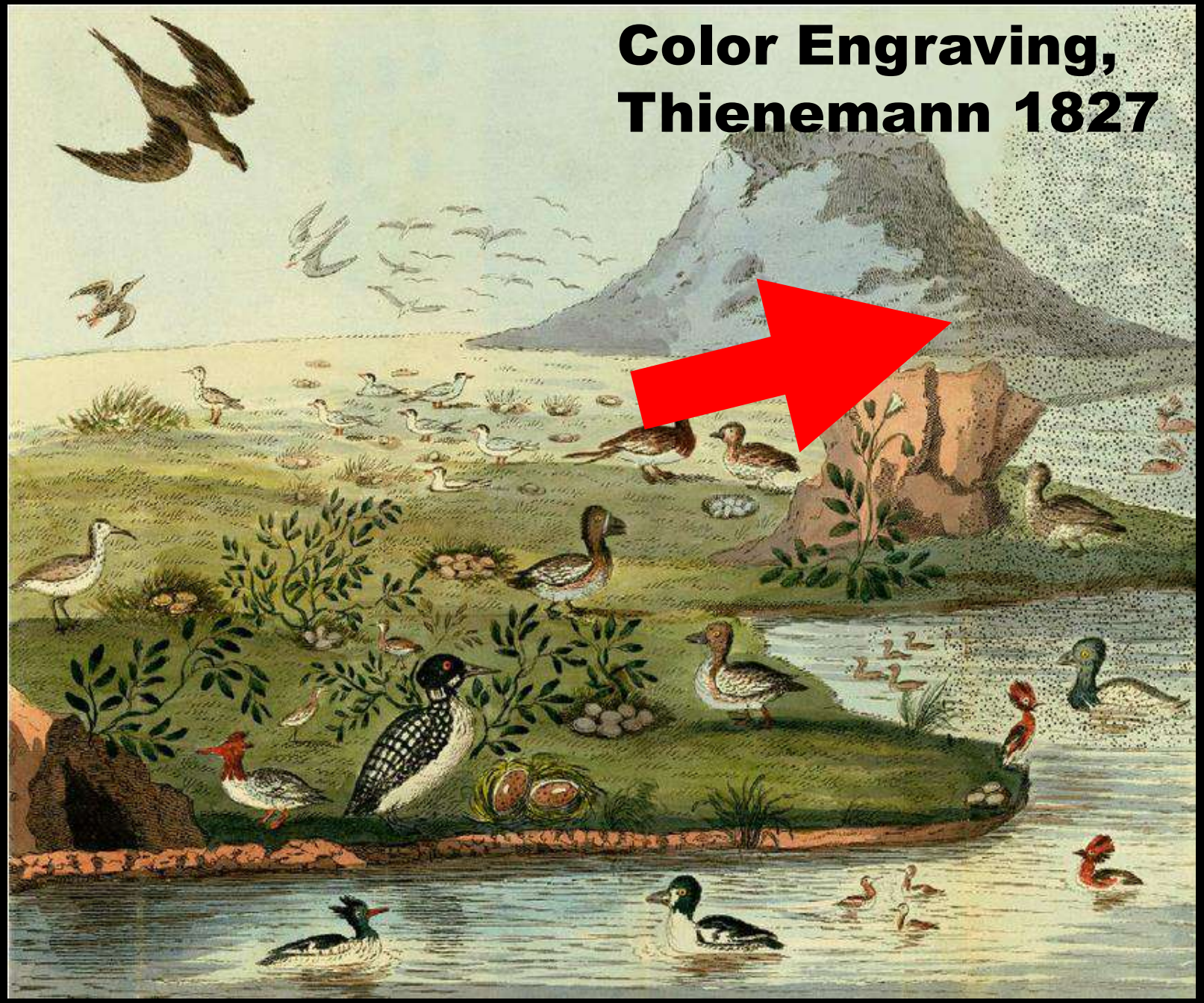


Designated Ramsar Site – internationally protected wetlands for waterfowl habitat



