

CNV Watershed Health

BACKGROUND

Healthy watersheds provide ecosystem services including water filtration, flood control and recreation. They additionally play an important cultural role for Indigenous and settler communities and support extensive biodiversity, including in the adjacent riparian terrestrial ecosystem. However, human impacts can decrease watershed health particularly through runoff of water across impermeable surfaces and the consequent introduction of solute contaminants (metals), and feces. Climate change impacts in the lower mainland may have further impacts by raising temperatures while decreasing water volume in summer leading to poor dissolved oxygen (DO) levels and pH for aquatic organisms. By contrast, the increasing intensity and volume of winter rainfall leads to sudden runoff and high levels of contaminant solvents.

QUESTION

To improve watershed health management in line with the CNV's Integrated Stormwater Management Plan (ISMP), we investigated:

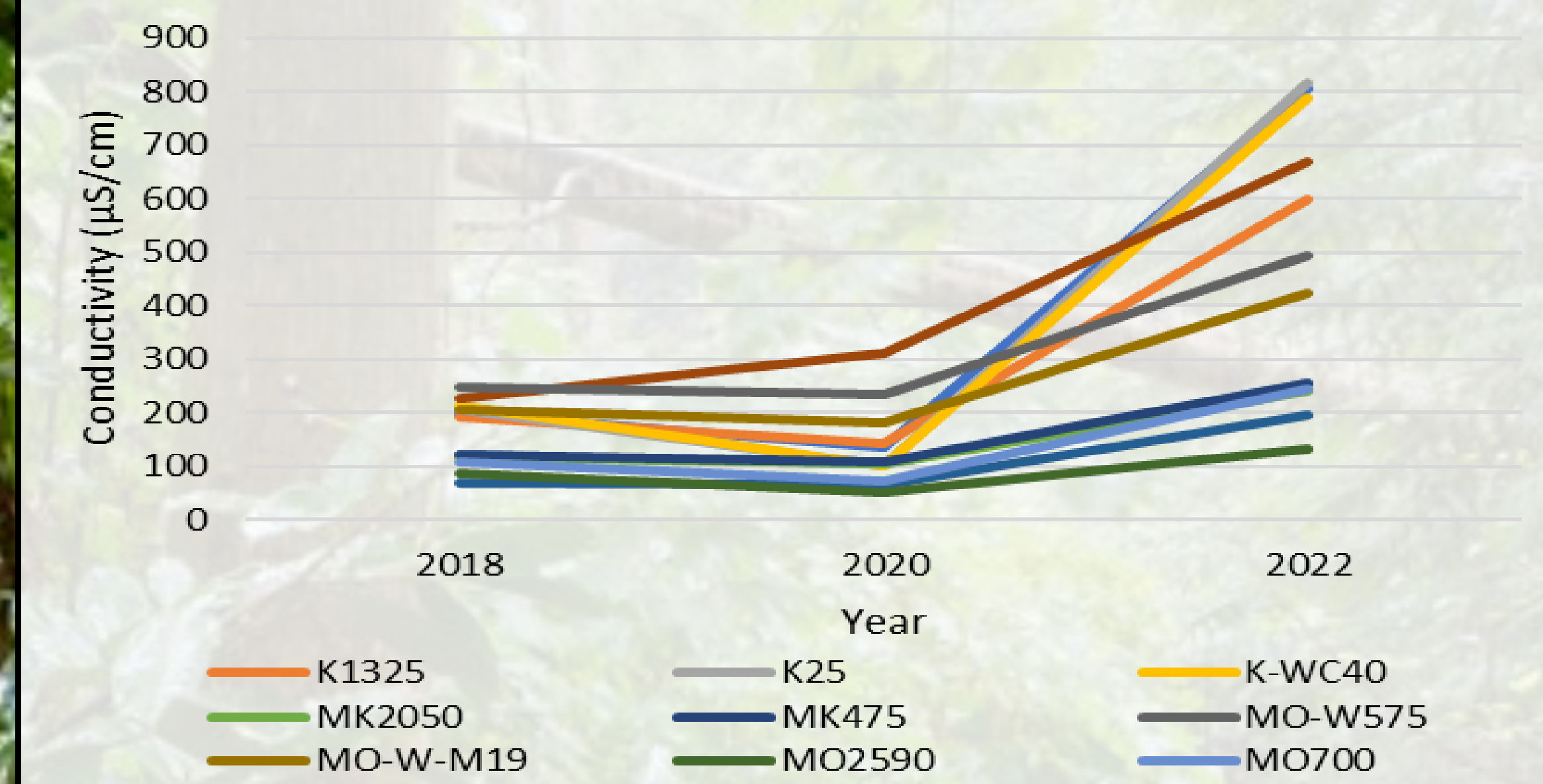
1. What are the trends in aquatic invertebrate diversity, abiotic factors (Temperature, DO, pH, Conductivity, Turbidity) and metals.
2. What impact does terrestrial vegetation have on aquatic invertebrates and water quality
3. What bat species occur in watersheds

