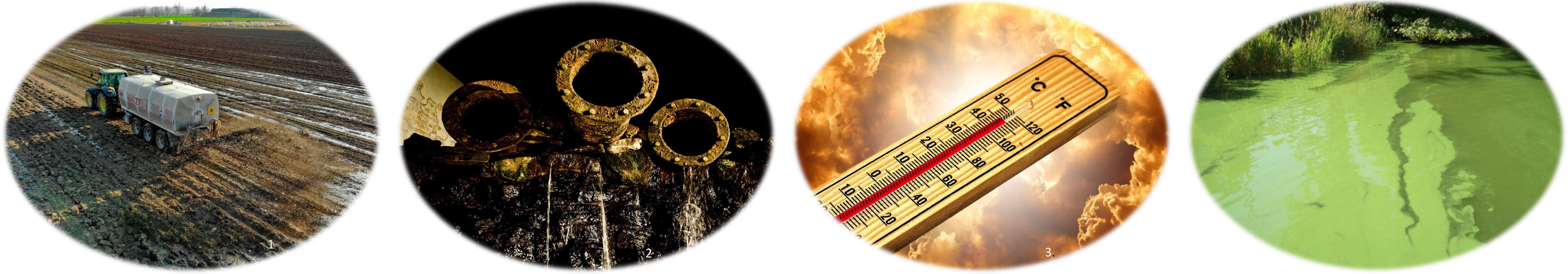


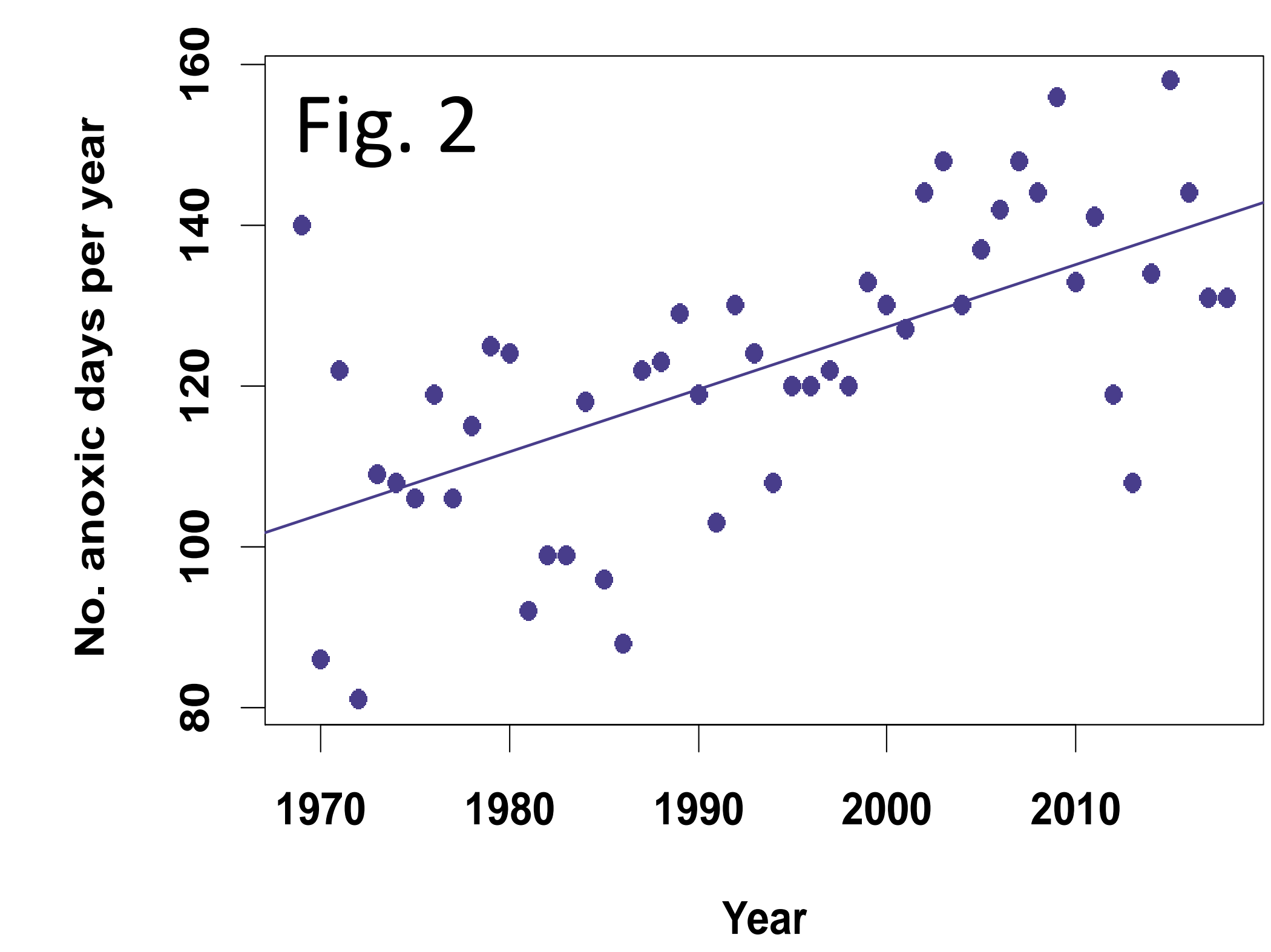
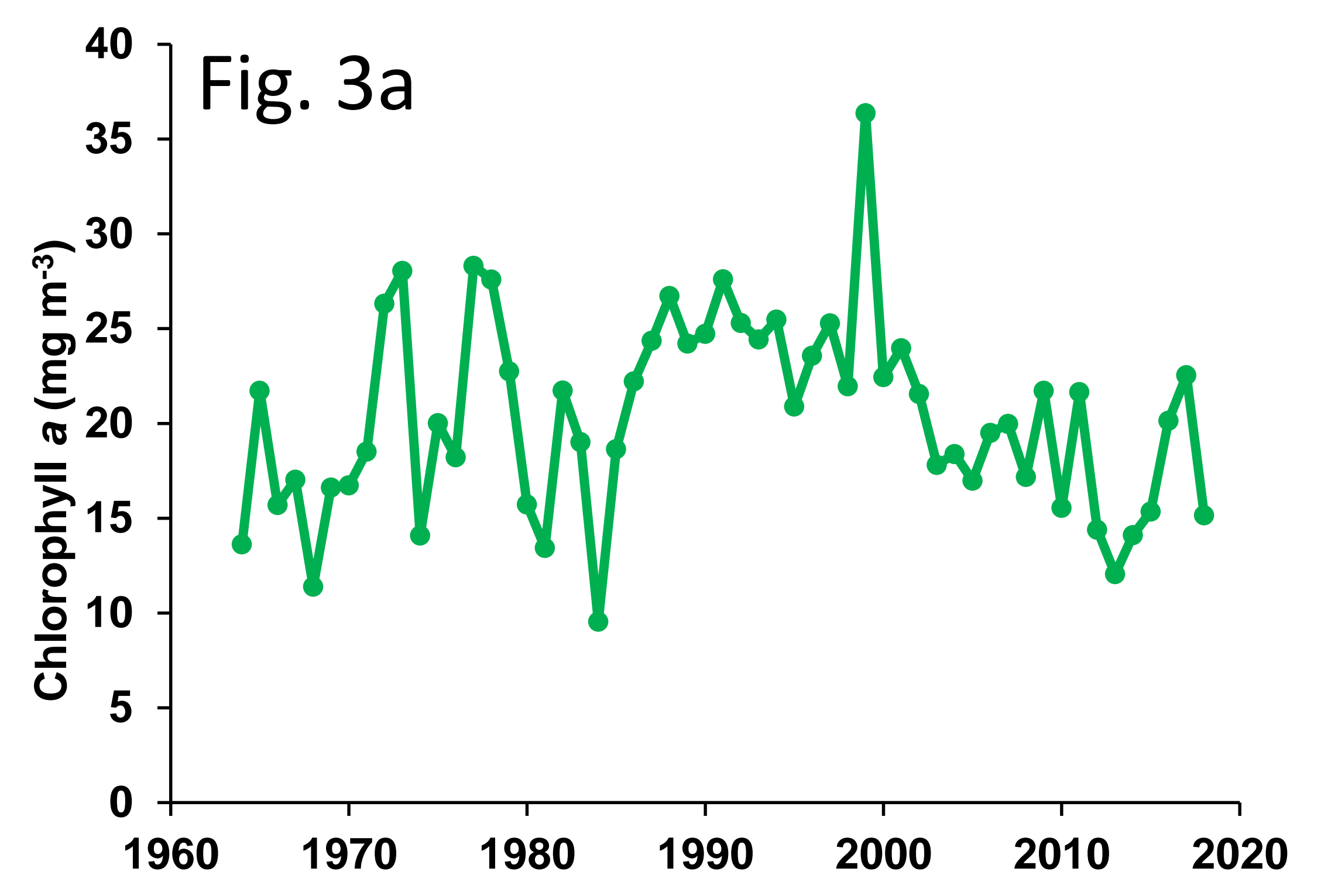