Mareike Schadach


Mývatn
Midge Lake


Color Engraving,
Thienemann 1827


Mý
Chironomidae



<1 week



2-24
months



Overwintering as larvae

Chironomus: Hemoglobin



Tanytarsus: diapause

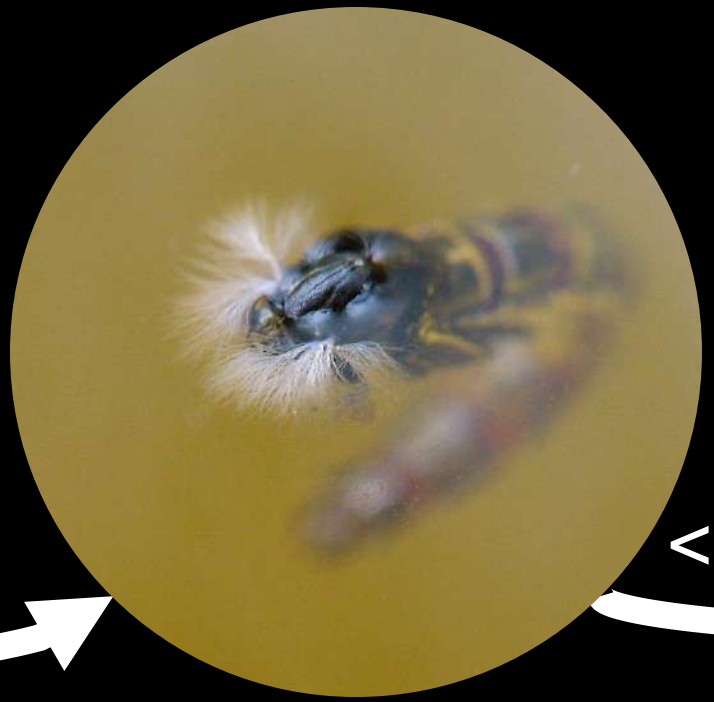




<1 week



2-24
months



<2 weeks

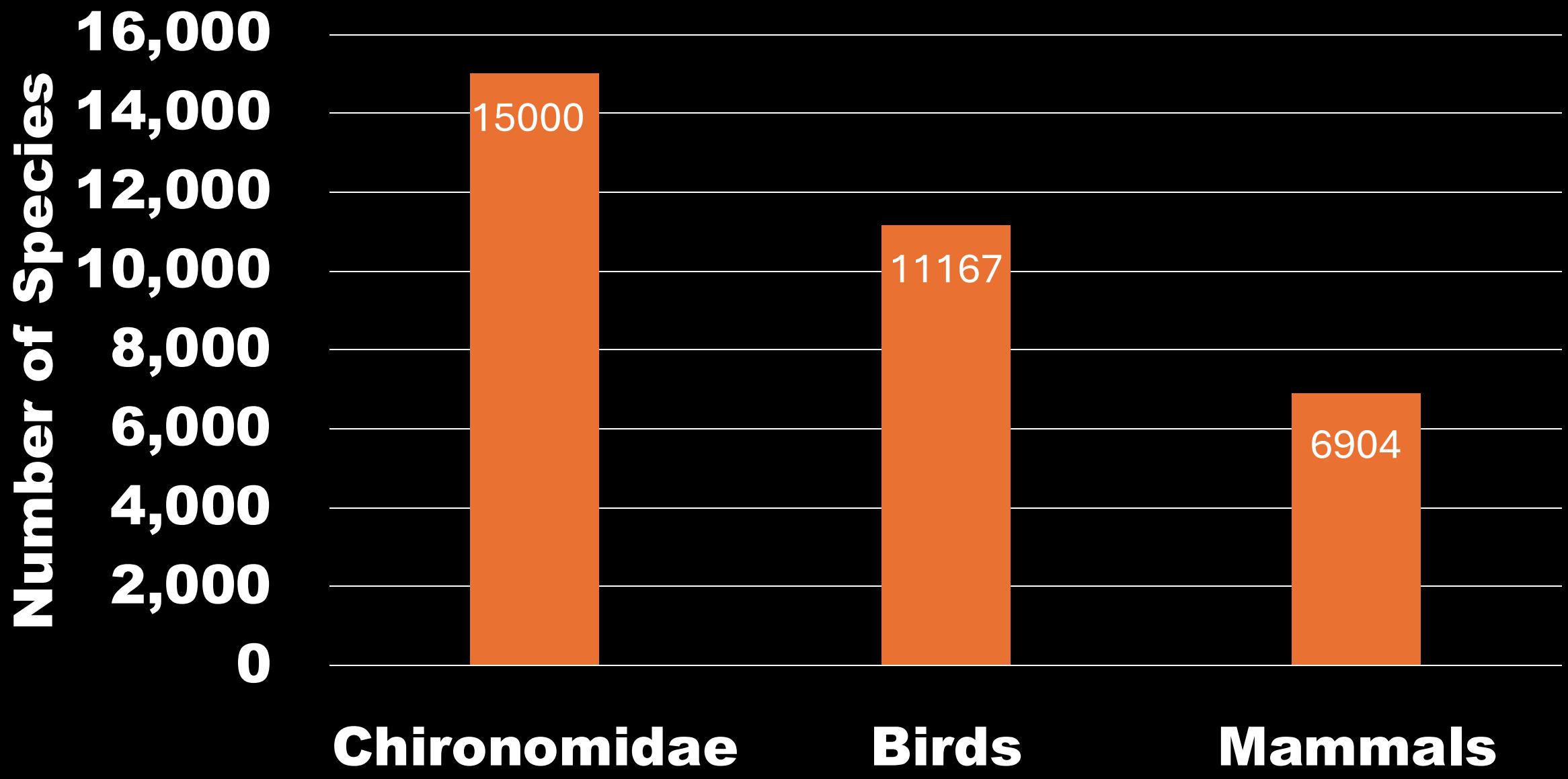


~2 weeks

Chironomid fly patterns

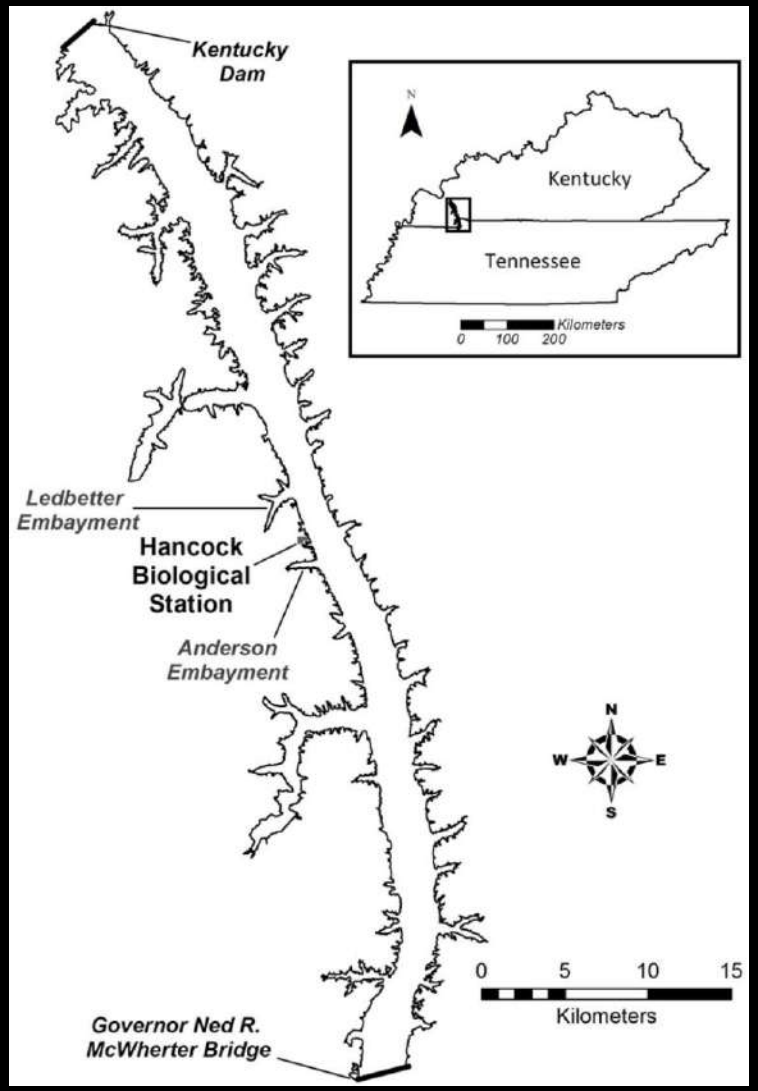


https://thefeatherbender.com/chironomid-fly-patterns/

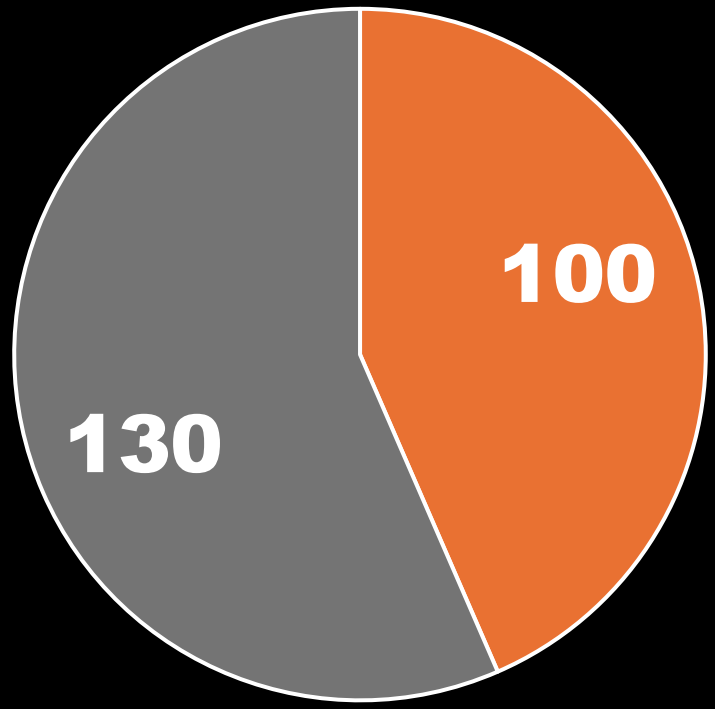


Estimates: Armitage 1994, Burgin et al. 2018, Cornell Lab of Ornithology

Kentucky Lake



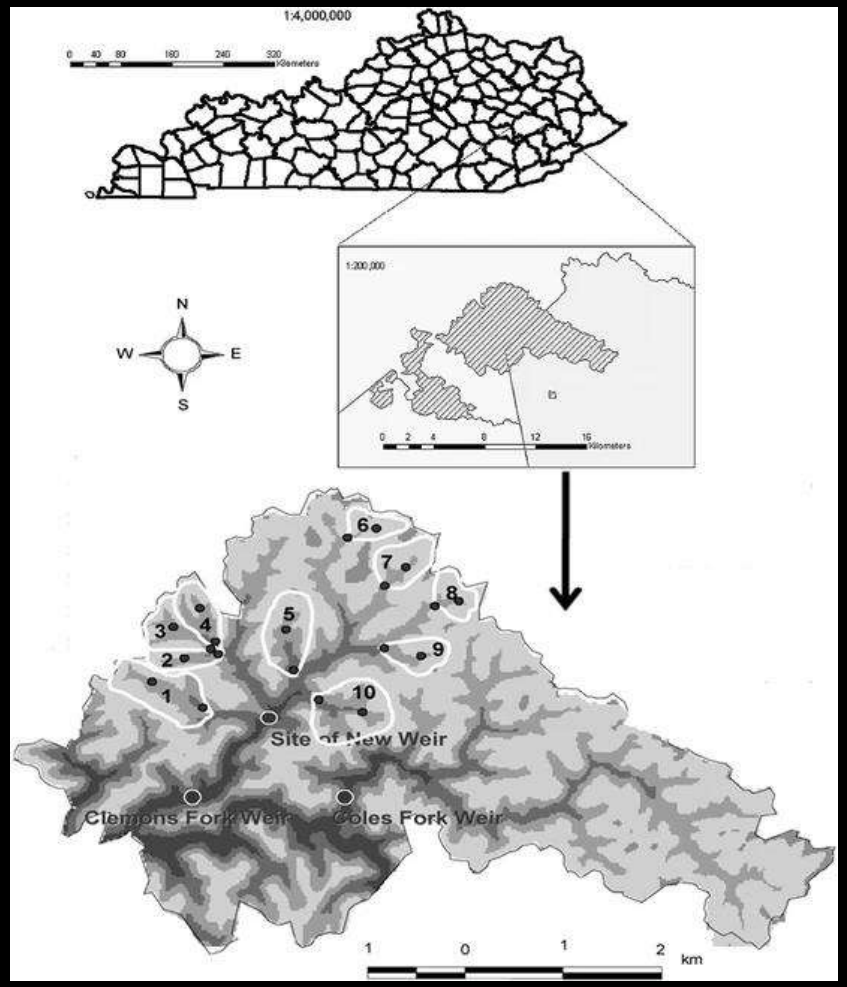
Number of Species



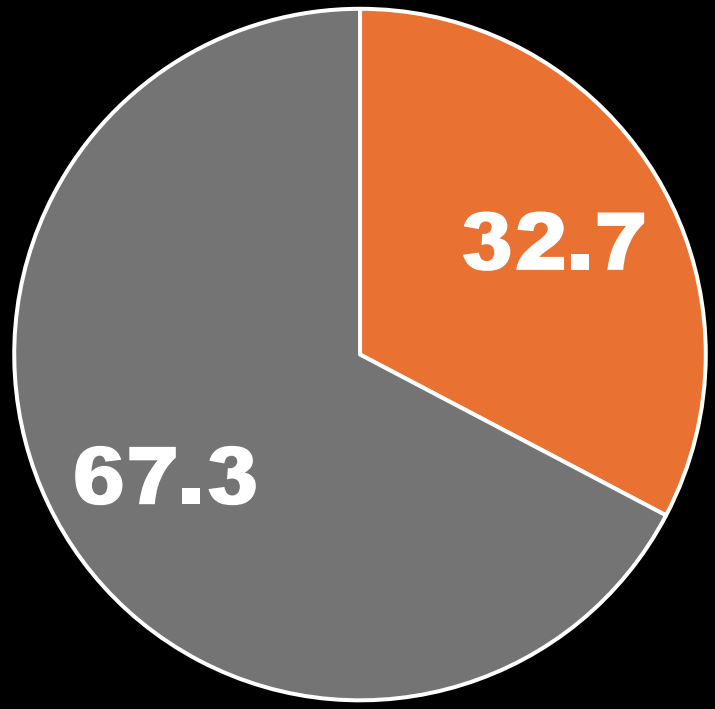
Chironomidae All other

White 2014

Cumberland River Tributaries



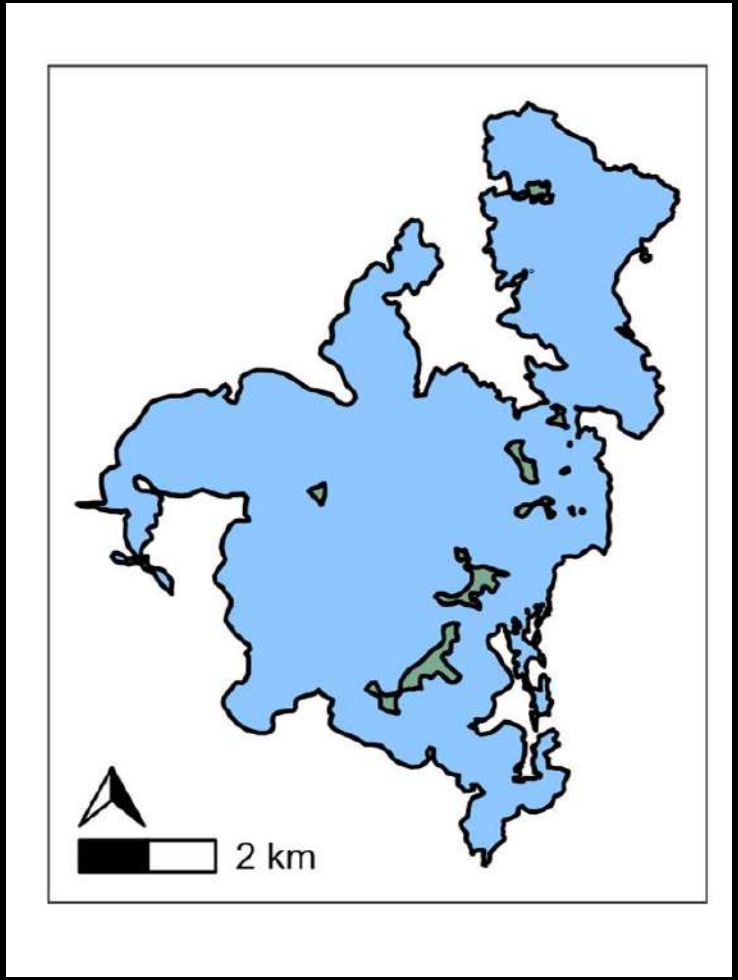
Number of Individuals



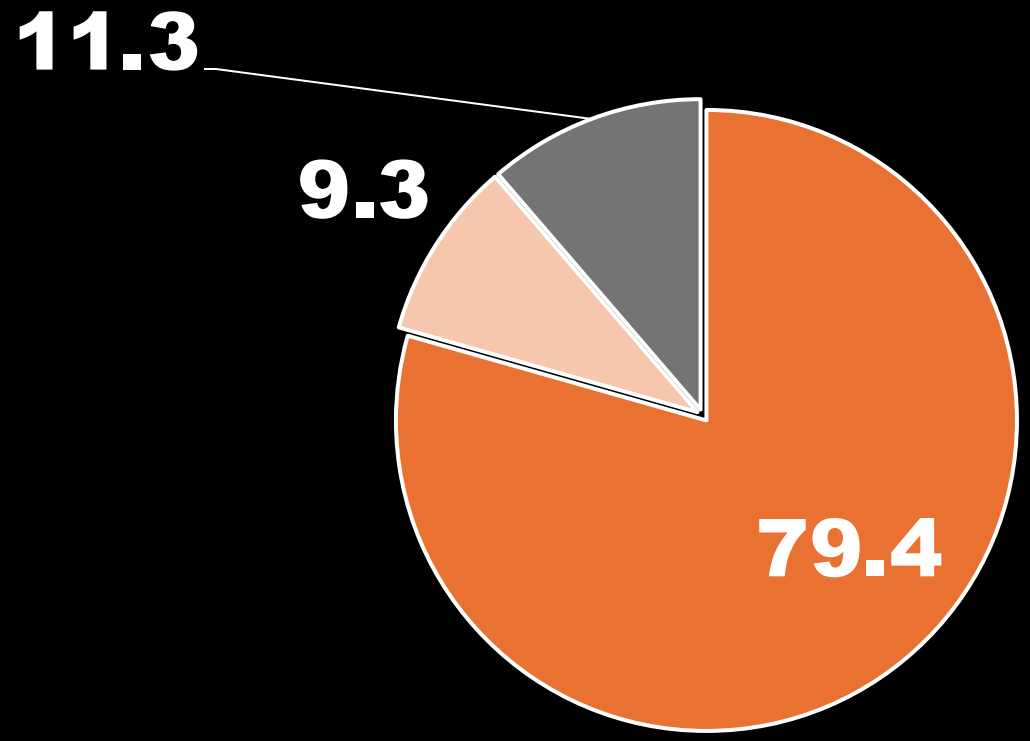
Chironomidae All other

Grubbs 2010

Mývatn



Number of Individuals



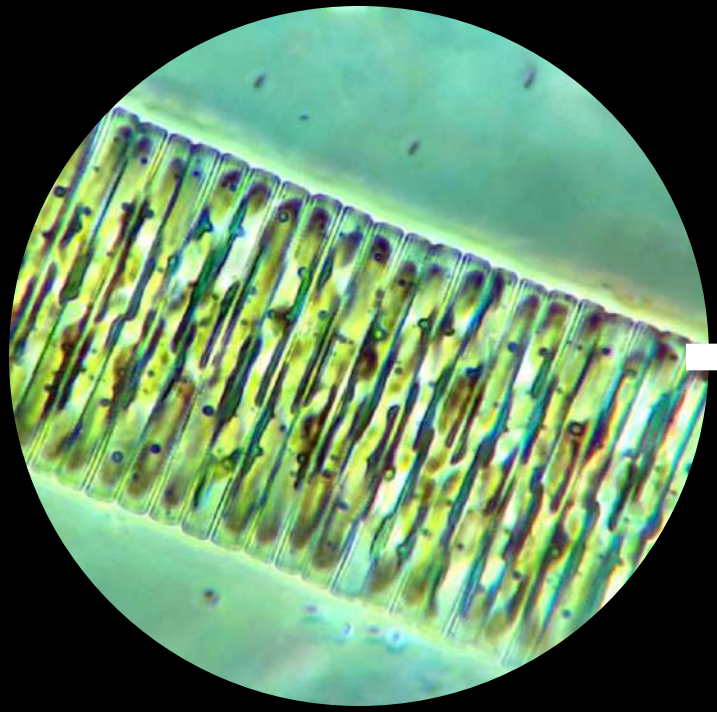
- ***Tanytarsus gracilentus***
- ***Chironomus islandicus***
- **All other**