DATA & METHODS

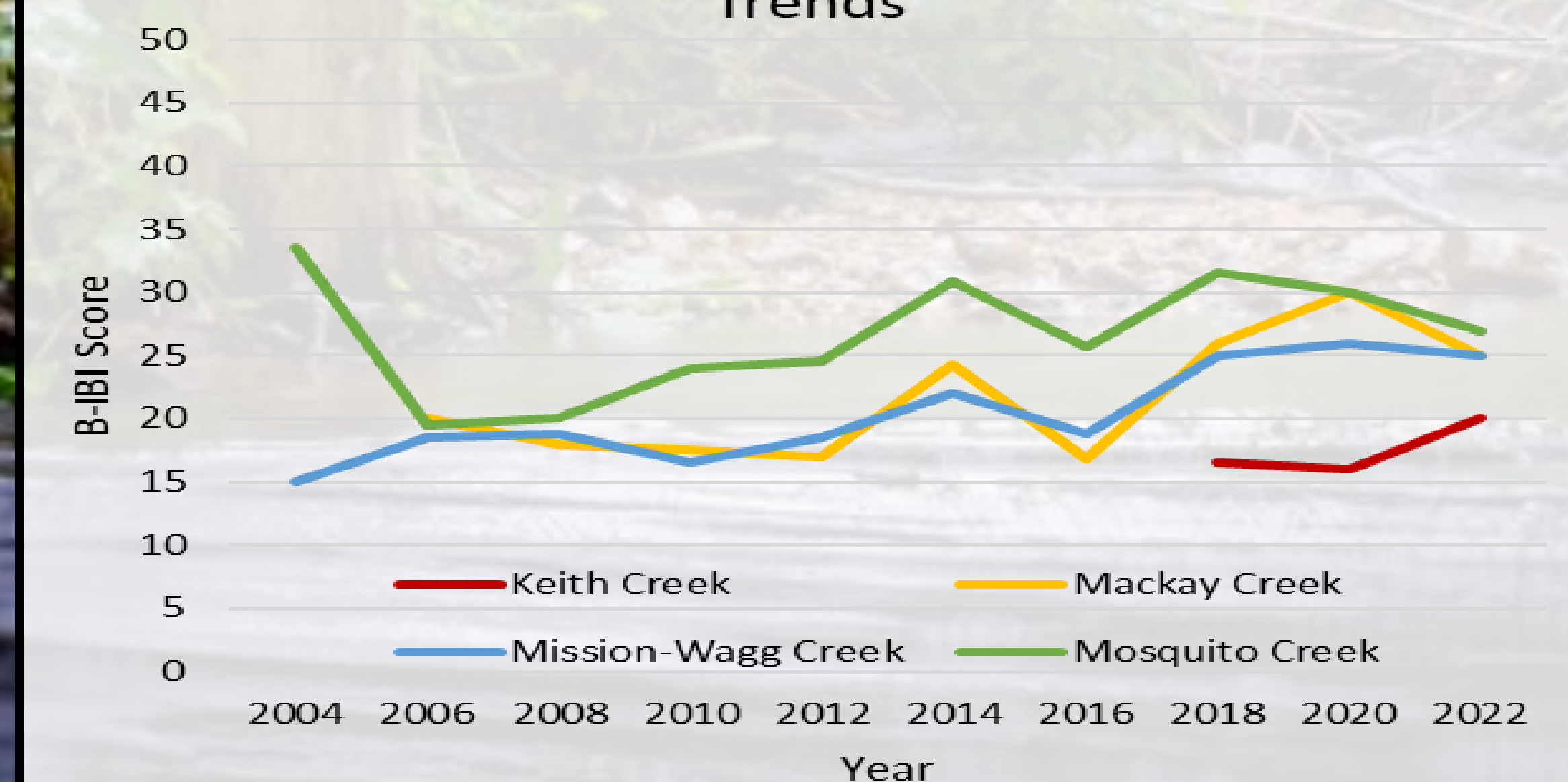
Data were available on water quality and invertebrate diversity from sites on the four main watersheds in the CNV, Mackay, Mosquito, Mission-Wagg and Keith creeks in both the wet and dry season (2003 – 2018 variable methods; 2018, 2020 and 2022 (consistent method, Bailey Environmental on behalf of the CNV).