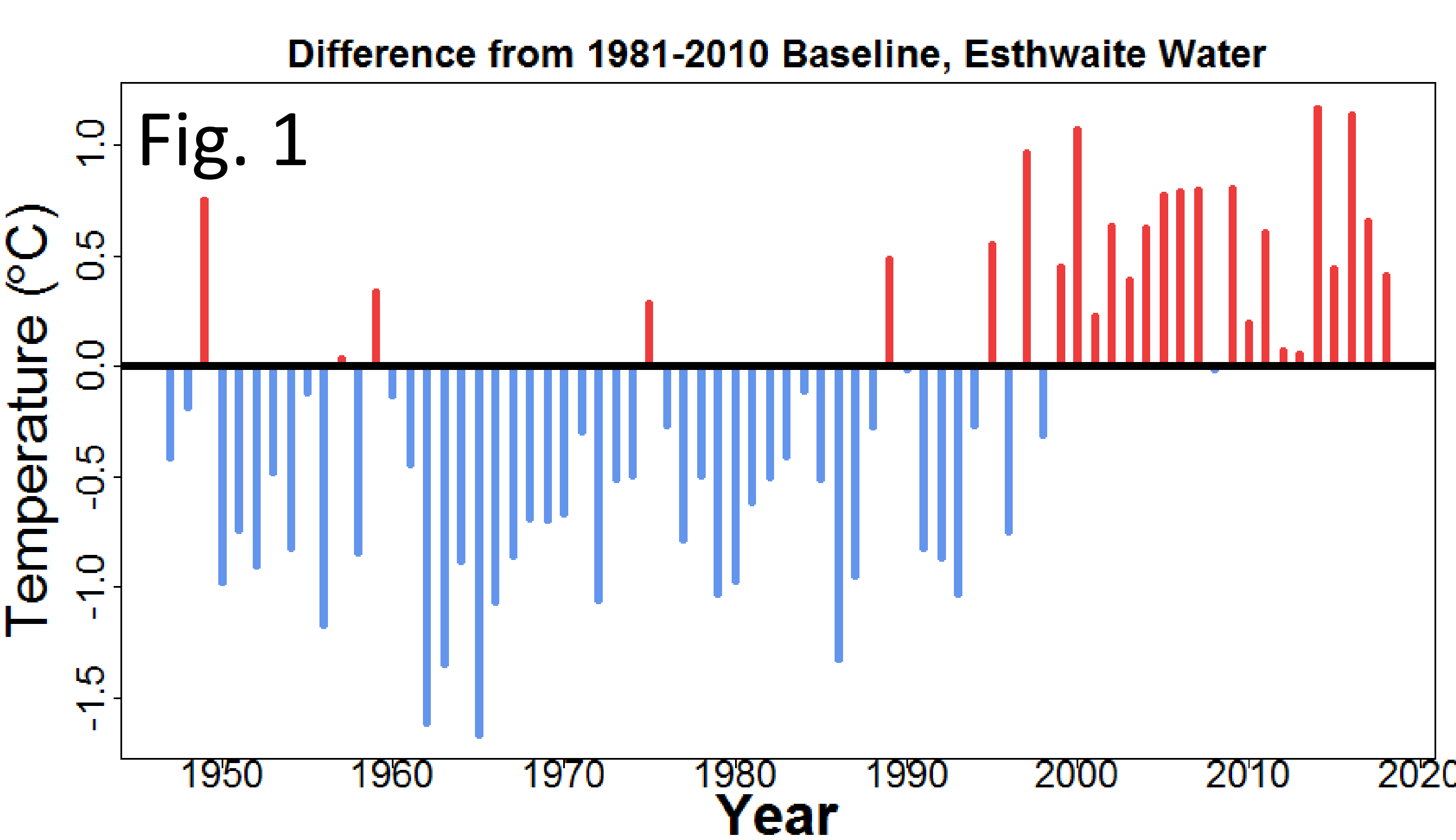
Environmental change



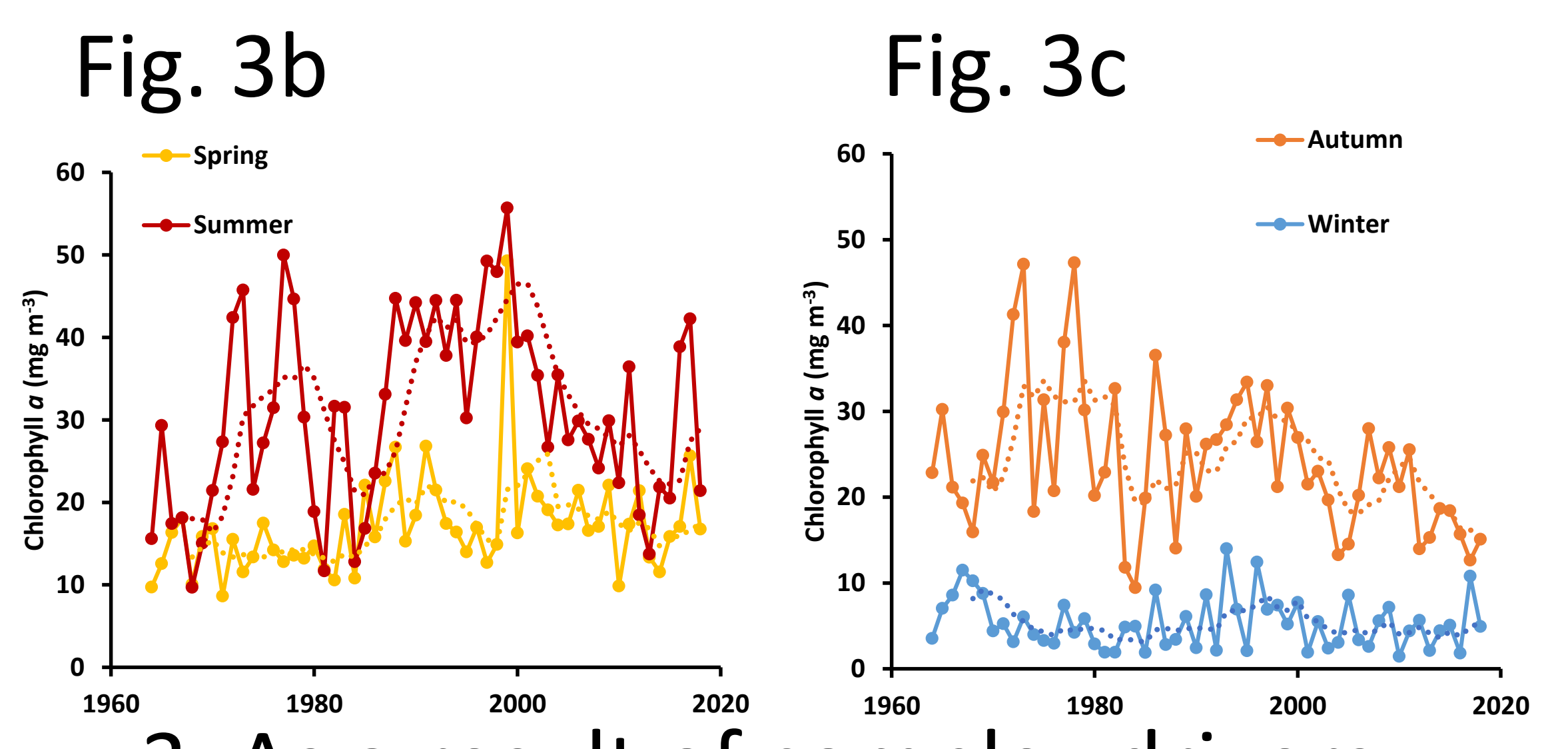
Pressures on freshwaters include pollution from agricultural runoff and wastewater, impacts of climate change, invasive species and feedbacks from ecological events like harmful algal blooms.