Lindegaard and Jonasson 1979






Midges in the Lake







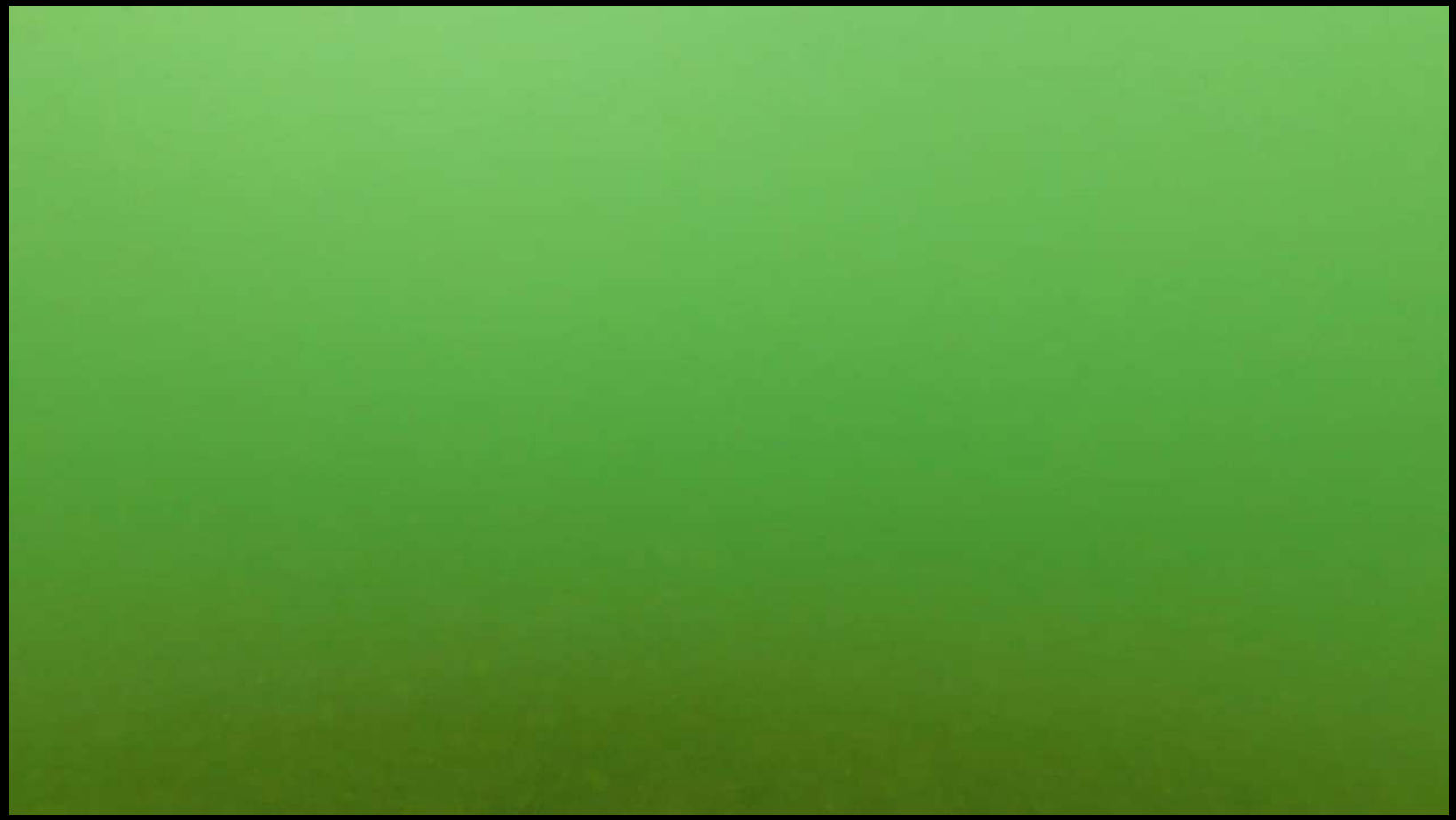


Photos: Andrei Savitsky, Bjarni Kristjansson, Arni Einarsson

Ecosystem Engineers

Organisms that physically alter their environment





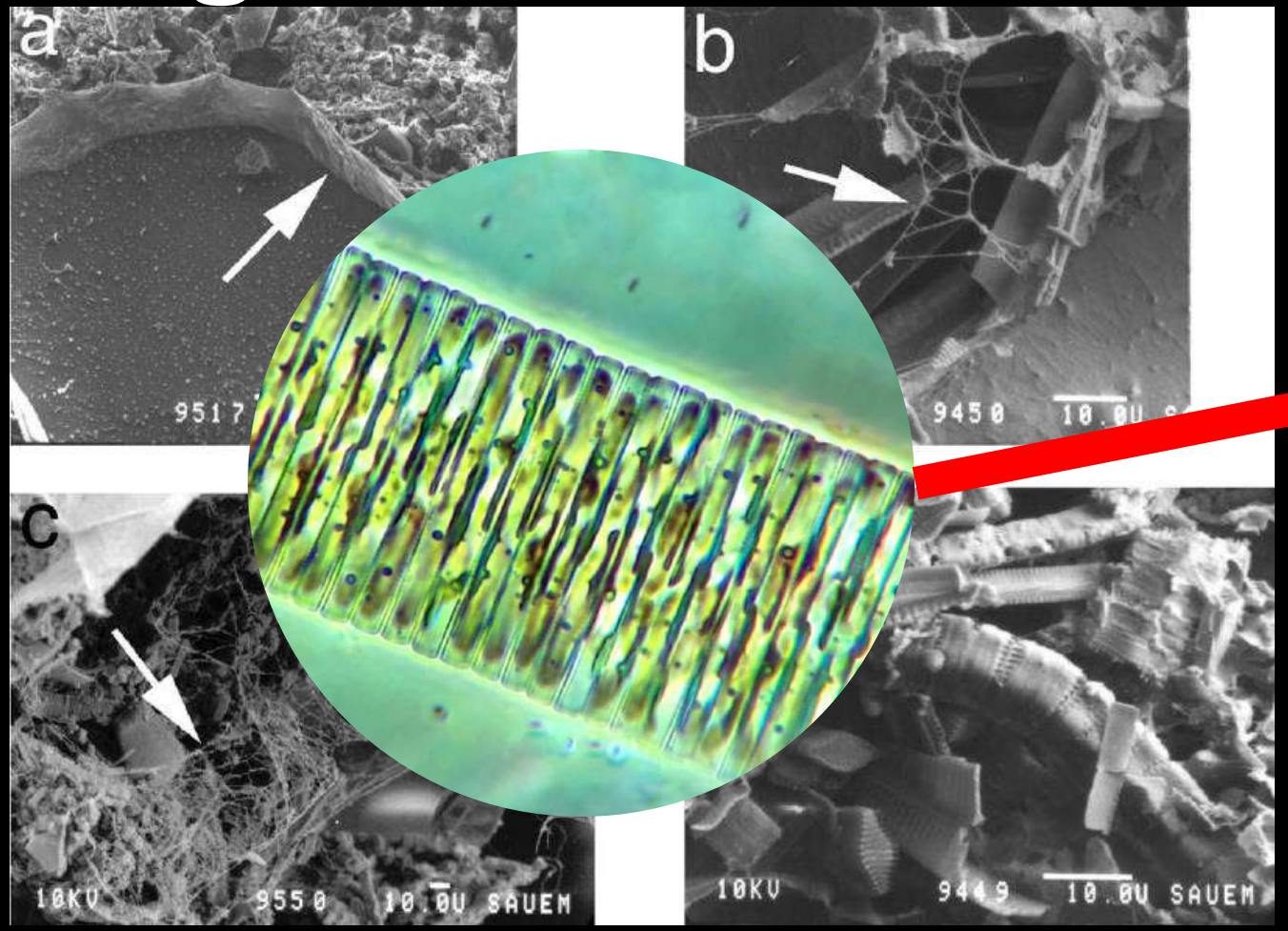


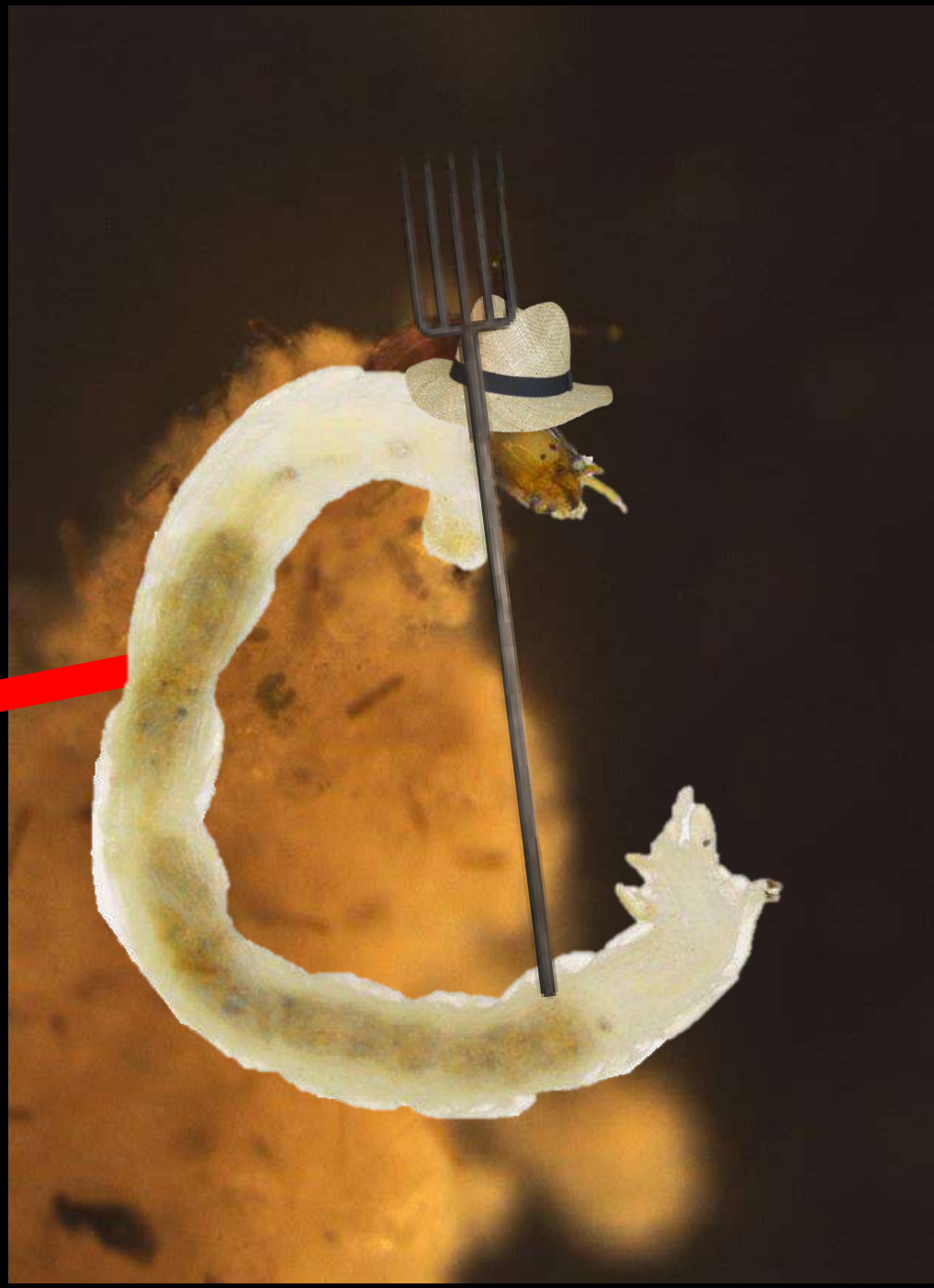
Ecosystem Engineers



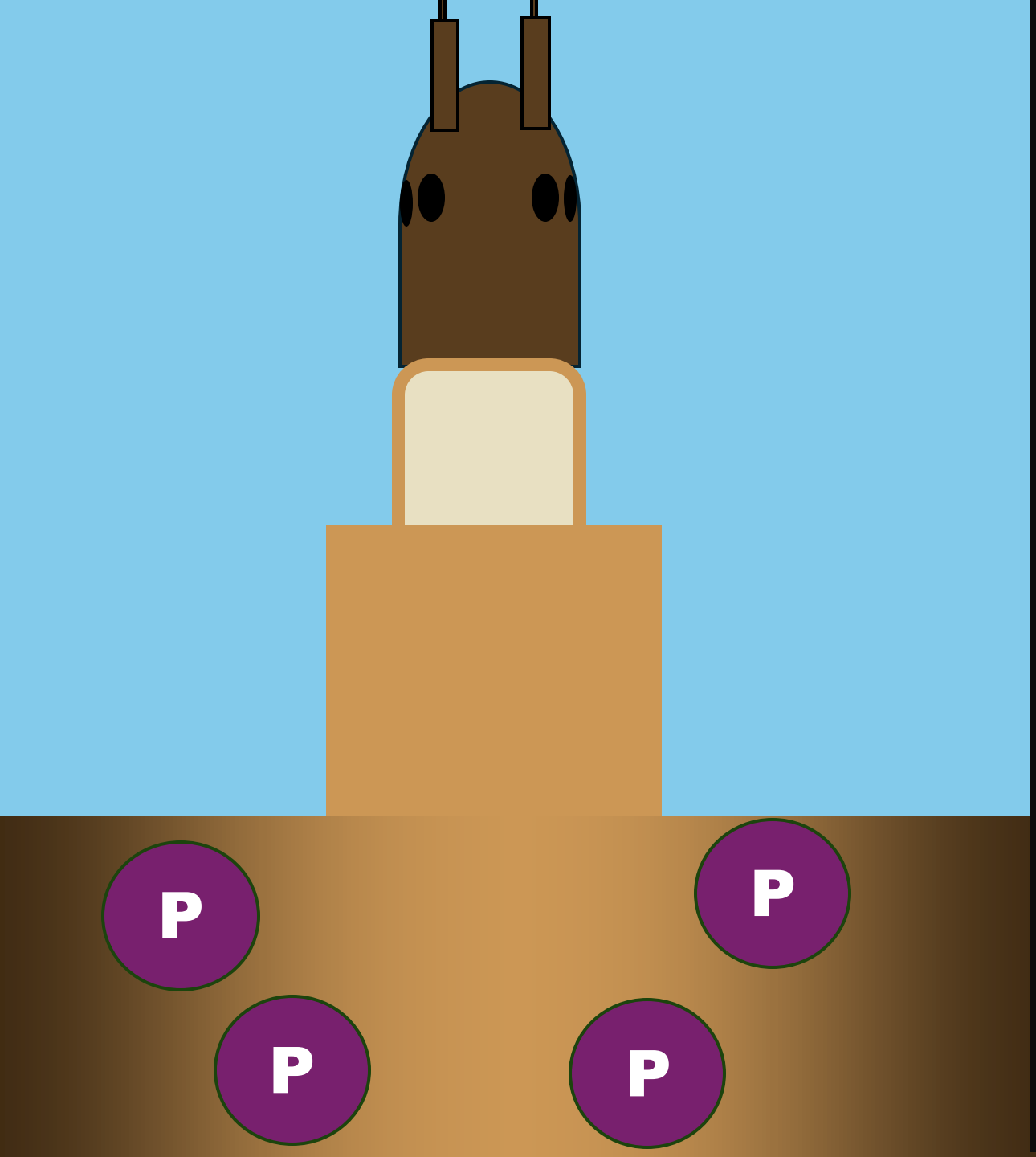
Darrell Gulin

Ecosystem Engineers



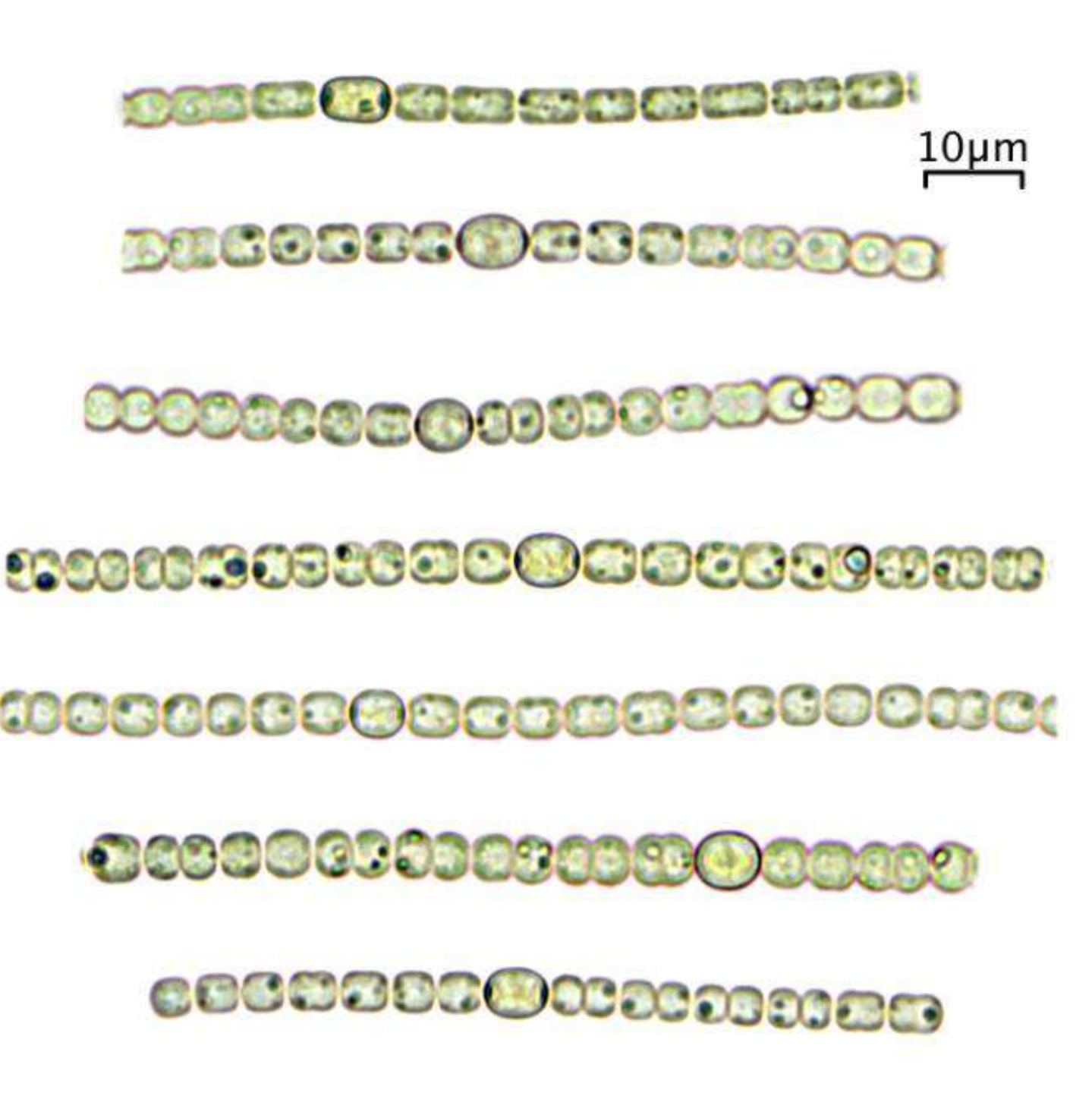


Olafsson and Patterson 2004


P
P
P
P



A.R. Ives

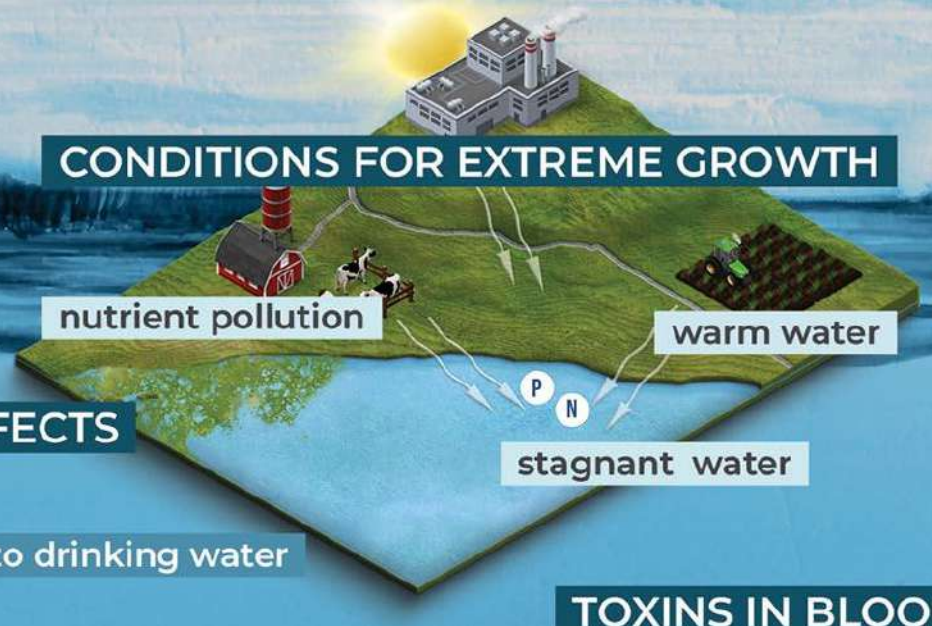

10µm



ALGAL BLOOMS

Algae and blue-green bacteria are an essential part of the aquatic food web. But given the right conditions, they can multiply rapidly and cause harmful algal blooms (**HABs**). Blooms can seriously harm people, animals, fish, and other parts of the ecosystem.

CONDITIONS FOR EXTREME GROWTH



HARMFUL EFFECTS

- danger to drinking water
- kills fish
- makes people and animals sick

TOXINS IN BLOOMS



Some HABs are made up of blue-green bacteria that are more likely to contain toxic compounds.

HAB EARLY WARNING SYSTEM

Chlorophyll measurements greater than 5 Relative Fluorescence Units (RFUs) are well above normal summer values.

