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INTRODUCTION

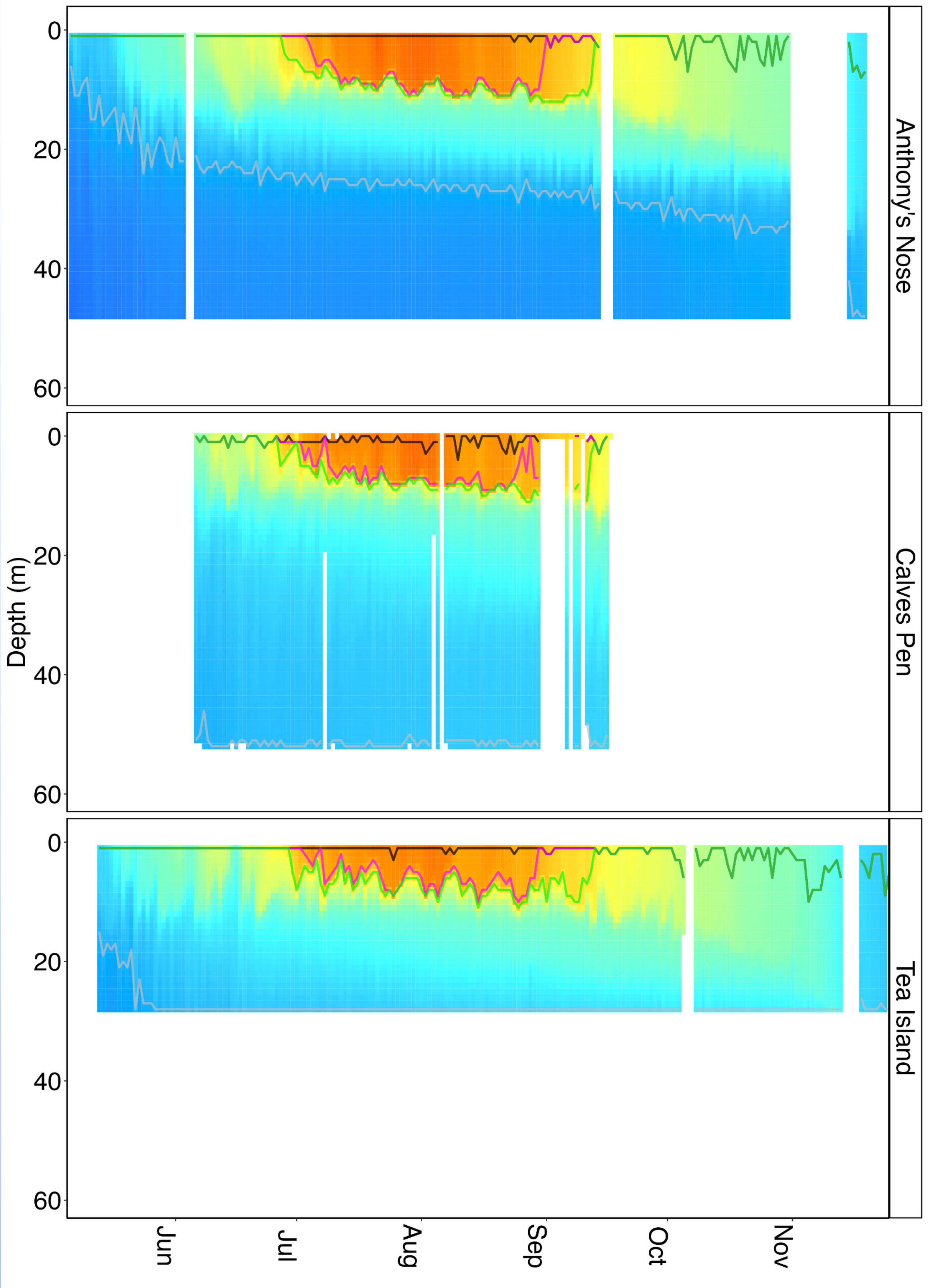
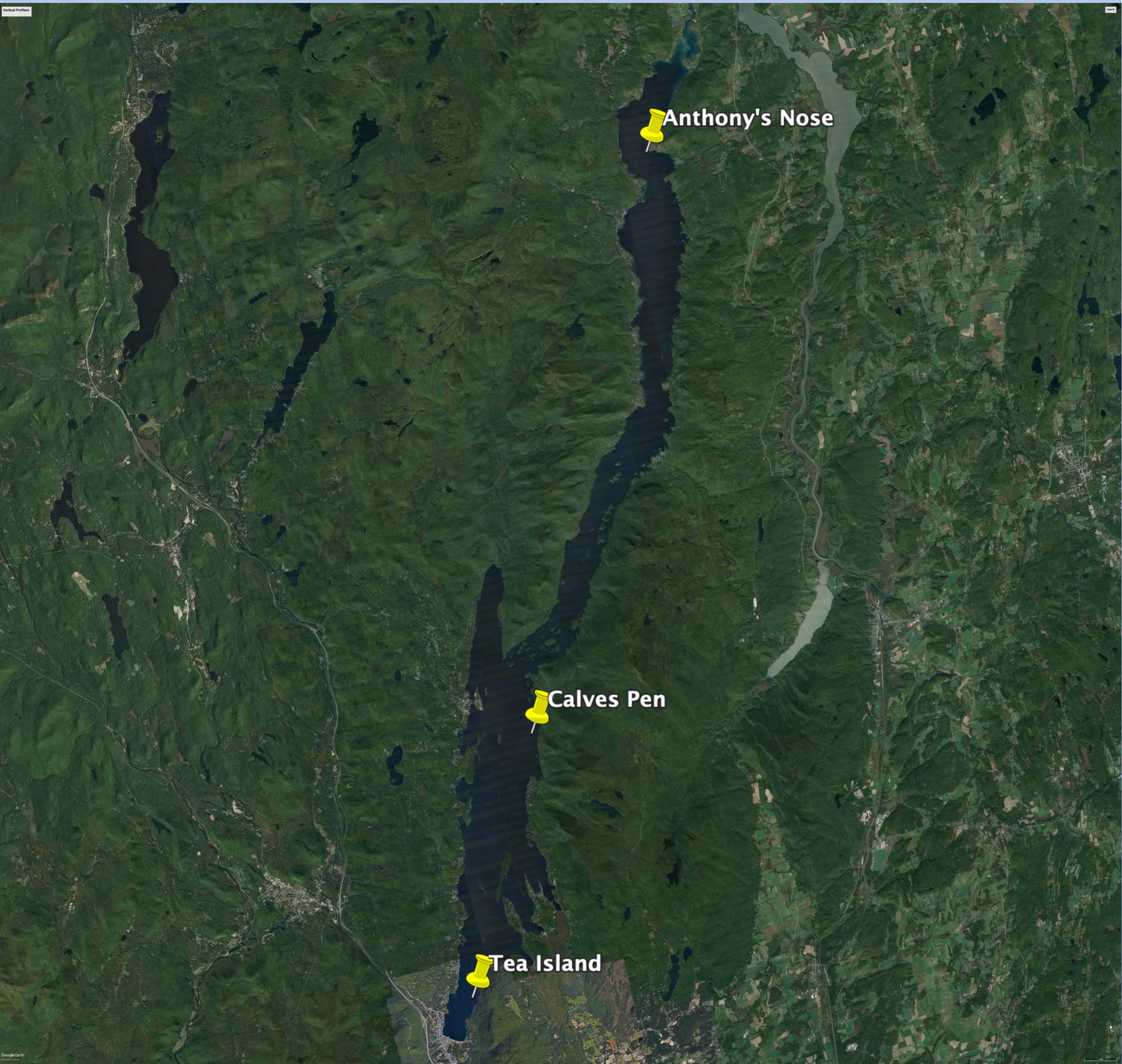
- Lakes around the world are rapidly warming due to anthropogenic climate change.
- Bioenergetic models can help simulate optimal fish growth.
- Optimal temperatures can help determine where in the lake each species is likely to be present.
- As temperatures warm, different fish guilds might thrive.

