Manuscript title here

## Analysis

## Reproducibility

Reproducibility receipt

## [1] "2022-12-02 11:11:58 CST"

## Local: main C:/Users/jrjunker/Documents/Projects/MTU\_projects/temperature\_energy-flux  
## Remote: main @ origin (git@github.com:jimjunker1/temperature\_energy-flux.git)  
## Head: [938a75c] 2022-12-01: updated manuscript version 2

## R version 4.2.1 (2022-06-23 ucrt)  
## Platform: x86\_64-w64-mingw32/x64 (64-bit)  
## Running under: Windows 10 x64 (build 19045)  
##   
## Matrix products: default  
##   
## locale:  
## [1] LC\_COLLATE=English\_United States.utf8   
## [2] LC\_CTYPE=English\_United States.utf8   
## [3] LC\_MONETARY=English\_United States.utf8  
## [4] LC\_NUMERIC=C   
## [5] LC\_TIME=English\_United States.utf8   
##   
## attached base packages:  
## [1] stats graphics grDevices utils datasets methods base   
##   
## loaded via a namespace (and not attached):  
## [1] compiler\_4.2.1 magrittr\_2.0.3 fastmap\_1.1.0 cli\_3.3.0   
## [5] tools\_4.2.1 htmltools\_0.5.2 rstudioapi\_0.13 yaml\_2.3.6   
## [9] stringi\_1.7.8 rmarkdown\_2.17 knitr\_1.39 git2r\_0.30.1   
## [13] stringr\_1.4.1 xfun\_0.31 digest\_0.6.29 rlang\_1.0.6   
## [17] evaluate\_0.15

An increasing number of theoretical and empirical studies are beginning to explore the implications of warming for the stability of ecosystems (**fussmann2014?**). ‘Natural laboratories’, such as the geothermal watershed studied here, offer a unique opportunity to isolate the effects of warming and the dominant processes by which it may modulate ecosystem structure and dynamics (O’Gorman et al. 2014). Particularly relevant in our study is the stability and functioning of light-driven ecosystems in response to present and future warming. One aspect of climate change that is especially pronounced in high-latitude ecosystems is the decoupling of light regimes—and thereby energy supply regimes—and the timing of temperature-driven metabolic demands (**huryn2019a?**, **mcmeans2015?**). Here, our within-community contrast in how warming skewed fluxes through taxa with respect to *P:B* vs. body size may shed light on the proximate ways in which temperature alters ecosystem structure and function. Temperature–size responses vary with a number of ecological factors (**ohlberger2013?**); however, warming-induced body size reductions act as a stabilizing process in consumer-resource interactions by reducing consumer:resource biomass ratios (**osmond2017?**, **gilbert2014?**, **sentis2017?**) and consumer energy demand relative to resource supply (**kozlowski2004?**, **delong2012a?**, **mccann2011?**). This gives credence to alternative models of organism body size optimization influenced by, for example, the balance of resource supply and energy demand (e.g., **kozlowski2004?**, **delong2012a?**). Crucially, these alternative models highlight the trade-off between asymptotic body size and metabolic demand (**delong2012a?**), a trade-off that may be particularly important in seasonally variable energetic regimes. In the absence of other limiting factors, increasing temperatures are likely to make seasonal “boom and bust” cycles of primary production more extreme because of the interactive effects of light and temperature limitation on photosynthetic rates (e.g., **rae1998?**). This process may increase the autocorrelation, as well as, the magnitude (i.e., enrichment) of resource supply, thereby, exaggerating the selection for reduced body sizes because larger and/or slower consumers may destabilize consumer-resource dynamics in the face of increasingly extreme seasonal autocorrelation of resource growth (**greyson-gaito2022?**). Thus, suggesting a connection between warming responses and a more general food web dynamic of increased relative rates of resource supply and consumer demand (e.g., paradox of enrichment, **mccann2011?**). Therefore, the general response of reduced body size along climactic or geographic temperature gradients may reflect, in part, constraints imparted by food web dynamics, in addition to, physiological mechanisms (e.g., oxygen, **deutsch2022?**, differential responses of biological process rates, **forster2011?**). The importance of this dynamic may be especially under-appreciated in high-latitude ecosystems (**mcmeans2020?**).

O’Gorman, E. J., J. P. Benstead, W. F. Cross, N. Friberg, J. M. Hood, P. W. Johnson, B. D. Sigurdsson, and G. Woodward. 2014. [Climate change and geothermal ecosystems: Natural laboratories, sentinel systems, and future refugia](https://doi.org/10.1111/gcb.12602). Global Change Biology 20:3291–3299.