warning level

Chl chlorophyll ≥ 5 RFU

Cary Institute for Ecosystem Studies

FOX 17 WZTV NASHVILLE

75°

LIVE 1

Toxic algae bloom suspected at Centennial Park's Lake Watauga

by Brianna Sorrell

Thu, September 24, 2026 at 6:29 PM



Midges on land





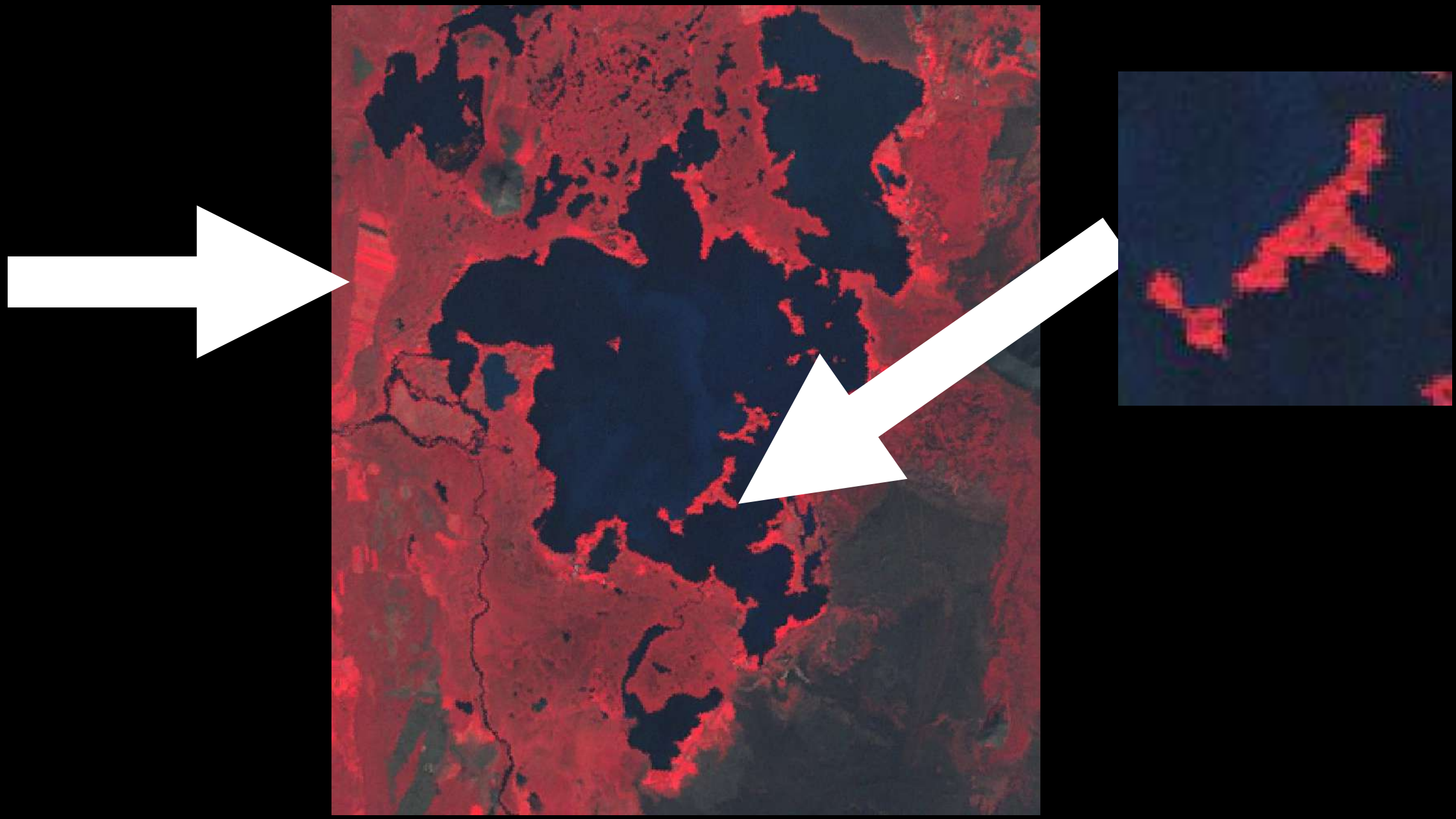






Tony Ives


Mýgras

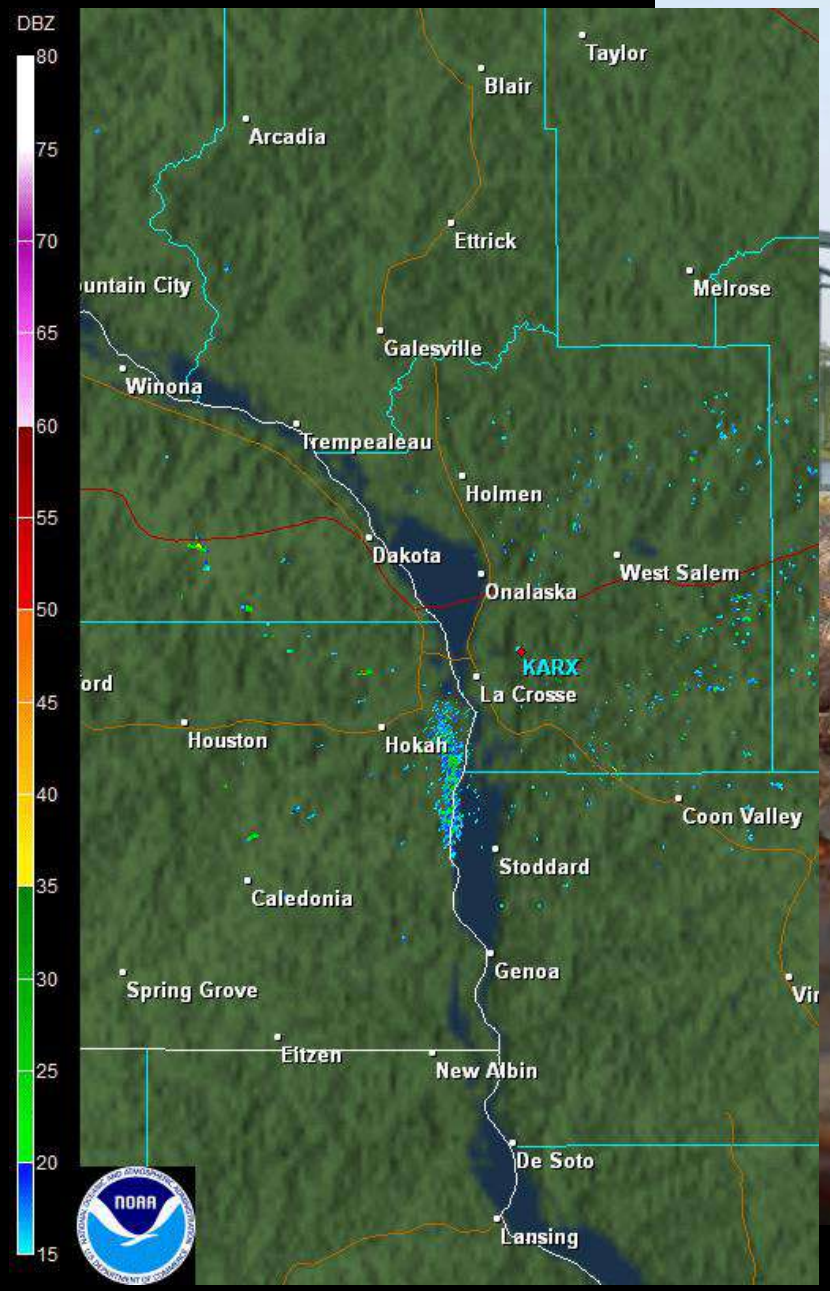


Phil Townsend



Claudette Anderson

LaCrosse, WI
June 22, 2012





Jason R. Gill