Ecosystem responses

1. Long-term monitoring of lake ecosystems allows detection of environmental change e.g. multi-decadal increases in surface water temperature (Fig. 1).

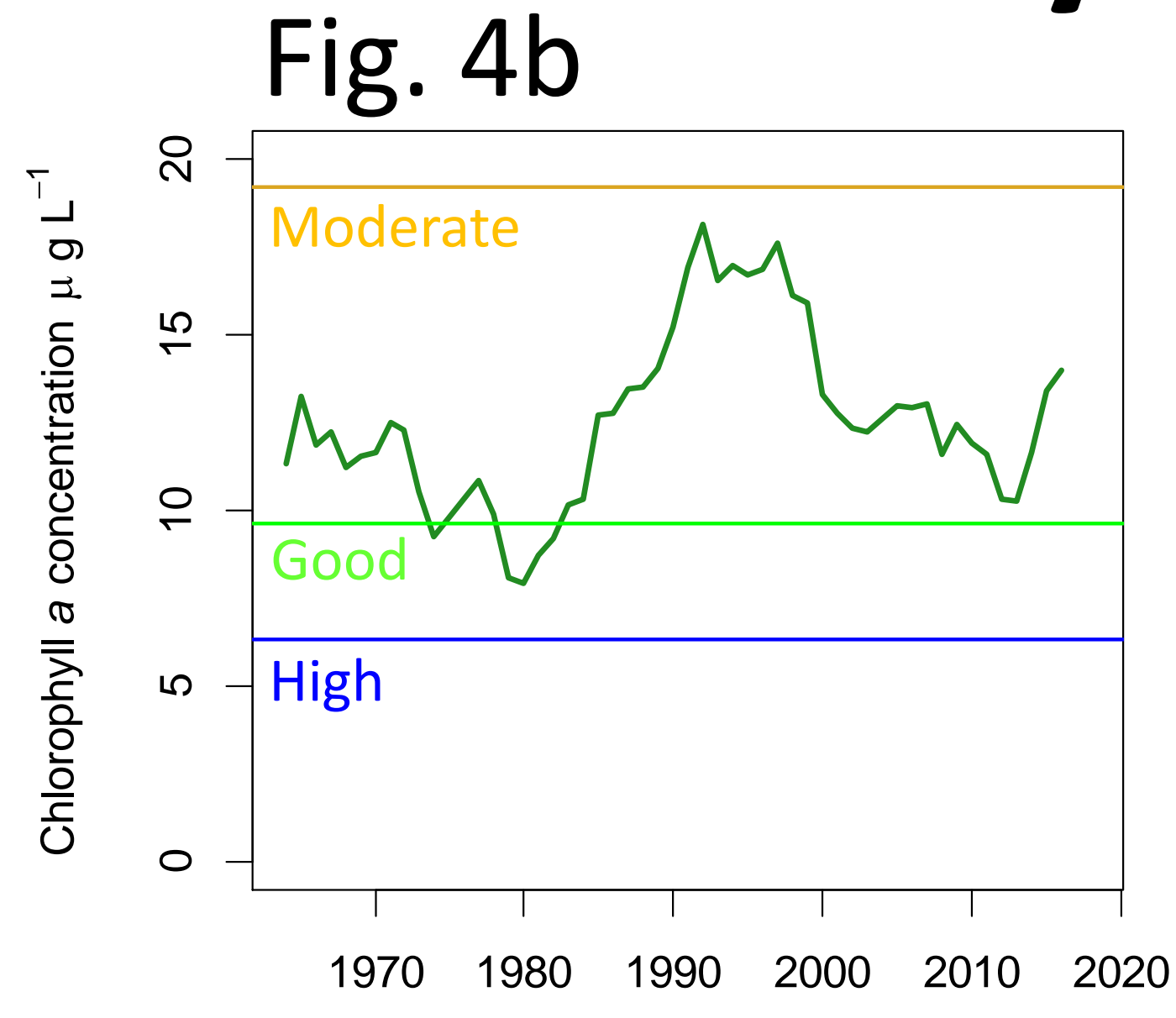