METHODS

- We used Fisheries Bioenergetics 4 to model thermal optimal growth temperatures for 4 cold- to warm-water species in Lake George, NY.
- We estimated fish location at three different sites by tracking the depth closest to their optimal temperature in 2019.

STUDY SITES

Site name	Location	Depth
Anthony's Nose	Northern Basin	50m
Calves Pen	Southern Basin	55m
Tea Island	Caldwell Sub-basin	30m



Species

- Brook Trout
- Largemouth Bass
- Northern Pike
- Yellow Perch

Water Temperature (°C)

30
25
20
15
10
5
0

Figure 1. Daily vertical water temperature data from 2019 at Anthony's Nose (a), Calves Pen (b), and Tea Island (c). Depths with the minimum absolute difference from the optimal temperature for each species are colored: gray for Brook Trout, black for Largemouth Bass, magenta for Northern Pike, and green for Yellow Perch.

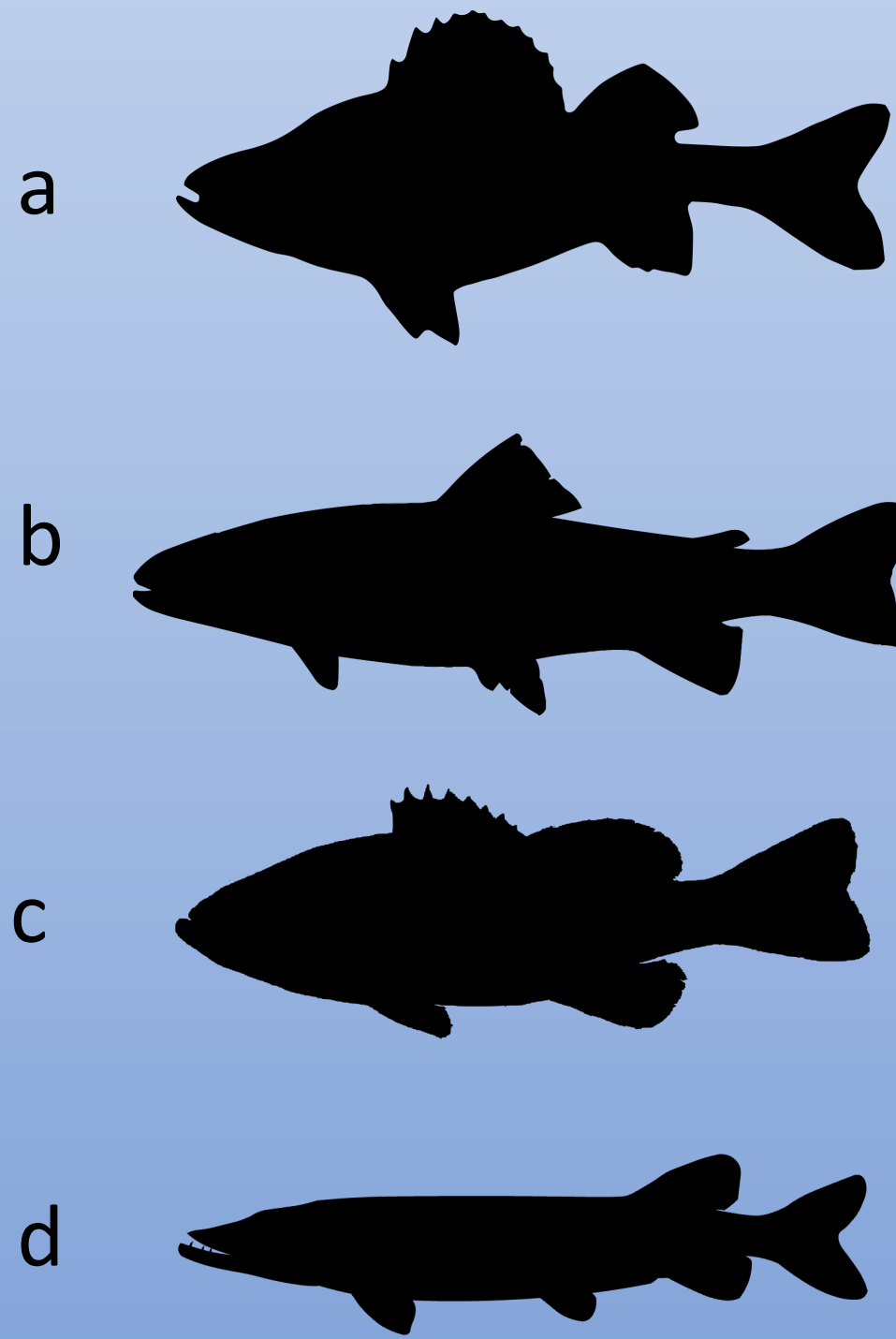


Figure 2. Percent change in mass over 100 days at constant temperatures with optimal temperature as a red diamond for Yellow Perch (a 21°C), Brook Trout (b 7°C), Largemouth Bass (c 27°C), and Northern Pike (d 21°C).

DISCUSSION

Fish Depth Overlap

- We observed depth overlap between Bass, Pike, and Perch in non-stratified months, and large overlap between Perch and Pike during the summer.
- Depth overlap could have implications for either predator-prey relationships or resource competition.

Site specific differences may dictate where species are found

- Tea Island is shallow and warmer than Anthony's Nose.
- Calves Pen is a similar depth as Anthony's Nose but is much warmer.
- This could be due to differences in site specific bathymetry or stream inflows.
- More work should investigate the drivers of deep-water temperature differences between these two sites and how this impacts the distribution of fishes.

Struggling Species

- Both Bass and Brook Trout currently struggle to find their optimal temperature.
- Brook Trout need deep, cold, and well oxygenated water. The lake is too warm in some areas for Brook Trout.
- Lake George surface temperatures have not yet warmed to 27°C, making it difficult for Bass to find their optimal temperature.

How Will The Distribution Of Species Change In Lake George In A Warmer World?

- Lake George is warming faster than other lakes around the world.
 - Bass may thrive in a warmer Lake George.
 - Brook Trout may struggle.
- We plan to apply a hydrodynamic model to simulate future water temperatures in Lake George under various climate warming scenarios.

REFERENCES

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We would like to thank the Jefferson Project, IBM, RPI, and The Lake George Association. Special thanks to Mark Lucius and Kevin Rose.