Milwaukee Journal Sentinel,


Scott Cromwell
Scott Cromwell


Andy Holt

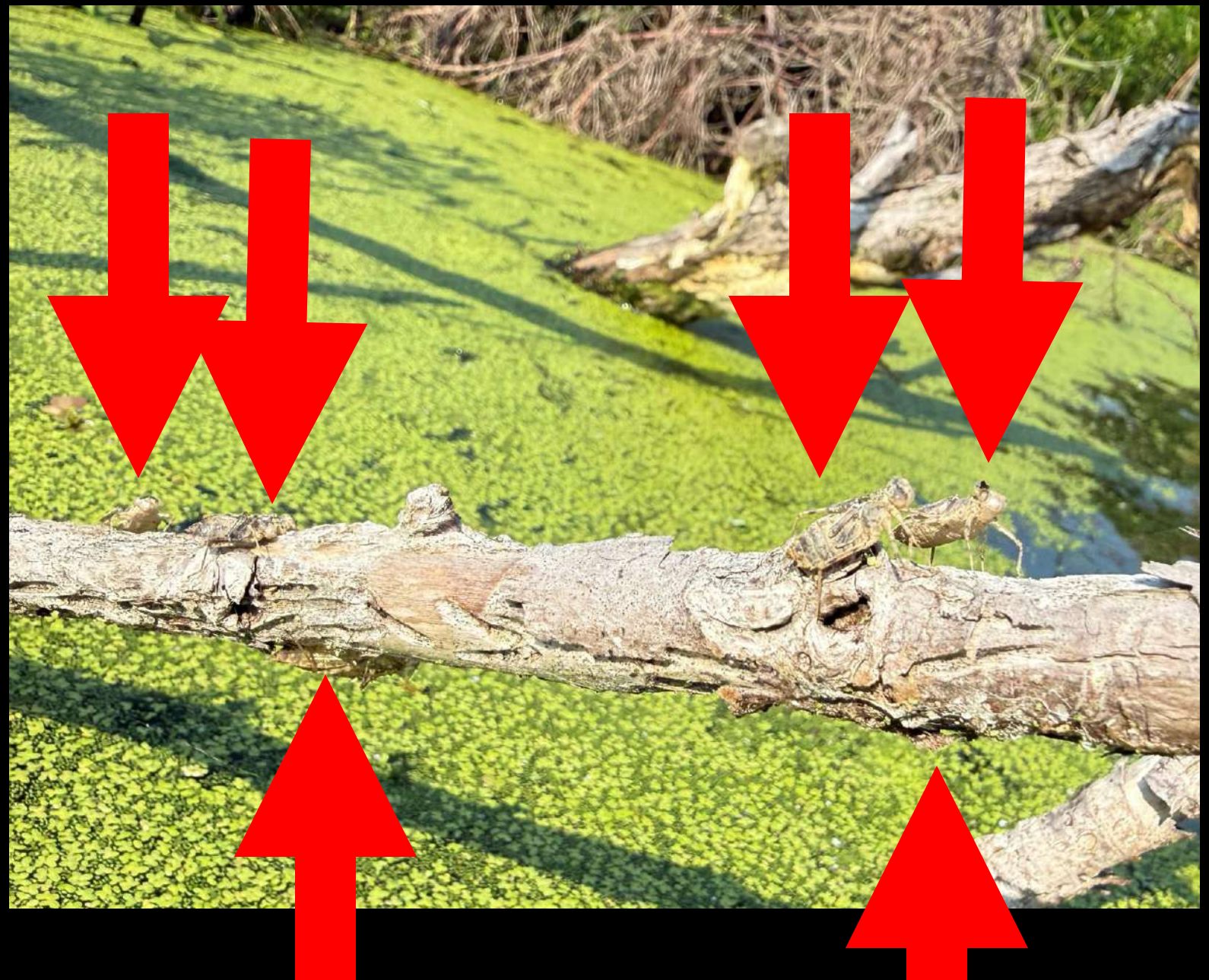

Mike Powell



Jacob Zydel

5 small ponds in Woodlawn in 2026

>20 species
>5,000 dragonflies and damselflies



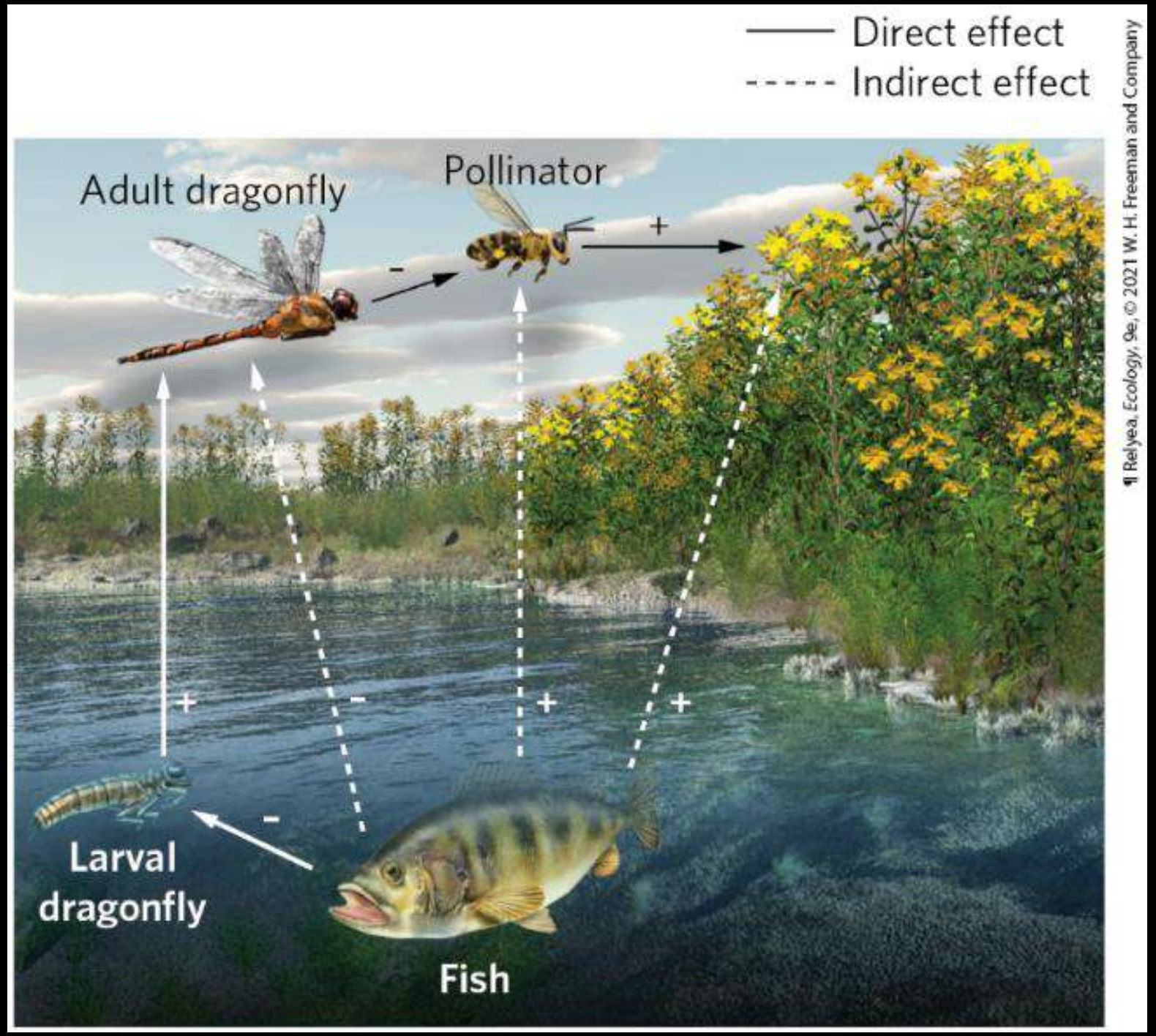


Image: Relyea 2021
Study: Knight et al. 2005

Midges over time





Náttúrurannsóknastöðin við Mývatn



Tanytarsus gracilentus

Count

1,000,000

10,000

100

1980

1990

2000

2010