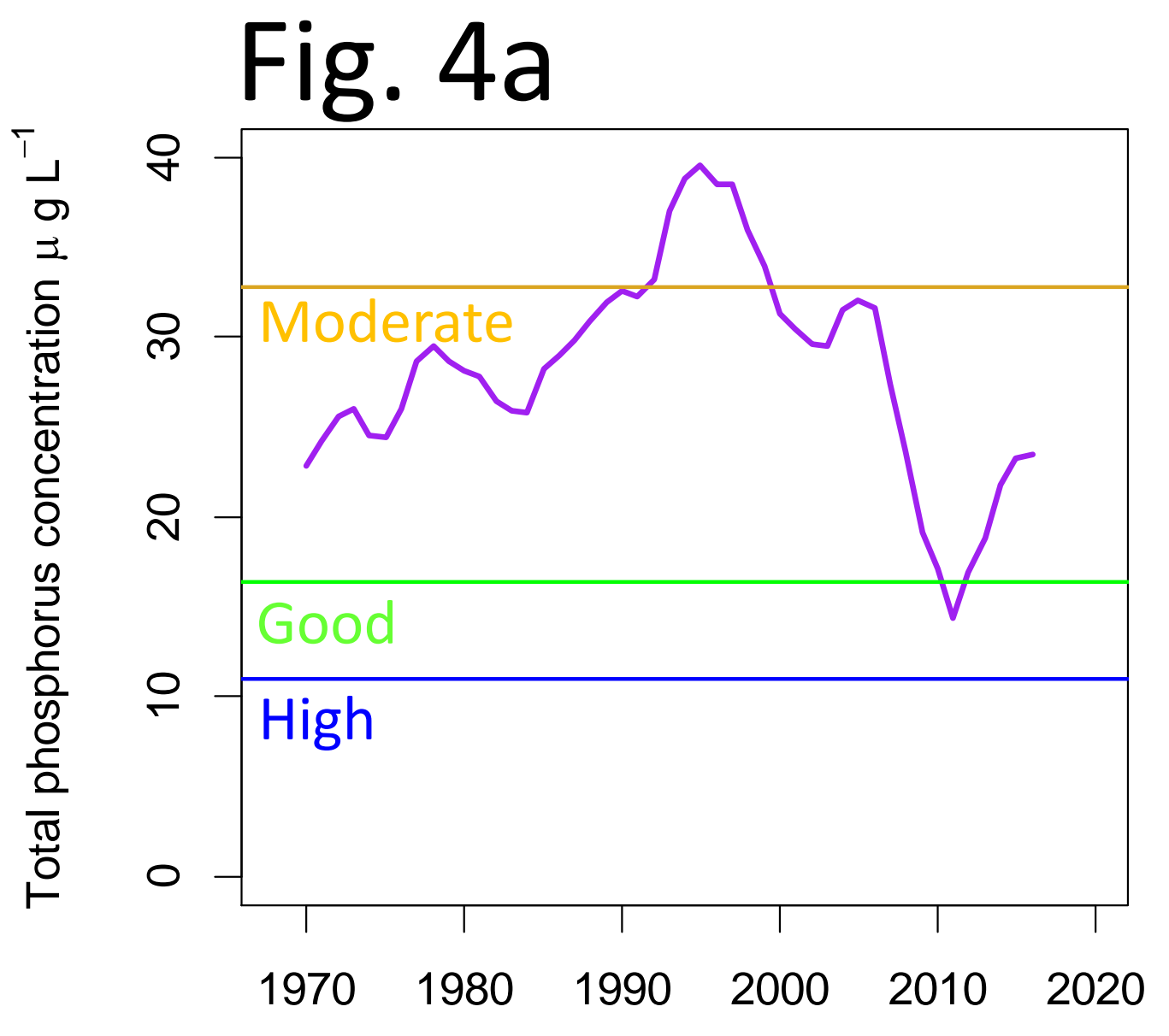


2. We can also detect long-term chemical and biological trends, such as an increase in the length of time that anoxia (oxygen depletion) persists in Esthwaite Water (Fig. 2).