We complemented these data with vegetation surveys at a subset of sites to characterize the terrestrial ecosystem, and bat surveys in Mackay, Mosquito, Mission-Wagg Creek

Average Conductivity During Wet Seasons



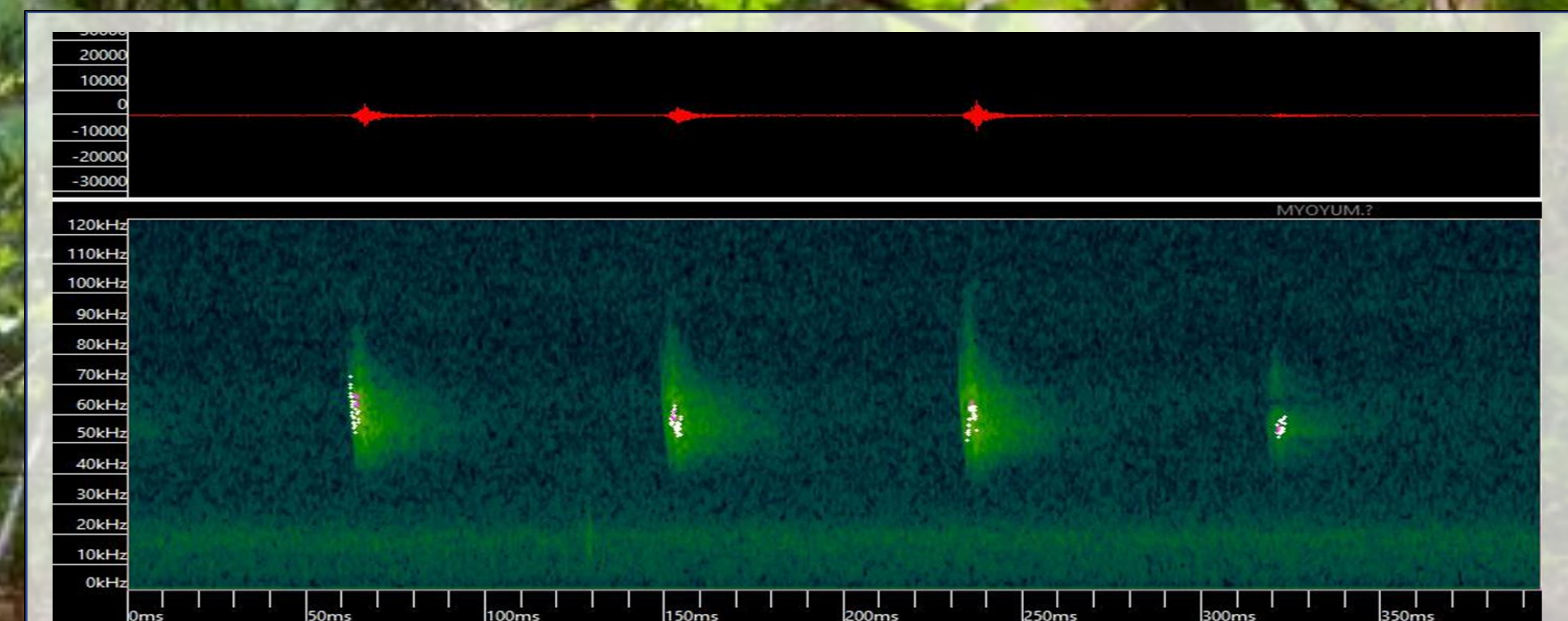
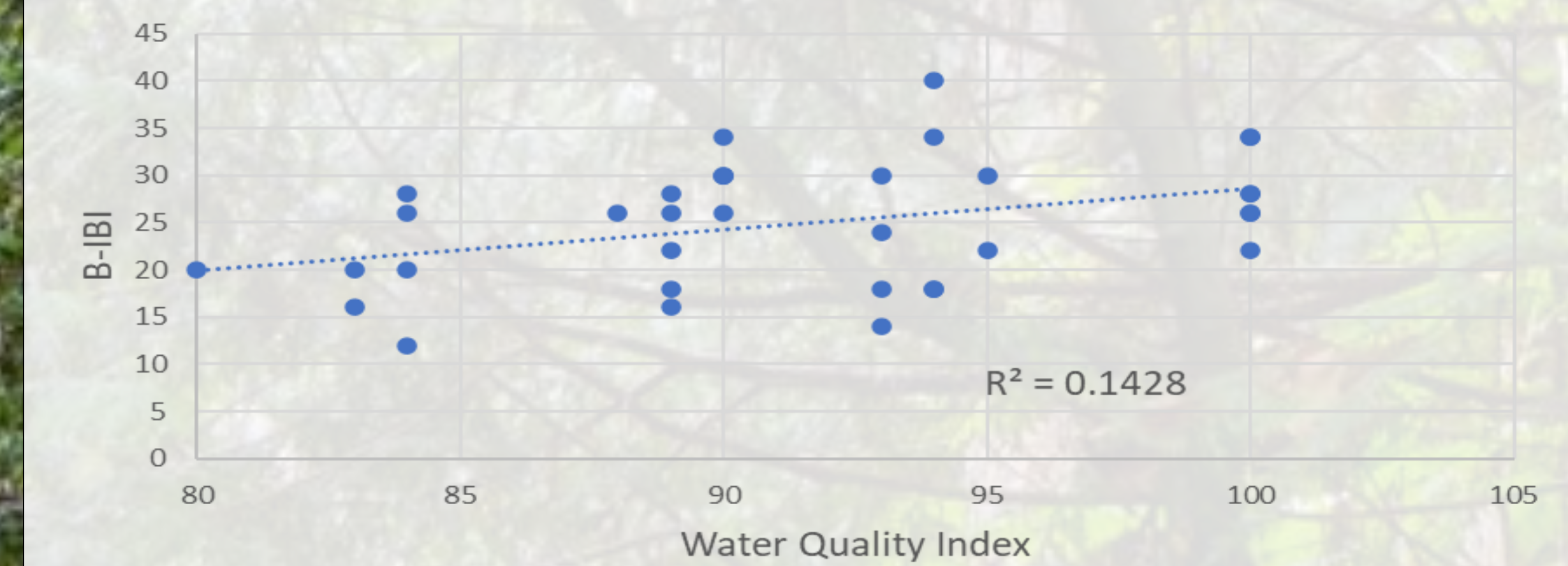
CNV Watersheds: Average B-IBI Score Trends