2020

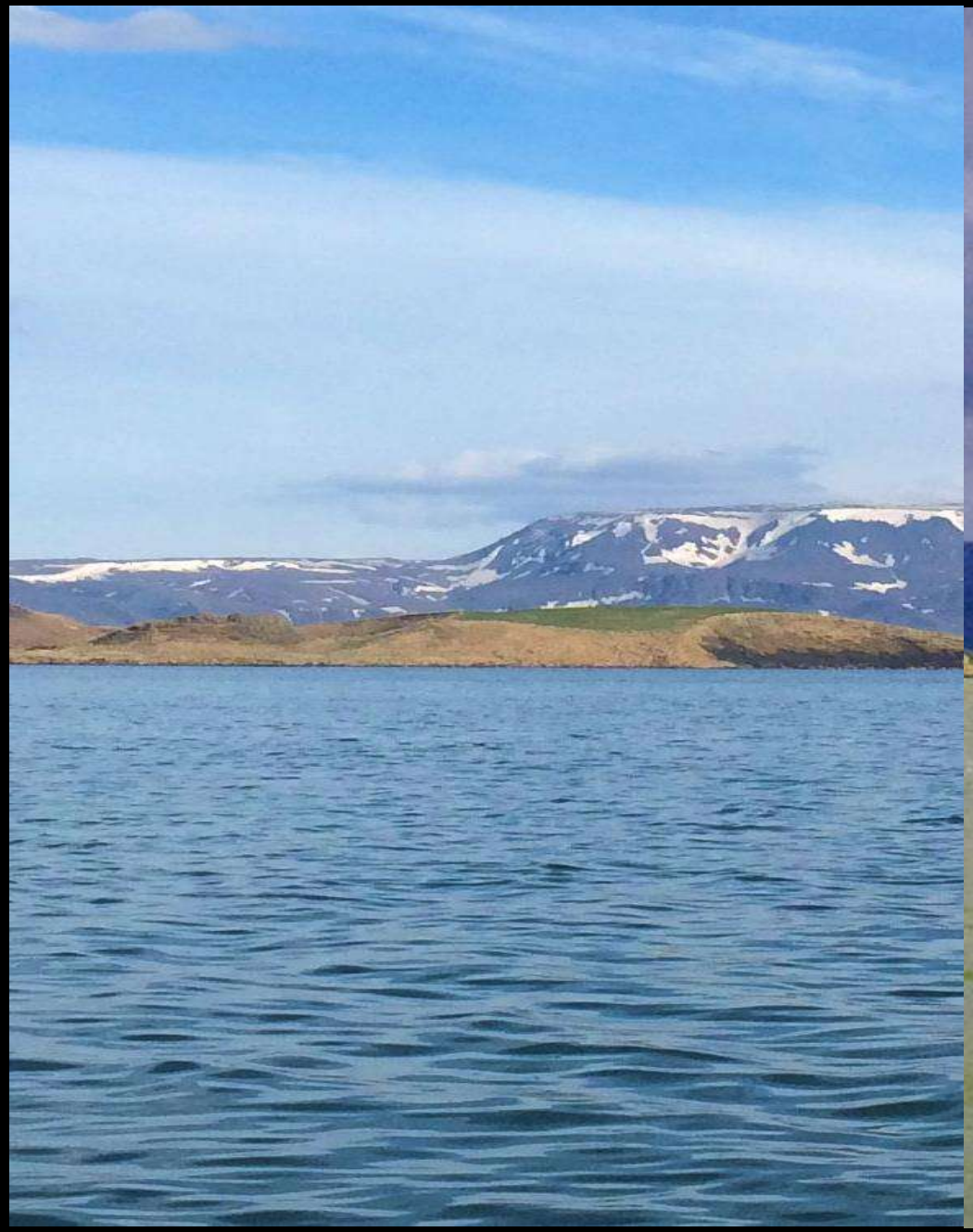
Year



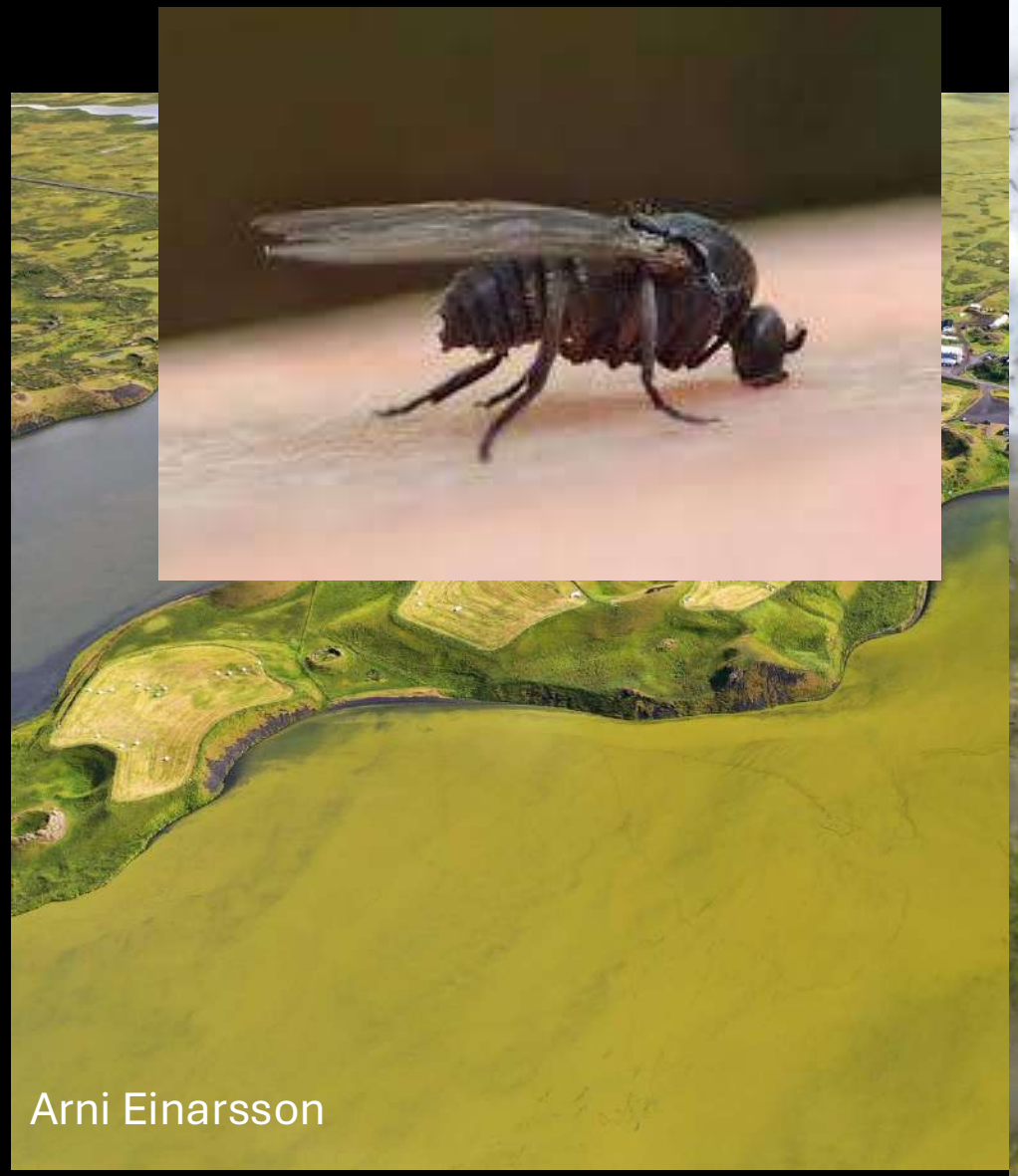
A.R. Ives



Árni Einarsson







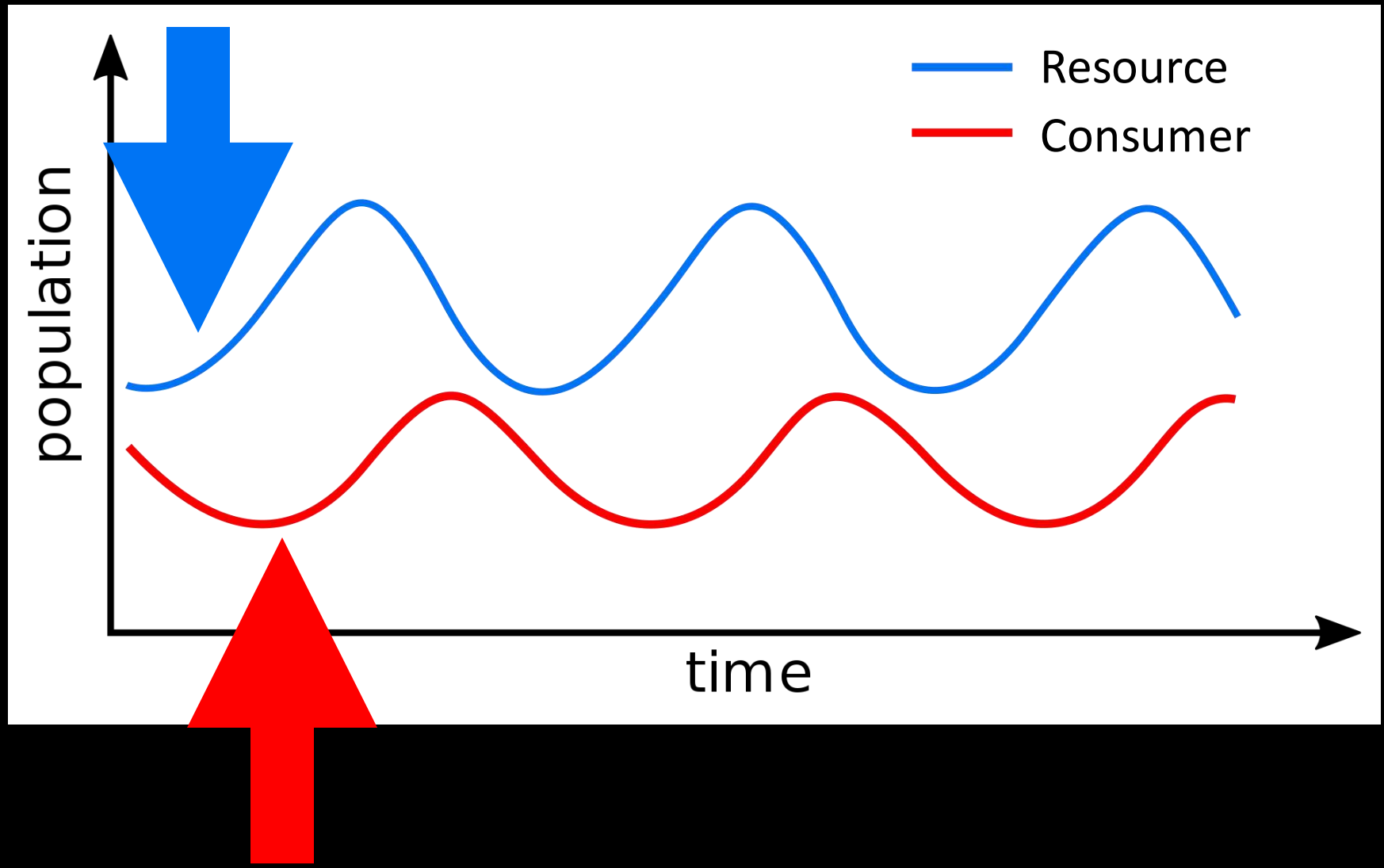
Arni Einarsson

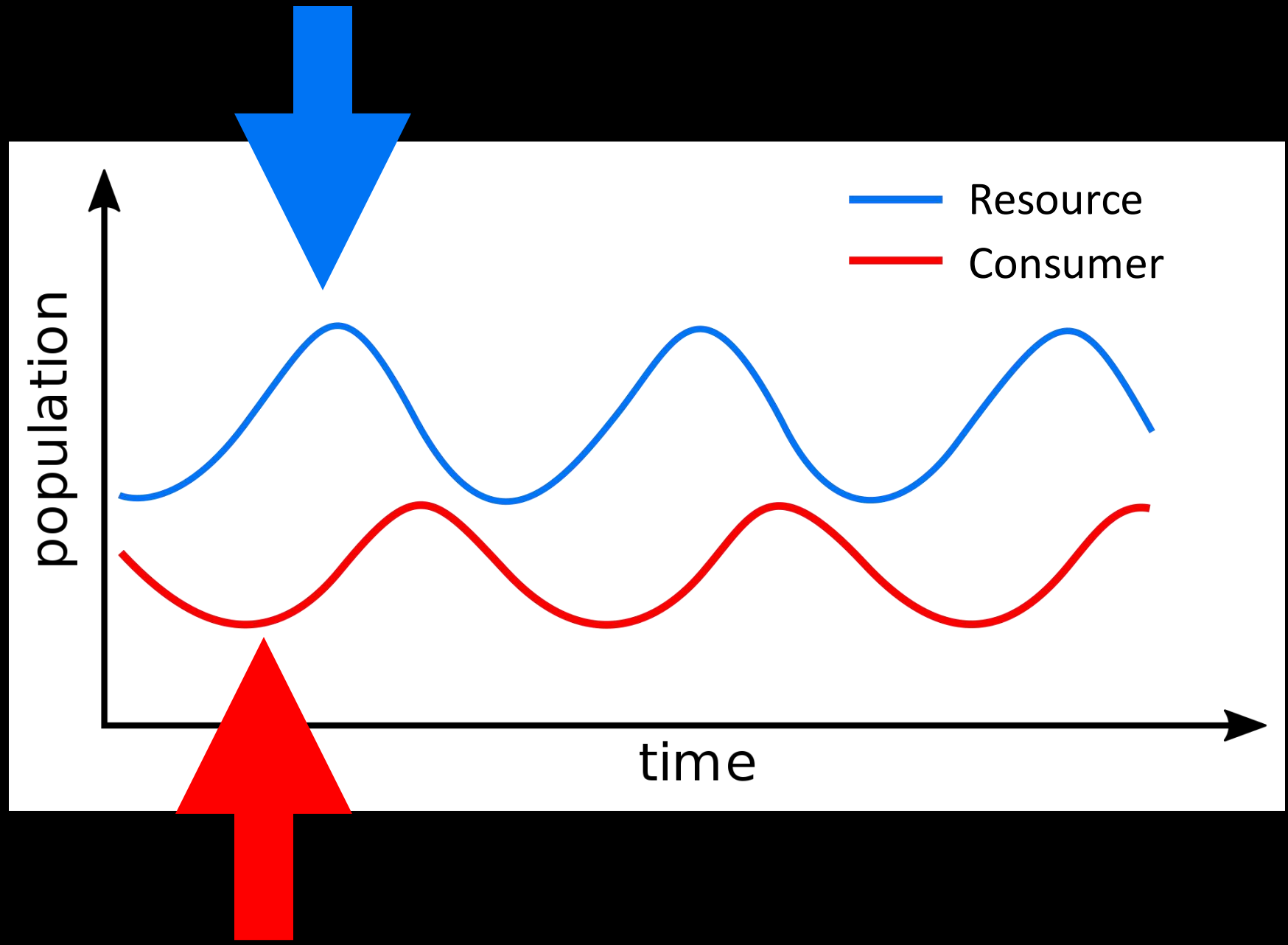


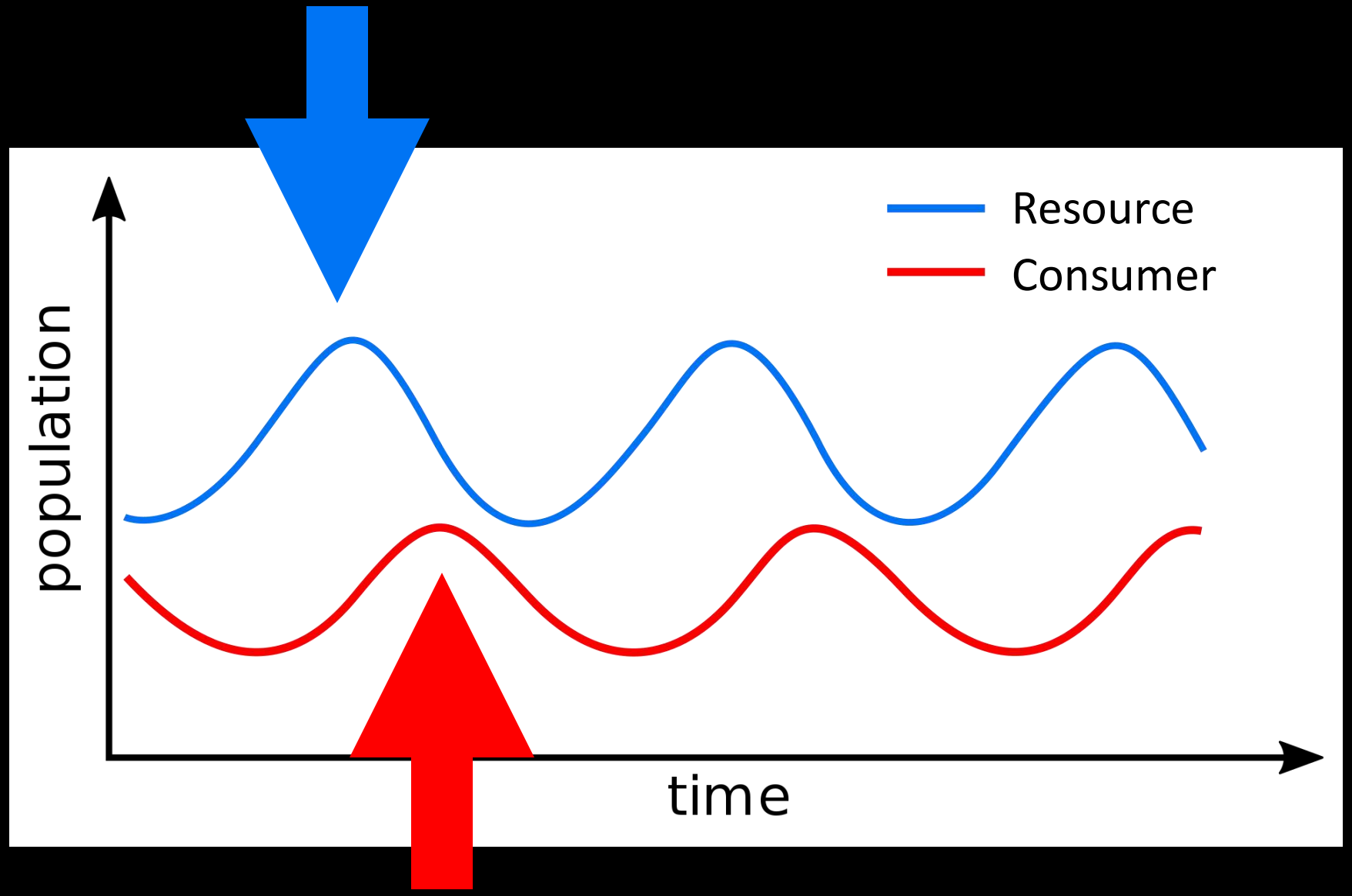
Tony Ives

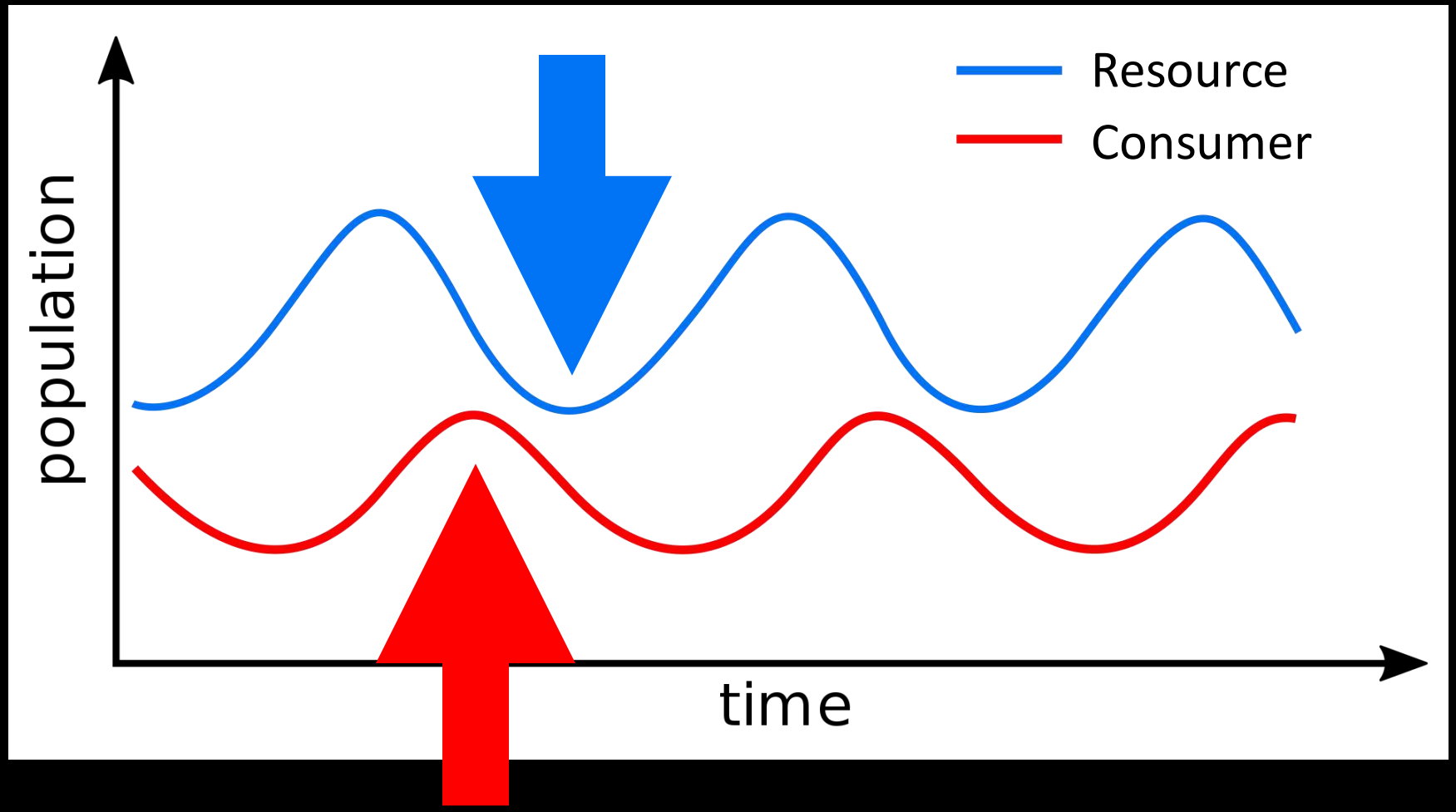


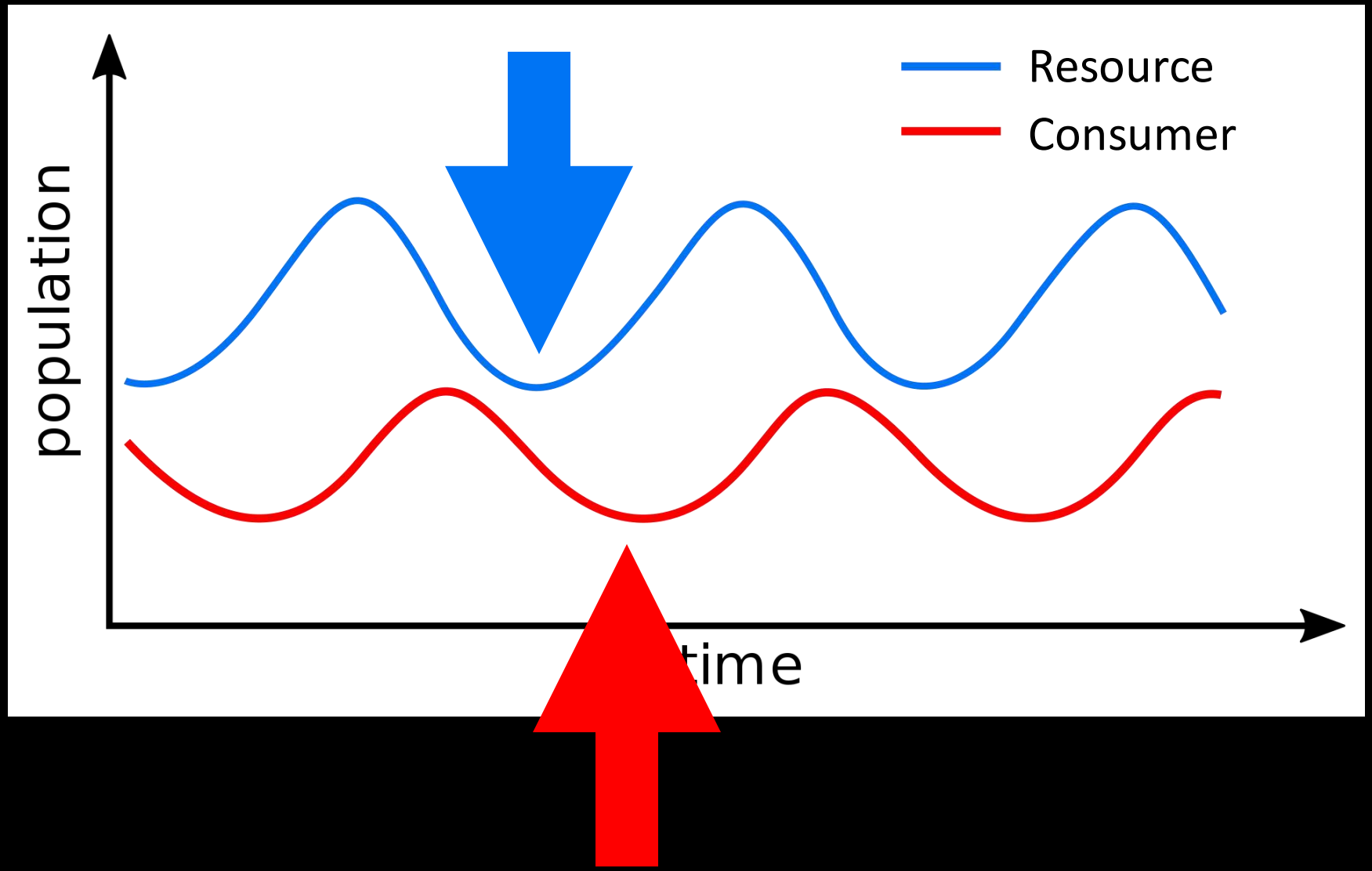
Tanytarsus gracilentus
1,000,000
10,000
100
Count
1980
1990
2000
2010
2020
Year

