Science Aims

There are eleven key biophysical science projects that the Lakes380 team aims to complete.

1.

Leaders: Marcus Vandergoes and Susie Wood

Lake selection was made with consideration to geographic spread, covering key gradients such as altitude, the presence of non-native species and catchment land cover. The team also consulted with regional councils, iwi, the Department of Conservation and the Ministry for the Environment to ensure culturally significant lakes, or those prioritised for restoration or protection were included.

1.

Leader: Marcus Vandergoes

This project involves ensuring that the team has robust and standardized methods for sampling water and sediment in all lakes. It also includes planning field trips, arranging logistics and making sure that all trips run smoothly.

3. Develop methods to assess lake health from surface sediments

Leader: Sean Waters (Cawthron)

Current methods of measuring lake health involved taking water samples regularly for multiple years. In this research project, we will develop new methods based on the nutrients, algae and bacteria in a surface sediment samples. We will develop these methods using a subset of lakes where lake health is well known.

4. Assess current lake health

Leader: Susie Wood (Cawthron)

The methods in research project 3 will be applied to surface sediment samples from other lakes to assess the current health of lakes across New Zealand.

PHOTO:

5. Developing DNA and high-resolution scanning methods

Leader: Xavier Pochon (Cawthron)

We will test whether the methods developed in research project 3 can be used on samples from sediment cores. This will allow us to assess changes in lake health over the last 1,000 years. We will develop DNA based methods to detect species identified by iwi/hapū partners as culturally significant e.g., tuna (eel). The methods will be used to track the past presence of these organisms in lakes.

6. Determining how lake health has changed at regional and national scales

Leader: Andrew Rees

Using the methods validated in research aim 3, we will establish how the health of our lakes has changed at a national scale. We will focus on identifying how lake health has changed from pre to post-human arrival in New Zealand.

PHOTOS:

7. Using sediment data to help develop models to predict future lake health

Leader: David Hamilton

This project will use the data from the sediment cores and climate models to estimate changes in lake health over the past 1,000 years. This will be used to validated models that estimate lake health. Once developed these models will be used to predict how lake health might change in the future.

8. Assessing how invasive species have impacted lake health

Leader: Dave Kelly (Cawthron)

Data from the sediment core samples will be used to assess how perch and trout have impacted the organisms that live in lakes and overall lake health. This project will focus on a subset of the lakes which are known to contain or be free of these fish.

Photos:

9. Measuring the impact of land use change on lake health

Critical step leader: Jamie Howarth

This project will focus on determining how lake health has changed with shifts in land use. It will investigate changes in land use from native forest to pine plantations or agricultural land use. The project will also investigate how lakes respond to natural disturbances including storms, volcanic eruptions, and earthquakes.

10. Measuring the impact of climate change on lakes

Critical step leader: Chris Moy (Otago University)

This project aims to examine how changes in climate over the last 1,000 years have impacted water quality and the organisms that live in lakes. The data will be used to help predict how lakes might respond to predicted climate change in the future.

11. Understanding what causes a lake to change from a healthy to unhealthy condition

Leader: Marc Schallenberg (Otago University)

Using a subset of the lakes the data from the sediment cores will be analysed to determine when and why lakes change from a healthy to unhealthy condition. These data will help identify lakes where protection or intervention might prevent lake health deteriorating.