RESULTS

- Keith Creek in overall poorest condition, with sediments being notably poor
- B-IBI scores worse at downstream sites in all watersheds, overall poor quality, however there is an upward trend
- Water quality parameters that need the most attention:
 - Conductivity in both dry and wet seasons
 - Temperature and dissolved oxygen in the dry season
 - Fecal coliforms in both dry and wet seasons
 - Metals in the wet season

Aquatic invertebrate diversity index (B-IBI in relation to water quality index (WQI) across CNV watersheds (2018-2022)



Spectrogram of Little brown bat, Mosquito creek. Only one bat was recorded in this period due to poor weather and winter seasonality

CONCLUSIONS

- Watershed health remains largely poor, despite long-term improvements
- Increasing temperature and decreasing DO in summer, coupled to increasing, turbidity, conductivity, iron, and copper levels in winter indicate climate change is a concern
- Water quality and vegetation data not found to be correlated with aquatic health, despite well-documented relationships
- More data required to identify specific sources of contamination

MANAGEMENT GUIDELINES

- Management of metal concentrations to include identification and mitigation of primary sources of runoff
- Management of climate change variables to include mitigation of temperature with increased tree canopy area
- Quantification and expansion of source controls and repeat estimates of TIA and EIA
- Increase in number and frequency of site assessments to generate more reliable dataset