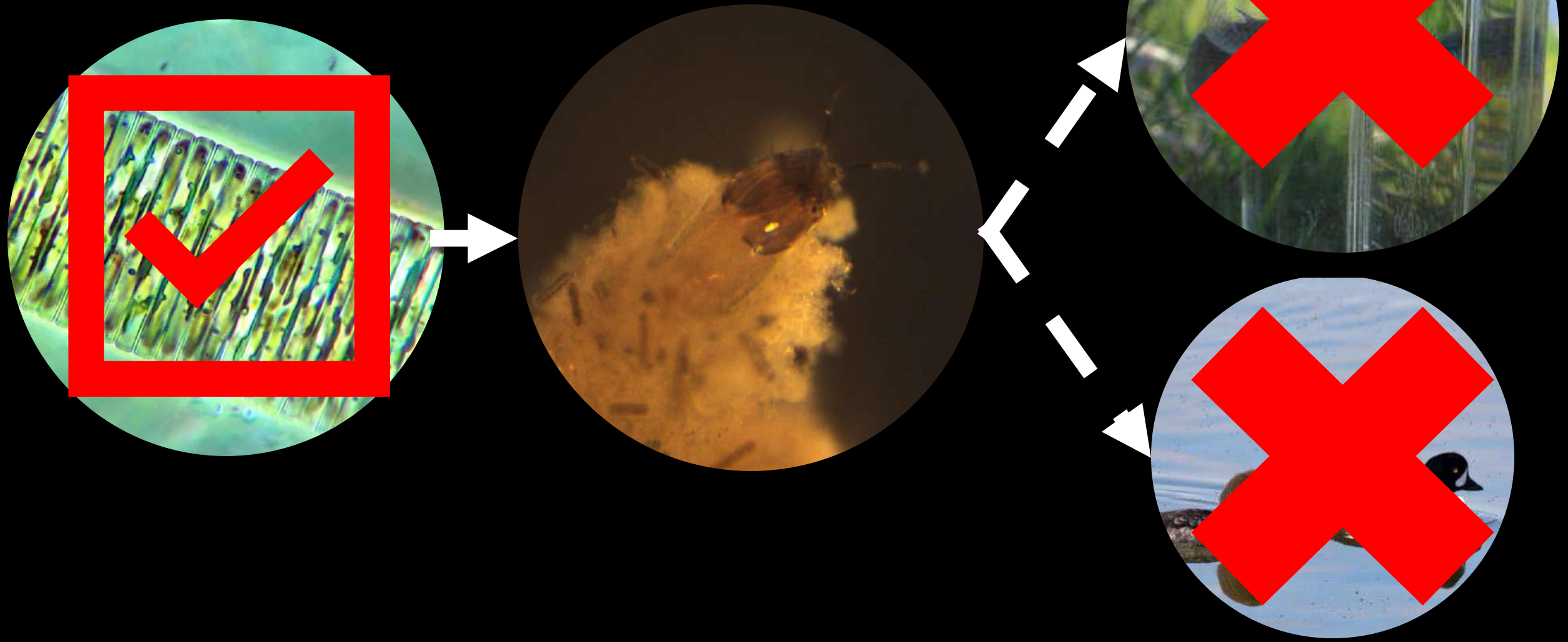

Resource
Consumer
population
time


Resource
Consumer
population
time


Resource
Consumer
population
time


Resource
Consumer
population
time


Resource
Consumer
population
time



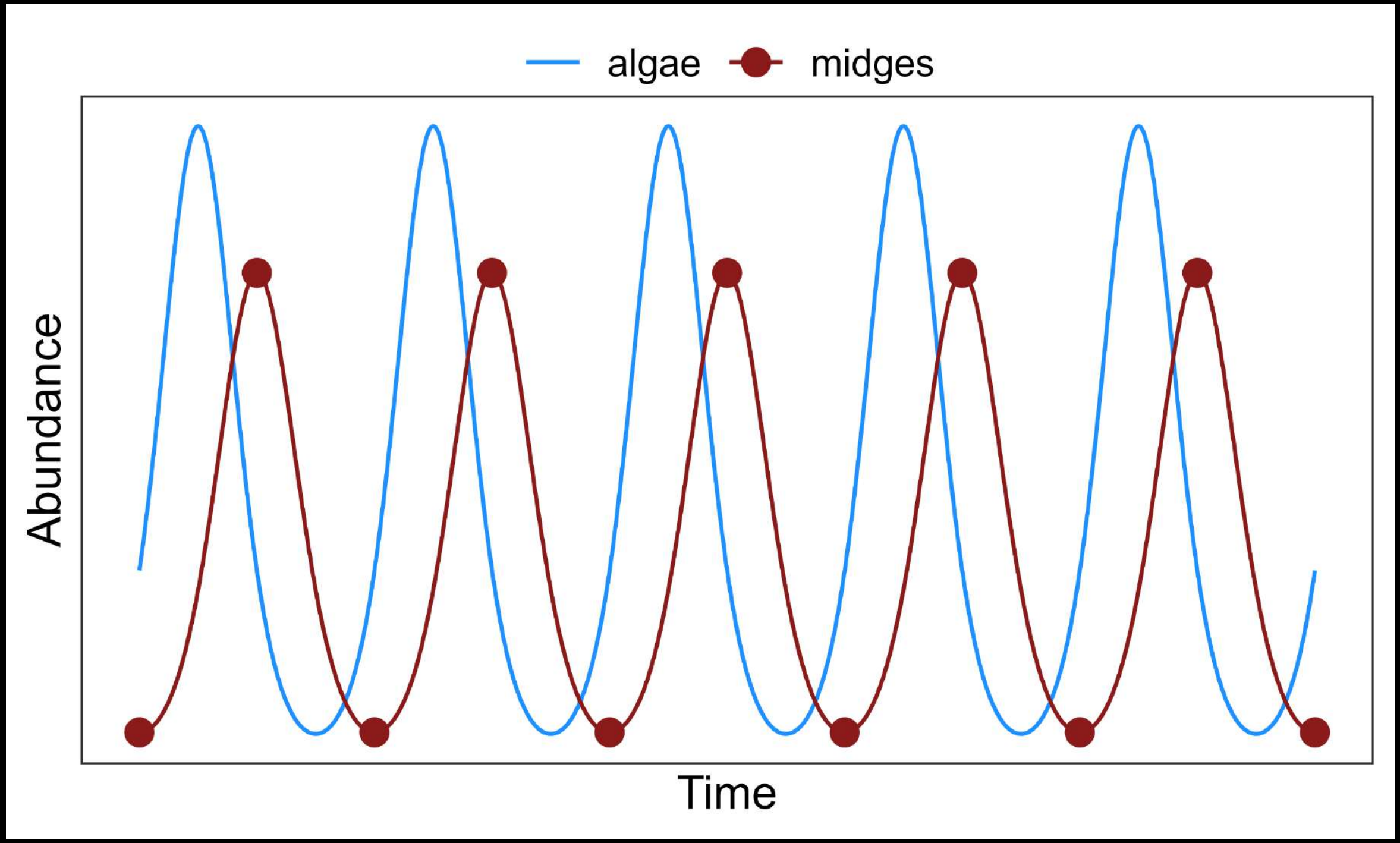
Photos: Andrei Savitsky, Bjarni Kristjansson, Arni Einarsson

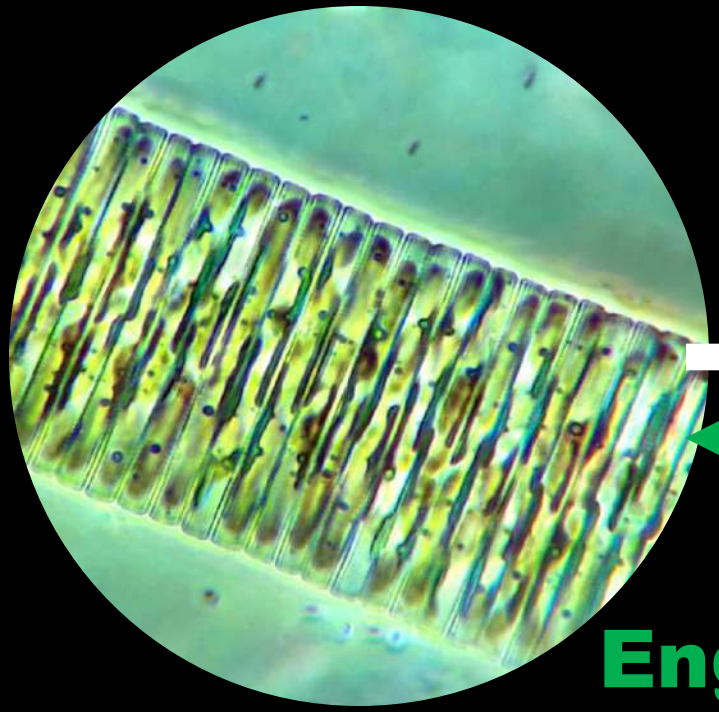


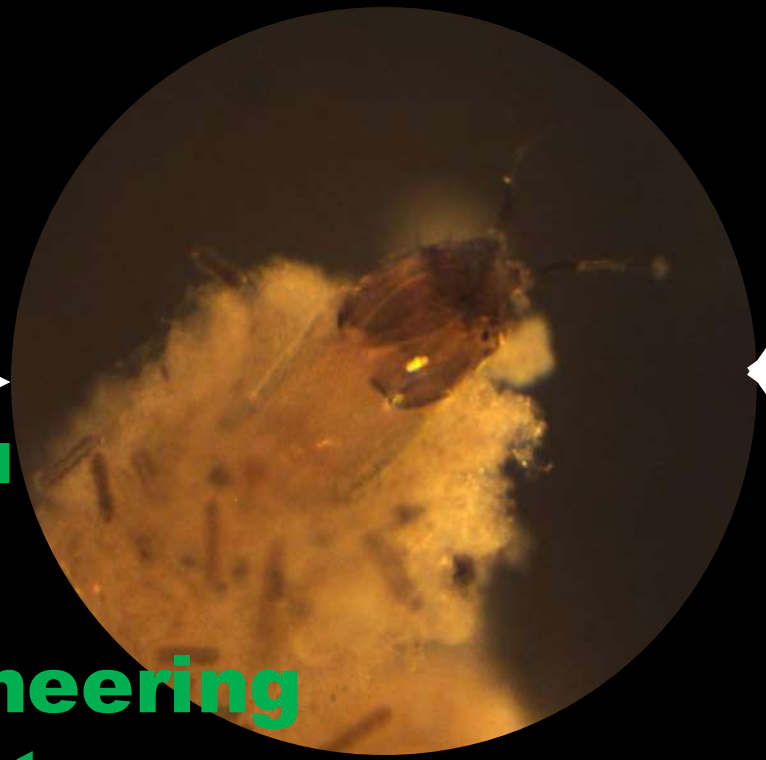
Tanytarsus gracilentus

1,000,000
10,000
100
Count

1980
1990
2000
2010
2020
Year


algae
midges
Abundance
Time





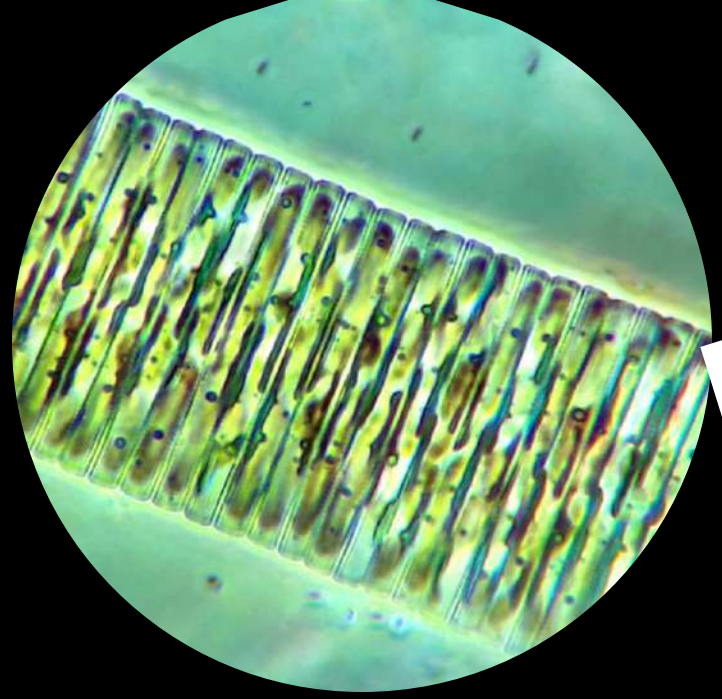
Engineering Effect

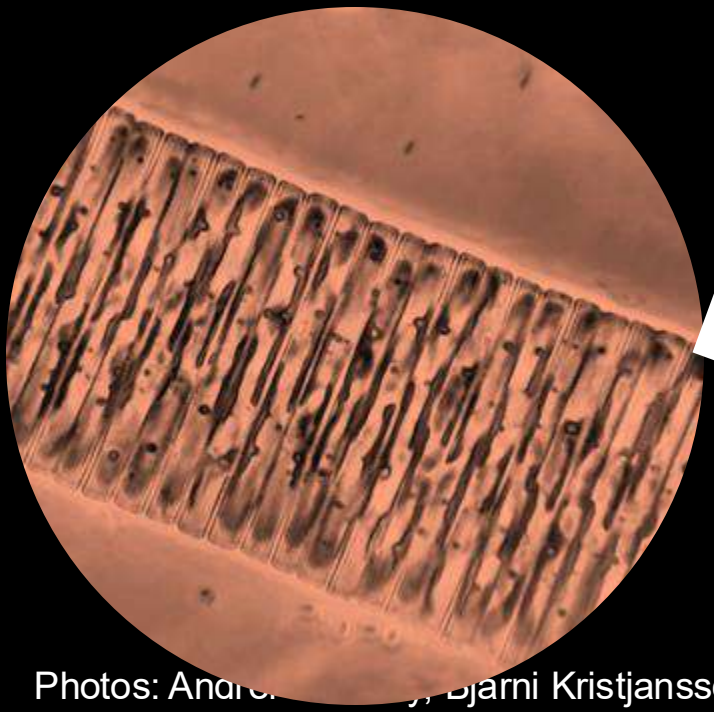
“farming”