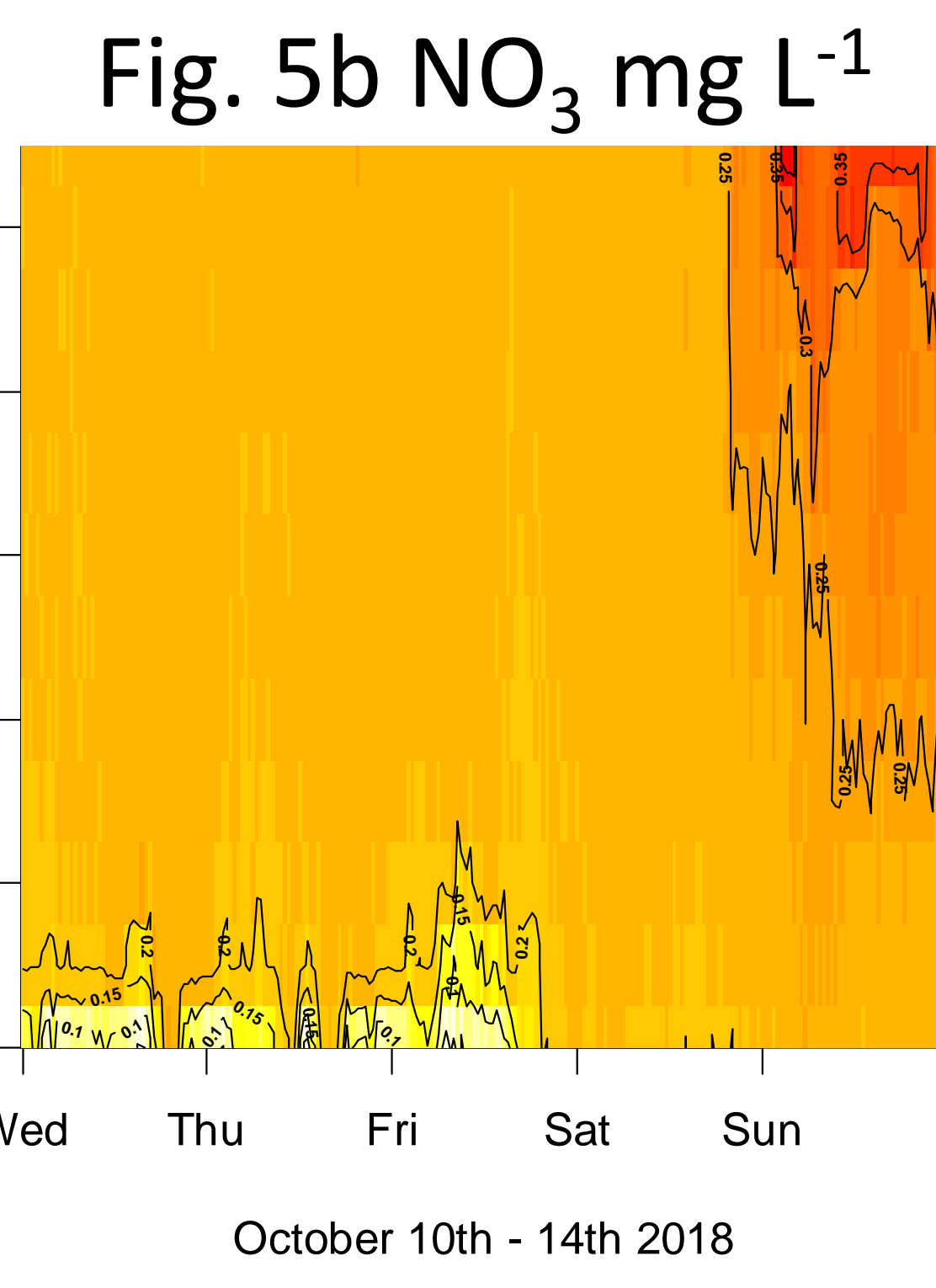
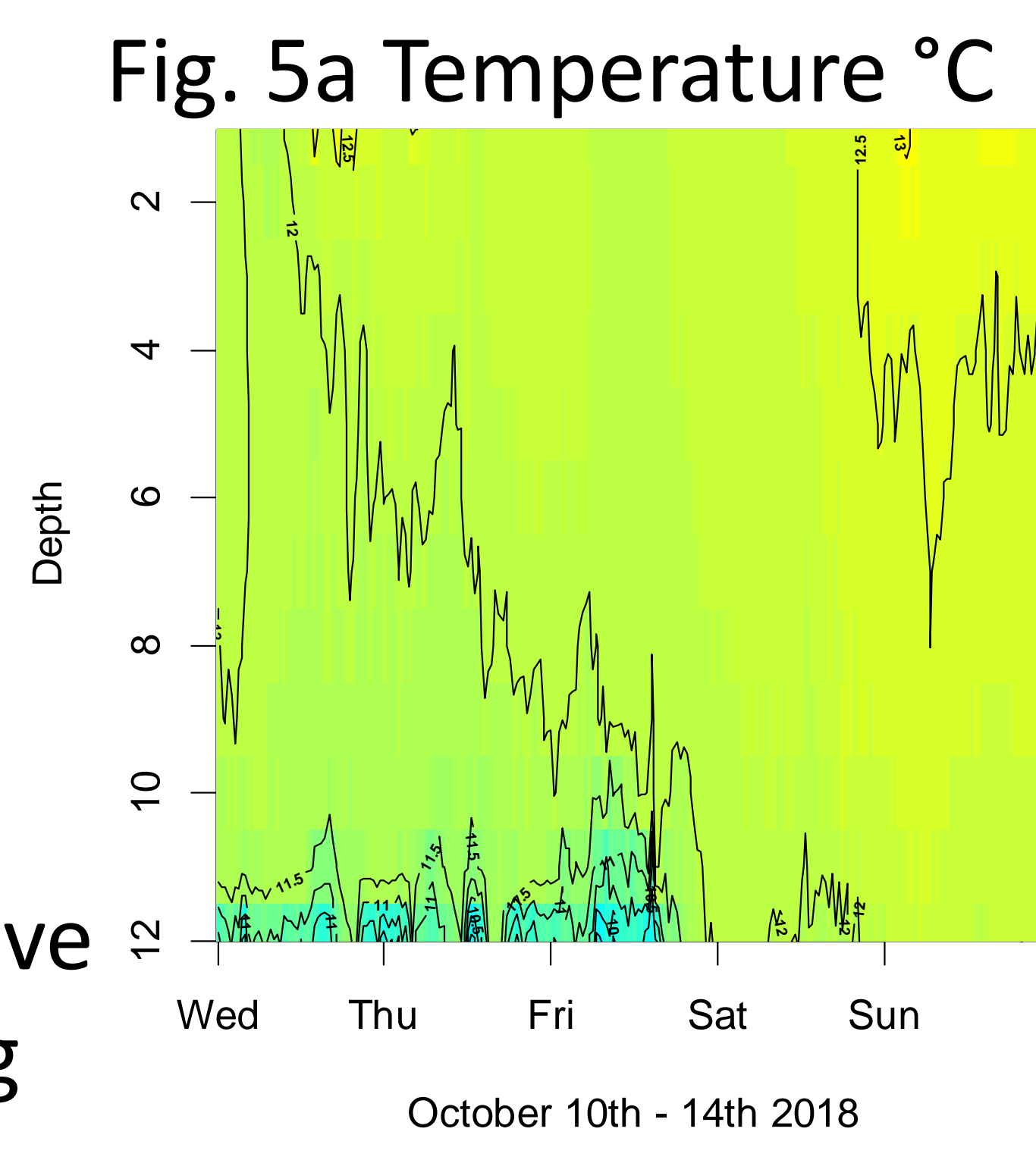


3. As a result of complex drivers, phytoplankton biomass in Esthwaite Water has varied greatly (Fig. 3a), with alterations to seasonal growth patterns (Fig. 3b and c).

Effects on ecosystem state and function



4. Combining our data with Water Framework Directive status boundaries provides an indicator of changing ecological state in Esthwaite Water (Fig. 4 a and b).



5. Using high-frequency data we can observe impacts on ecosystem processes e.g. lake overturn (Fig. 5a) on nutrient cycling (Fig. 5b).

1. Image by Pascvii on YouTube from Pixabay
2. Image from Shutterstock
3. Image by Gerd Altmann from Pixabay