Photos: Andrei Savitsky, Bjarni Kristjansson, Arni Einarsson







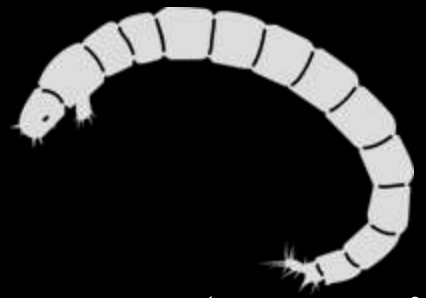




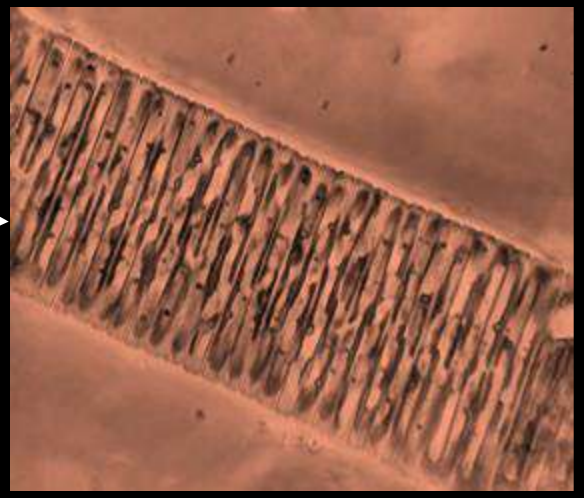
Photos: Andre[illegible], Bjarni Kristjansson, Arni Einarsson

Favorable

- High survival and growth
- Detrital pool increases





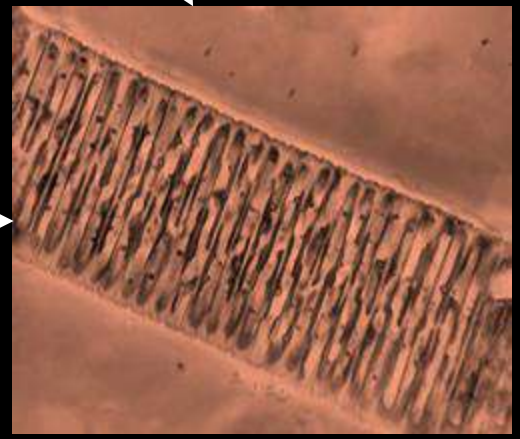


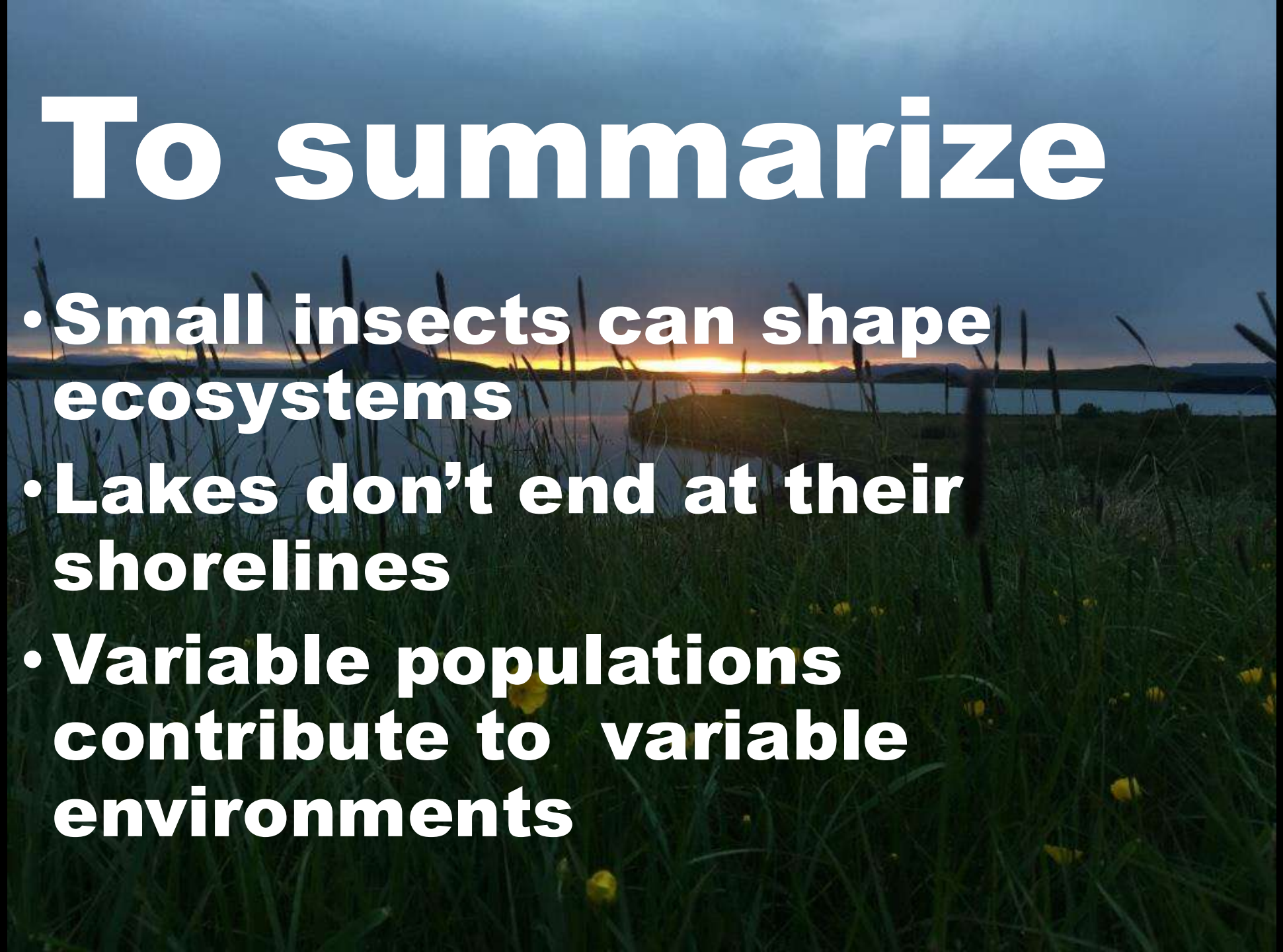
Unfavorable

- Lower survival and growth
- Detrital pool decreases









To summarize

- Small insects can shape ecosystems
- Lakes don’t end at their shorelines
- Variable populations contribute to variable environments

“I’m part of the nature here. I’m just one link on the chain. You see, the midge eats the algae, the trout eats the midge, and I eat the trout”

Finnbogi Stefánsson (Local Farmer from Geirastaðir at Mývatn)

The Laxá Farmers (*Hvellur*) (2013)

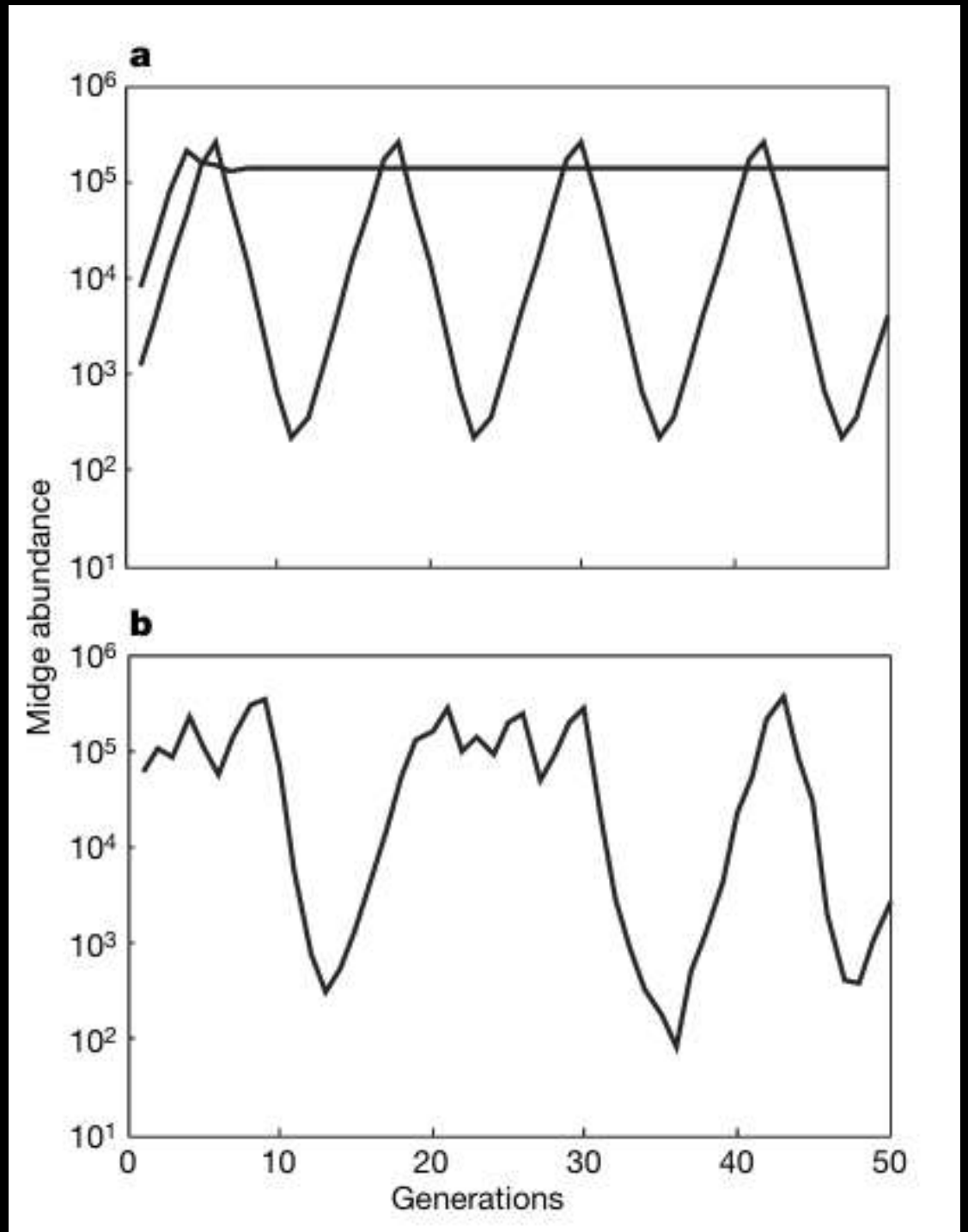

Thank You!

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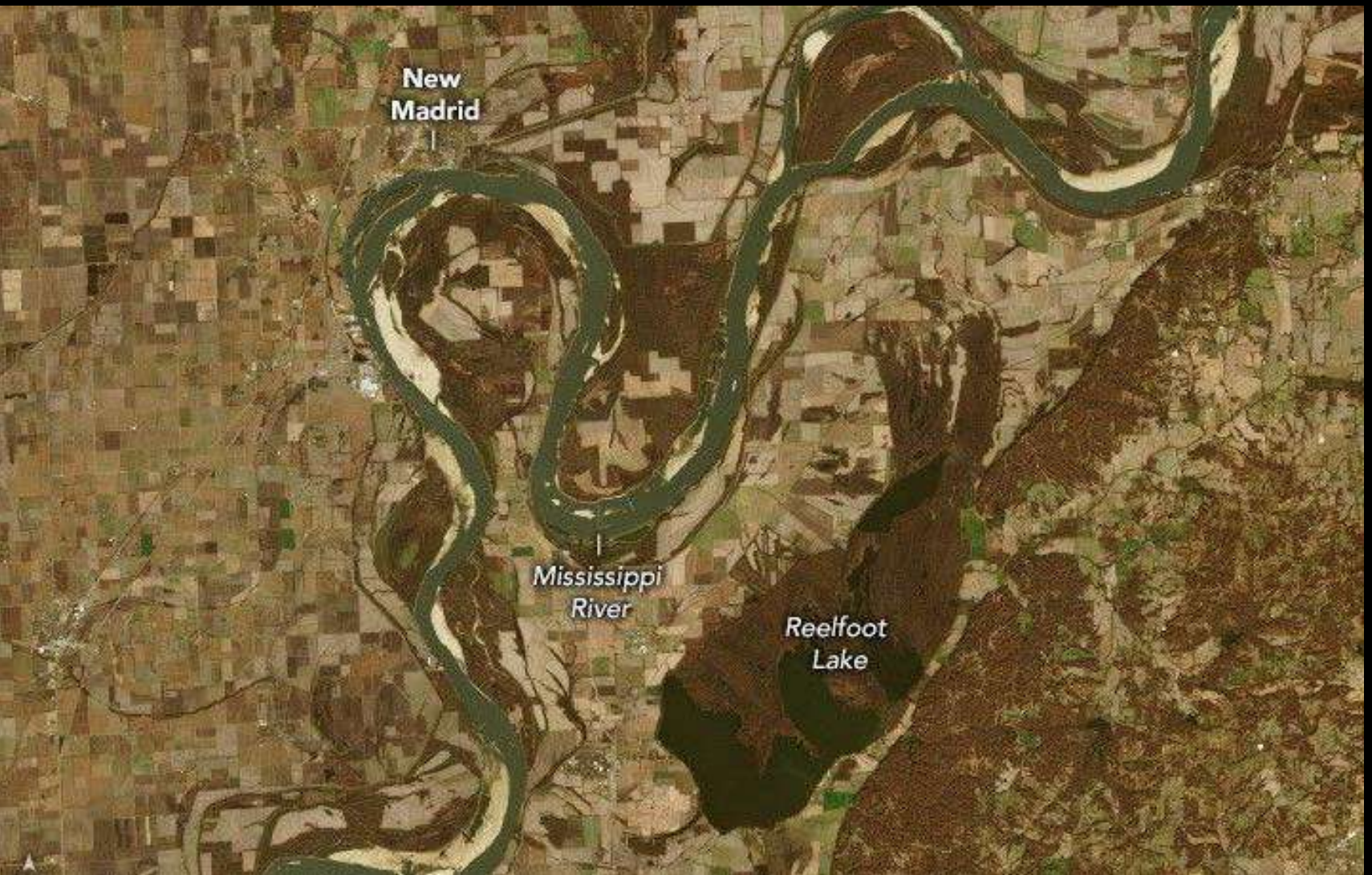
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